Middle East
HEALTH
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January-February 2015

Heart failure breakthrough

New combination drug set to become next gold standard

Changing perceptions

Viewing obesity as a disease state and the role of bariatric surgery

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An HIV epidemic is emerging among injecting drug users in the MENA region

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- Clinical study shows evidence of Near Death Experience
- Sanofi opens production facility in King Abdullah Economic City

Xtra large Product News section

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ARAB HEALTH

Prognosis

Drug Discovery

We have a big issue for you as we head into 2015, filled with many interesting news stories, research and product news. Perhaps most important is the release of very positive results from the PARADIGM-HF trial which tested a new heart failure combination drug. The co-lead author of the study, Milton Packer, MD, says the results "are extraordinarily powerful and compelling; they are destined to change the management of patients with chronic heart failure for years to come". Read more about this breakthrough for patients with heart failure on page 48.

In local news, the biannual Grand Hamdan awards for medicine and medical research were announced, with the main award going to Professor Magid Abou Gharbia, the Associate Dean for Research, Professor of Medicinal Chemistry and Director of the Moulder Center for Drug Discovery Research at the School of Pharmacy, Temple University, for his work with drug discovery. Find out about all the award winners and other regional news in the Middle East Monitor on page 10.

Of particular concern, largely because it is being ignored by most health authorities in the region, is the growing epidemic of HIV among people who inject drugs through the sharing of needles. This comes on the back of the escalating Afghan opium poppy production in recent years and the subsequent increased supply of heroin in the region. In a comprehensive report published in *PLoS Medicine* the researchers noted that concentrated HIV epidemics have emerged in Pakistan, Afghanistan, Egypt and Morocco. You can read more about this issue on page 32.

And on a more esoteric note, the results from a four-year international study looking objectively at the possibility of awareness during resuscitation has found evidence that some people who are clinically dead prior to being resuscitated have so-called near-death experiences and out-of-body experiences. You can read more about this fascinating study on page 46.

This is just a taste of what we have in store for you in this issue. Read on and be informed.

We thank the great support of our advertisers without whom we would not be able to produce this magazine. And we wish you all a happy, prosperous and healthy new year.

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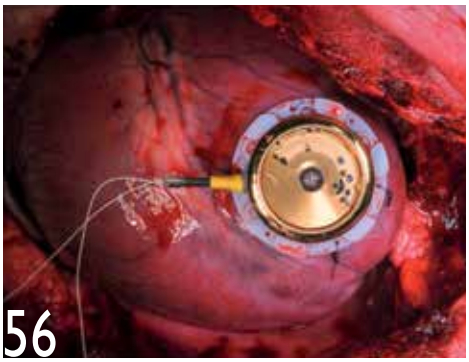

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middle east monitor

Update from around the region

Grand Hamdan Award goes to Prof Magid Abou Gharbia for his pioneering work with drug discovery

The winners of the 8th Hamdan Awards with a total value of AED2.8 million (US$760,000) were announced to the press in November in Dubai by Dr Ali Rashid Al Nuaimi, the Director of the UAE University and a member of the Board of Trustees of Sheikh Hamdan Bin Rashid Al Maktoum Award for Medical Sciences, and Professor Najib Al Khaja, the Secretary General of the award.

Speaking at the announcement to the media, Dr Ali Rashid Al Nuaimi said: "Along with the Award's efforts to support the advancement of the health sector through its Centre for Arab Genomic Studies, Research Support and Community Service Center, Publishing Center and Continuing Medical Education Center, honouring the excellent individuals and institutions remains at the top of the Award's achievements in which we, the citizens of the United Arab Emirates, all take pride and cherish."

He noted that the Award, in its current term – 2013-2014 – selected 'drug discovery' as the topic of the Grand Hamdan International Award, and targeted therapy, cell therapy and vaccines as the topics of the Hamdan Award for Medical Research Excellence.

"Heightened global interest in these topics is clear evidence that our scientific committee had the foresight to select such topics for this award two years ago in December 2012, but of course it is not just a fortuitous choice, it was rather based on a systematic analysis of data from the healthcare sector worldwide," he explained.

The Grand Hamdan Award went to Professor Magid Abou Gharbia, the Associate Dean for Research, Professor of Medicinal Chemistry and Director of the Moulder Center for Drug Discovery Research (MCDDR) at the School of Pharmacy, Temple University, Philadelphia, Pennsylvania, US, for his work with drug discovery.

The awards for Medical Research Excellence were given to: Professor Stanley A. Plotkin, Emeritus Professor of the University of Pennsylvania and Executive Advisor to Sanofi Pasteur, for his work with vaccines; Professor Carl June, the Program Director of Translational Research, Abramson Family Cancer Research Institute, Professor, Department of Pathology and Laboratory Medicine, University of Pennsylvania, for his research on cell therapy; Professor Olle Ringden, distinguished professor at the Karolinska Institutet in Sweden. For over a decade, he worked as the director and medical director at the Center for Allogeneic Stem Cell Transplantation at the Huddinge University Hospital in Stockholm, Sweden – for his work with cell therapy; and Professor Brian J Druker, a physician-scientist at the Oregon Health & Science University, director of OHSU Knight Cancer Institute, JELD-WEN Chair of Leukemia Research, and professor of medicine – for his research on targeted therapy.

The Hamdan Award for Volunteers in Humanitarian Medical Services went to the Carter Center, United States; Noor Dubai Foundation, UAE; Dr Mads Fredrik Gilbert, a Norwegian doctor, activist and politician from the far left revolutionary socialist party Red - Norway; and Dr Melvin Korkor, an Ebola survivor and now carer in Liberia.

The Hamdan Award for Medical College/Institute or Centre in the Arab World was awarded to: College of Medicine & Health Sciences, Sultan Qaboos University, Sultanate of Oman; and Mongi Ben Hamida National Institute of Neurology, Tunisia.

The Hamdan Award for Distinguished Personalities in the Arab World was given to: Professor Mohamed Ghoneim, one of the founders of the Ghoneim Urology and Nephrology Center (a WHO Collaborating Centre for Management of Renal and Urological Disorders), Mansoura, Egypt; and Dr Zohair Yousef Al Halees, a paediatric heart surgeon working in the Heart Centre at King Faisal Specialist & Research Centre in Riyadh, Kingdom of Saudi Arabia.

The Hamdan Award for Outstanding Clinical Department in the Public Sector in the UAE was awarded to: the Department of Pediatrics, Tawam Hospital, Al Ain; and the Cardiology and Cardiothoracic Surgery Centre, Dubai Hospital.

The Hamdan Award for Original Research Paper Published in the *Hamdan Medical Journal* went to: Dr Sirag Bennaser, a Libyan physician and medical researcher, for his research paper entitled: "In vitro interactions between rodent hepatic stellate cells and metastatic and non-metastatic human colorectal cancer cell lines."

DHA announces plans to regulate healthcare pricing

The who's who of the healthcare world gathered in Dubai on 3 November to debate the changing face of healthcare at the 2nd Annual Healthcare Investment MENA, as part of the AccuMed Connect panel discussion.

Key individuals governing the health authority across the UAE came together with healthcare providers and healthcare insurers to address the issues related to pricing in the healthcare industry and how this is affecting the sector as a whole and more importantly, the service that consumers are receiving.

The panel was made up of: Dr. Haidar Al Yousuf, CEO Health Funding, Dubai Health Authority, UAE; Marwan Nabulsi, Director, Health System Finances, Health Authority Abu Dhabi, UAE; Eng. Sobhi Batterjee, Founder President & CEO, Saudi German Hospitals Group, KSA; Dr. Sami Alom, Chief Strategy Officer, Al Noor Hospital Group, UAE; André Daoud, Chief Business Officer, NEXtCARE, UAE; Dr. Sherif A. Mahmoud, Regional Head, Medical Operations, AXA Gulf, KSA.

Dr Haidar Al Yousuf, CEO of Funding, DHA, said that the emirate's healthcare industry was in a "state of transition" when he addressed the opening day of conference at The Address Hotel, Dubai

(l-r) AccuMed's founder and managing director Dr Ayham Refaat; André Daoud, Chief Business Officer, NEXtCARE; Dr. Haidar Al Yousuf, CEO Health Funding, Dubai Health Authority, UAE; Eng. Sobhi Batterjee, Founder President & CEO, Saudi German Hospitals Group, KSA; Dr. Sami Alom, Chief Strategy Officer, Al Noor Hospital Group, UAE; Dr. Sherif A. Mahmoud, Regional Head, Medical Operations, AXA Gulf, KSA; Marwan Nabulsi, Director, Health System Finances, Health Authority Abu Dhabi, UAE.

Mall, Dubai, UAE. He announced that as of next year, the DHA will implement a regulation to control the price increases by healthcare providers. He clarified that the new regulation will address price increases only, but the Dubai Health Authority will not be responsible for setting minimum and maximum prices.

Dr Haidar added: "This is a healthcare system in a state of transition. It is a new process for the region, aimed at moving the market away from the fee for service model, focusing on pay for quality. These are definitely changing times and all the stakeholders in the system need to change the way they do business. The DHA is obviously trying to strike a balance between regulating processes, but at the same time, keeping the free market spirit of Dubai."

Delegates also had the chance to hear about how the healthcare pricing system works in other Emirates in the UAE. Abu Dhabi was the first Emirate to introduce a basic price list and to cap the multiplier for the reimbursement rate of services.

Looking at Abu Dhabi experience in this area, Nabulsi, from the Health Authority of Abu Dhabi, said: "In Abu Dhabi, 60 to 70% of AUH claims are paid for by the government. With this in mind, the ceiling is a necessity."

American Heart Association opens office at Dubai Healthcare City

Dubai Healthcare City announced in December the opening of the Middle East and North Africa office of the American Heart Association.

The American Heart Association, a nonprofit based in the United States and the world's largest volunteer organization dedicated to cardiovascular health, trains more than 16 million people a year globally in lifesaving first aid, CPR and advanced cardiovascular care.

The American Heart Association's courses are designed to reduce disability and deaths caused by cardiovascular disease and stroke – leading causes of death in the United Arab Emirates, the Middle East and North Africa. The organization has been serving the area and operating in the UAE for six years.

The office, located at the Mohammed Bin Rashid Academic Medical Center, Dubai Healthcare City's dedicated academic complex, works with 212 American Heart Association-affiliated training centers and sites that provide lifesaving training courses in the region. The new office will facilitate American Heart Association program development in the region designed to help more people live healthier, longer lives.

"Cardiovascular disease is one of the leading causes of death in the UAE and the region," said Marwan Abedin, Chief Executive Officer of Dubai Healthcare City. "It is essential that more health professionals are equipped with the necessary training to help increase survival from heart disease and stroke. The American Heart Association is an important partner for us as we look for avenues to improve medical education for healthcare professionals and medical students among others."

Nancy Brown, Chief Executive Officer of the American Heart Association, praised the development. "The mission of the American Heart Association is to build healthier lives, free of cardiovascular diseases and stroke, and we are committed to the expansion of science-based lifesaving training solutions in the UAE. It's very exciting that through collaboration with our colleagues in the UAE we are together bringing more lifesaving skills to the region."

Emirates Islamic sets up philanthropic initiative for DHA

Emirates Islamic, one of the leading Islamic financial institutions in the UAE, has announced a philanthropic community initiative to collect donations on behalf of Dubai Health Authority (DHA) for their MOSA'ADAH charity programme.

MOSA'ADAH, a charity program created by DHA, aims to help patients and families who cannot afford medical treatment, as well as contribute to projects in support of hospital equipment and medical facilities.

As part of this initiative, Emirates Islamic customers can donate funds to MOSA'ADAH under a specially created charity account: Emirates Islamic 0384 540010 001 under 'MOSA'ADAH'. Dona-

tions can be made through any Emirates Islamic branch, ATM or CDM across the UAE or via online banking and by SMS.

Jamal Bin Ghalaita, Chief Executive Officer of Emirates Islamic said: "The UAE is home to people across different nationalities and income groups. As a home-grown brand with a deep commitment to the values and ethics of Shari'a, Emirates Islamic is keen to offer fellow citizens a safe and reliable way to connect to others in need. Our decision to partner with MOSA'ADAH complements the bank's efforts to promote community related participation."

"We invite our customers to contribute to the MOSA'ADAH charity programme using one of our secure, direct and easy donation channels," added Bin Ghalaita.

His Excellency Engineer Essa Al Haj Al Maidoor, Director-General of the DHA, emphasised the importance of this announcement, which reflects a real partnership model between the public and private sector as they move towards supporting charity initiatives and assisting patients in need. He also highlighted DHA's commitment towards ensuring that all members of the community have access to adequate healthcare services, in addition to improving the health status of the population through DHA's hospitals and health centres.

Sidra applies for first-ever patent covering use of MRI techniques to monitor cancer cells

Doha-based Sidra Medical and Research Center (Sidra) in November announced its first patent application to the United States Patent and Trademark Office. The application is for the first non-invasive technique for monitoring cancer progression, a procedure which could positively impact treatment methodologies for patients.

The technique, invented by Sidra researchers Dr Francesco Marincola and Dr Mohamed Haris, is for the use of non-invasive Magnetic Resonance Imaging (MRI) to detect levels of the Creatine Kinase (CK) enzyme inside a patient's cancerous tissue. CK is an enzyme found in the heart, brain, skeletal muscle and other tissues. Patients suffering from cancer tend to have higher levels of CK; measuring the presence of which helps determine existence or progression of cancer.

Dr Francesco Marincola and Dr Mohamed Haris

Sidra's new procedure has both diagnostic and patient management implications. The MRI-based technique requires patients to receive an injection of phosphocreatine solution, which is visualized by an MRI, helping doctors get a clear image of what is happening inside. It will help assess whether a tumour is benign or aggressive without the need for a biopsy. This will have a significant impact on the treatment and recovery times of patients as it has the potential to help them embark on required treatment programs faster - particularly if CK expressions determine tumour malignancy. Using diagnostic markers determined through this technique will also help in drug design; enabling clinicians to see which drug combinations are most effective, as well as in monitoring patients' medication intake.

"While there are other techniques being used to monitor CK activity, there is no current method which can provide high-resolution imaging of CK expression in a patient's cancerous tissue. Detection of CK expression in *vivo*, meaning inside the patient's tissue without the need for sample removal, provides a definite diagnostic marker for tumour malignancy, as well as response to treatment. Our invention will allow for routine examinations of cancer patients and improve the ability to track cancer progression by increasing detection sensitivity and delivering a high-resolution image of what's happening inside," said Dr Haris, Principal Investigator, Sidra Medical and Research Center.

"We're looking forward to embarking on the next phase – clinical trials – so that all the measures and protocols are in place before this new technique is ready for launch. While there is a possibility that further trials and research can take time, we are excited to showcase that Sidra is a serious contender in the research genre. This patent is testament to the commitment and dedication of the Sidra research team and our efforts to bring pioneering research capabilities to Qatar," said Dr Marincola, Chief Research Officer, Sidra Medical and Research Center.

Sidra's first patent comes as the state-of-the-art women's and children's facility moves ahead with its research focus around prioritizing translational research programs and supporting clinicians in the practice of personalized medicine. Sidra's mission is to conduct innovative research relevant to women's and children's health that addresses Qatar's national priorities by enhancing the quality of life for its citizens. As such, most of the programs undertaken by the Research Branch will support the concept of personalized medicine and revolutionize the approach to patient care. Other world-class research programs that are underway include a study to determine contributing factors to developing gestational diabetes and Sidra's participation in the Qatar Genome Project.

Iraq joins USP Global Program to assist with medicine quality testing

The National Center for Drug Control and Research (NCDCR) of Iraq is the newest participant in a U.S. Pharmacopeial Convention (USP) program designed to assist developing countries improve medicine quality.

"Joining USP's Technical Assistance Program is an important step for increasing Iraq's capacity to ensure the safety and efficacy of medicines for its people," said Ahmed Al-shather, Ph.D., director of NCDCR. "A large part of protecting the

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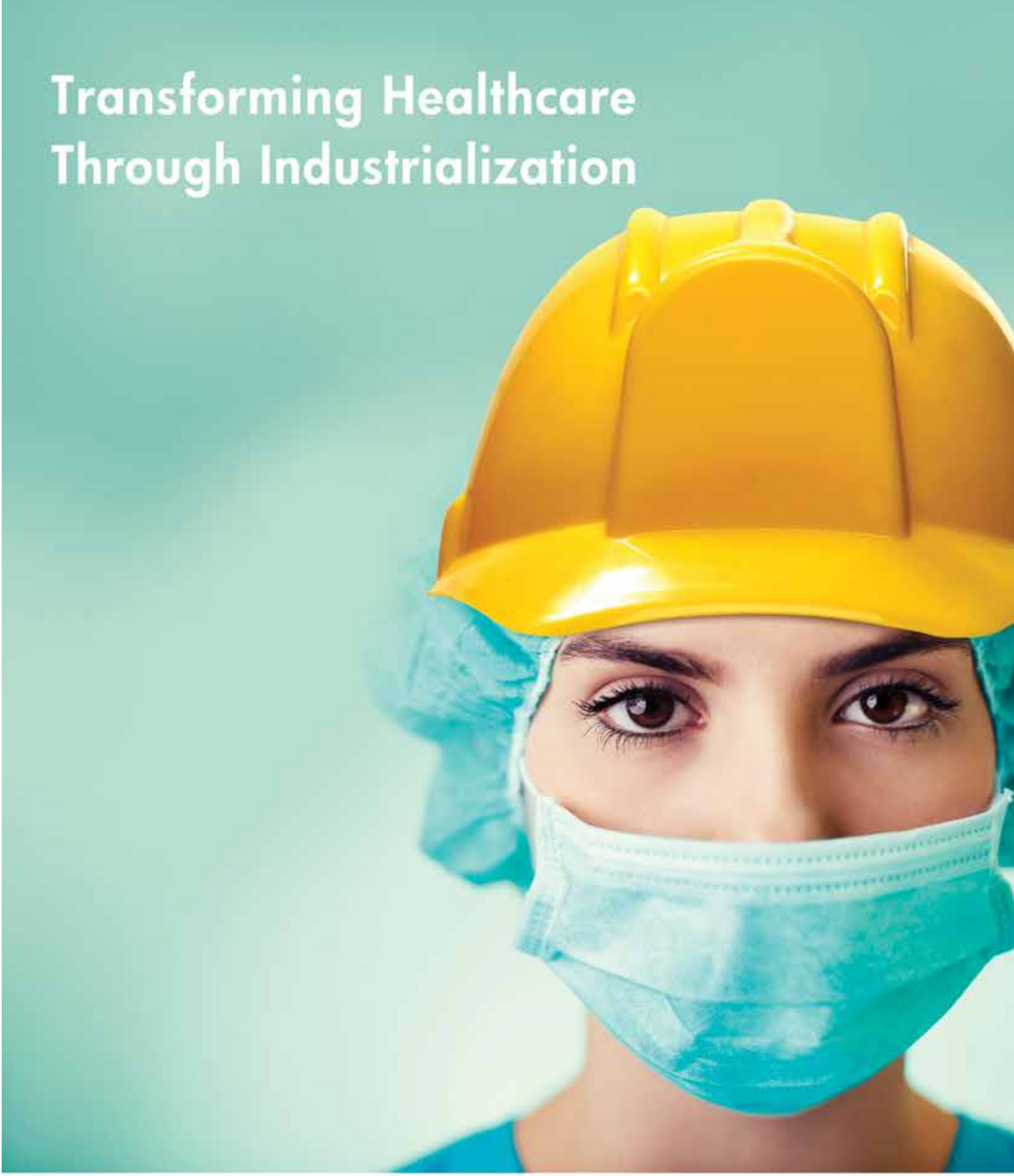

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health of Iraq's citizens is making sure that good quality medicines are accessible."

USP's Technical Assistance Program (TAP) provides participating nations with public written standards, associated reference standards (very pure physical samples used as reference chemicals) and the technical training needed to test the quality of pharmaceutical products. TAP also provides training on screening for counterfeit and substandard medicines in the market.

According to Patrick Lukulay, Ph.D., vice president of USP's global health impact programs: "TAP was developed by USP to provide tools for quality testing that would help increase the capacity of developing countries with limited resources. By strengthening its own internal capacity for monitoring medicine quality, each nation participating in TAP can improve access to good quality medicine, reduce the burden of disease and, ultimately, promote public health."

With only 10% of its medicine supply manufactured locally, Iraq is heavily reliant on imported medicines. As the national quality control laboratory of Iraq, NCDCR is responsible for conducting physical, chemical and biological tests on drugs to ensure their quality, regardless of whether these products come from domestic or international sources.

USP and other pharmacopeias typically sell reference and written quality standards for use by pharmaceutical manufacturers and quality control laboratories. National quality control laboratories with limited resources may not have access to up-to-date documented standards and associated materials needed for effective quality testing. The USP Technical Assistance Program is intended to address this.

TAP began in 2011 with just five countries in Africa – Ethiopia, Ghana, Kenya, Senegal, and Sierra Leone – and since then has expanded to include more than 35 countries in Africa, Asia, and Latin America and the Caribbean.

World Innovation Summit for Health supports Universal Health Coverage Day

The World Innovation Summit for Health (WISH), a global initiative of Qatar Foundation for Education, Science and Community Development (QF), lent its support to the first ever Universal Health Coverage Day which took place on 12 December.

Professor the Lord Darzi of Denham

In a statement, WISH said they were proud to stand alongside more than 500 partner organizations from over 100 countries, including World Health Organization, Oxfam and Save the Children in calling for fair healthcare for all.

Universal Health Coverage (UHC) is the basic concept that every person, everywhere, should have access to healthcare without suffering financial hardship. This essential human right is a cornerstone of sustainable development and global security. Recognised as a subject of such importance, the World Bank Group has identified UHC as a top priority for sustainable development.

Recent research looking into the health of 2035 showed that for every US$1 invested in health today, we could reap US$20 increase in income over the next 20 years. To date more than 80 countries have asked the World Health Organization (WHO) for help in moving toward UHC, including the emerging economies of Brazil, Russia, India, China and South Africa.

Commenting on the significance of universal healthcare coverage, Professor The Lord Darzi of Denham, Executive Chair of WISH and Director of the Institute of Global Health Innovation at Imperial College of London, said: "This essential human right of healthcare is a cornerstone of thriving communities, sustainable development and global security – that today, one billion people still live without access to good healthcare is shocking. The policy report that we will publish on UHC in February 2015 will provide recommendations for policymakers to implement much needed change in how healthcare is financed and delivered."

Qatar Biobank receives two ISO certifications

Qatar Biobank has recently been certified with two International Organization for Standardization (ISO) certifications by the British Standards Institute Group Middle East (BSI).

As a member of Qatar Foundation for Education, Science and Community Development (QF), Qatar Biobank supports QF's mission to ensure that Qatar addresses national health priorities, by enabling research on the causes of diseases that prevail in Qatar.

Qatar Biobank is one of the first Qatar Foundation centres to receive the two qualifications - ISO 9001 and ISO 27001, addressing Quality Management Systems and Information Security Management respectively.

Working with the Supreme Council of Health, Hamad Medical Corporation and supported by scientists from Imperial College London, Qatar Biobank will enable medical research on health issues that prevail in Qatar.

Omar Rashid, General Manager of BSI, issued the two ISO certifications to Qatar Biobank at the Certification Ceremony held at the Qatar Foundation Student Center in Education City. The ceremony was attended by Qatar Biobank staff members, Members of the Board, key stakeholders and partners.

Protecting the privacy and confidentiality of contributors to Qatar Biobank, who volunteer health information and biological samples is integral. Qatar Biobank has put rigorous confidentiality processes in place and the ISO certification helps ensure that the samples collected are fit for purpose and provide important assurances to participants.

With Qatar Biobank set for the wide-scale public launch next year, having collected health information and biological samples from more than 1,700 members of the local community, the ISO certification represents a significant milestone, equipping the organisation to welcome more participants.

"As part of our ramp-up phase, the increase in participants will be significant. Achieving this international certification is integral in paving the way for Qatar Biobank to develop innovative scientific outputs that can be applied globally in accordance with industry best practice," said Dr Hadi Abderrahim, Managing Director of Qatar Biobank.

Tamer El Nashar, Information Technology Project Manager at Qatar Biobank, said: "The ISO certification equips us to be ready to collect the depth and breadth of quality samples and information, which will allow researchers across research centres in Qatar to advance the understanding of human health and disease."

Sanofi opens production facility in King Abdullah Economic City

Two years after the laying of the first stone, Sanofi announced 10 December 2014 the opening of its production facility in King Abdullah Economic City (KAEC) industrial valley, making it one of the first multinational pharmaceutical groups to produce locally in the Kingdom of Saudi Arabia.

Sanofi has had a strong presence in Saudi Arabia for half a century with offices in Jeddah, Riyadh and Dammam. Over the five past years, the company has increased its investments and contributions in the Kingdom through numerous partnerships designed to improve the health of Saudi patients, particularly in the field of chronic diseases. The opening of a manufacturing facility was therefore a natural next step and KAEC was chosen as the location due to the pro-business and competitive environment of the region. The new factory is creating jobs for Saudi citizens and transfers Sanofi technology for the benefit of the Kingdom and the Gulf Cooperation Council.

Commenting on the opening of the plant, Philippe Luscan, Sanofi Executive Vice President Global Industrial Affairs, said: "We are delighted to open this facility, together with King Abdullah Economic City and the Saudi Arabia General Investment Authority as our strategic partners. As a pioneer, we built a plant designed to produce up to 20 million packs of locally-made high quality medical treatments which will benefit the needs of the regional community, through an adapted life cycle management. We are proud to share Sanofi's technology knowledge and industrial culture of quality, customer service, respect for environment and safety with the Kingdom of Saudi Arabia.

"Producing locally is the best way to fulfil patient local needs, hiring and training local technicians and managers," he added.

Speaking about Sanofi's decision to invest in Saudi Arabia, Mohanud Helal, Secretary General of the Economic Cities Authority, stated: "This inauguration also positions KAEC as a hub for pharmaceuticals and life sciences industries in the region. The Economic Cites, with its unique regulatory regime and streamlined government services, is rightfully positioned to offer an attractive investment environment in the region." MEH

worldwide monitor

Update from around the globe

Universal Health Coverage Day launched to accelerate equitable access to healthcare

A new global coalition of more than 500 leading health and development organizations worldwide is urging governments to accelerate reforms that ensure everyone, everywhere, can access quality health services without being forced into poverty. The coalition was launched 12 December, on the first-ever Universal Health Coverage Day, to stress the importance of universal access to health services for saving lives, ending extreme poverty, building resilience against the health effects of climate change and ending deadly epidemics such as Ebola.

Universal Health Coverage Day marks the two-year anniversary of a United Nations resolution, unanimously passed on 12 December 2012, which endorsed universal health coverage as a pillar of sustainable development and global security. Despite progress in combatting global killers such as HIV/AIDS and vaccine-preventable diseases such as measles, tetanus and diphtheria, the global gap between those who can access needed health services without fear of financial hardship and those who cannot is widening. Each year, 100 million people fall into poverty because they or a family member becomes seriously ill and they have to pay for care out of their own pockets. Around one billion people worldwide can't even access the health care they need, paving the way for disease outbreaks to become catastrophic epidemics.

"The need for equitable access to quality health care has never been greater, and there is unprecedented demand for universal health coverage around the world," said Michael Myers, Managing Director of The Rockefeller Foundation, which is spearheading Universal Health Coverage Day. "Universal health coverage is an idea whose time has come – because health for all saves lives, strengthens nations and is achievable and affordable for every country."

For much of the 20th century, universal health coverage was limited to a few high-income countries, but in the past two decades, a number of lower- and middle-income countries have successfully embraced reforms to make quality health care universally available. Countries as diverse as Brazil, Ghana, Mexico, Rwanda, Turkey and Thailand have made tremendous progress toward universal health coverage in recent years. Today, the two most populous countries, India and China, are pursuing universal health coverage, and more than 80 countries have asked the World Health Organization for implementation assistance.

"Putting people's health needs ahead of their ability to pay stems poverty and stimulates growth," said Dr Tim Evans, Senior Director for the Health, Nutrition and Population Global Practice at the World Bank Group. "Universal health coverage is an essential ingredient to end extreme poverty and boost shared prosperity within a generation."

The 500+ organizations participating in the first-ever Universal Health Coverage Day coalition represent a diverse cross-section of global health and development issues, including infectious diseases, maternal and child health, non-communicable diseases and palliative care. Across these issues, knowledge and technologies exist to save and improve lives in significant numbers, but the impact of these tools is severely hampered by lack of equitable access to quality health services.

on the WEB Universal Health Coverage Day
http://universalhealthcoverageday.org

Broad Institute, Harvard, MIT license CRISPR-Cas9 gene-editing technology to Editas Medicine for therapeutic applications

The Broad Institute, Harvard University, the Massachusetts Institute of Technology and Editas Medicine have entered into a worldwide license agreement to grant Editas access to intellectual property related to genome editing technology that has wide-ranging therapeutic potential and could lay the groundwork for treating diseases where a gene's expression needs to be altered.

The agreement relates to technology that engineers the CRISPR-Cas9 system – a naturally-occurring part of the bacterial immune system. Researchers at Harvard Medical School, the Wyss Institute for Biologically Inspired Engineering at Harvard University, Broad Institute, MIT, the McGovern Institute for Brain Research at MIT, and Harvard University Faculty of Arts and Sciences (FAS), have optimized the CRISPR-Cas9 system to allow for insertion, replacement, and regulation of targeted genes in higher organisms, with the potential to one day be used in humans.

CRISPRs (clustered regularly interspaced short palindromic repeats) are DNA loci containing short repetitions of base sequences. Each repetition is followed by short segments of "spacer DNA" from previous exposures to a virus.

By altering gene expression with this gene-editing technology the human therapeutic applications are vast and could include turning down CCR5 gene to prevent in HIV entering its target cells, for example, or repairing gene mutations such as in sickle cell diseases or haemophilia.

In addition to their therapeutic implications, CRISPR–Cas9 systems enable scientists to modify genes and better understand the biology of living cells and organisms.

"The CRISPR-Cas9 technology represents yet another great example of how new insights into nature's design principles can be rapidly leveraged to develop new engineering innovations, in this case genome reengineering methods that can be used to create an entirely new class of targeted therapeutics," said Wyss Institute Founding Director Donald Ingber, M.D., Ph.D. "This breakthrough also demonstrates our collective commitment to accelerate the transition from fundamental discovery to clinical application."

Eric Lander, president and director of the Broad Institute, said: "The Broad, MIT, and Harvard share the goal of developing innovative technologies such as CRISPR–Cas9 and promoting their translation to benefit patients. We're committed to making these technologies broadly available for research and also ensuring that therapeutic development – bringing this technology to the clinic – has the best chance of success."

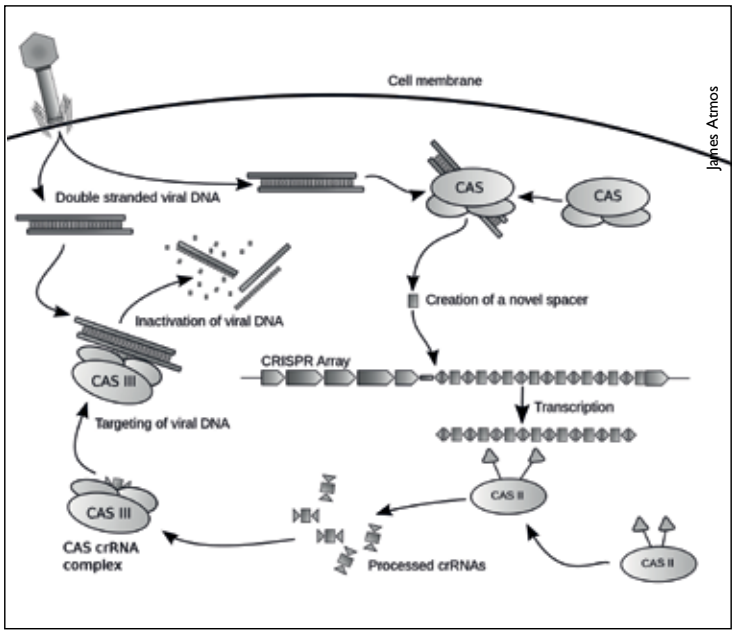


Diagram of the possible mechanism for CRISPR

The agreement includes a mechanism to ensure that no promising target genes will be neglected; genes that are not being pursued by Editas will be made available for licensing to other parties so that new medicines based on this technology can be developed for any disease that could be treated by this approach. Broad Institute, MIT, and Harvard University partners have made CRISPR-Cas9 technology broadly available to the research community, and have freely granted licenses to academic scientists, and non–exclusively to industry partners, for development of research tools and reagents and will continue to do so.

Also included in the agreement are additional technologies relating to engineering and optimization of transcription activator–like effector (TALE) proteins that can also be programmed to target and modify specific genes, as well as a novel protein-based drug delivery system, which could potentially achieve up to one thousand–fold more effective drug delivery than conventional methods.

"We have already seen how the CRISPR molecular system has proven to be so powerful in basic research," said Jeffrey S. Flier, Dean of Harvard Medical School. "The potential for this approach to translate into new ways to treat human conditions that have proved vexing is compelling and warrants new and innovative collaborations among academia and industry."

Obesity-attributable absenteeism costs US more than $8 billion per year

A study conducted by researchers at Columbia University's Mailman School of Public Health shows that obesity costs the United States $8.65 billion per year as a result of absenteeism in the workplace – more than 9% of all absenteeism costs. The consequences of obesity among the working population go beyond healthcare and create a financial challenge not only for the US but for individual states as well. Findings are published online in the *Journal of Occupational and Environmental Medicine*.

"In areas where local wage level is higher or have high burden of obesity, the value of lost productivity really adds up," said Y. Claire Wang, MD, ScD, co-director of the Obesity Prevention Initiative at Columbia University's Mailman School of Public Health, and senior author.

To calculate the loss in worker productivity, researchers used nationally representative data about height, weight, and missed workdays for health reasons among 14,975 people from the National Health and Nutrition Examination Survey for the years 1998 to 2008. They also analyzed body mass index (BMI) data for 2012 by state for more than 100,000 people using the Behavioral Risk Factor Surveillance System.

"Obesity and healthy-living behaviours are often seen as just individual choices," noted Wang, Mailman School associate professor of Health Policy and Management. "But our paper really highlights the fact that the burden is beyond just individual choices."

Previous studies of this kind tend to focus on healthcare cost resulted from treating obesity-related illness which is only one

dimension of its burden to the society. For instance, in 2011, Wang and her colleagues published a study in *The Lancet* estimating a $66 billion higher medical expenditure by 2030 if the US trend in obesity continues. However, in thinking about obesity, especially severe obesity, as a threat to a competitive, healthy workforce, the authors present this problem as a priority from an economic standpoint. "Healthy community and healthy workers mean business." Wang said.

Organic Vaccines in commercial evaluation agreement with US NIH over MERS

On July 7 and September 3, 2014, Organic Vaccines LLC, a 98% held subsidiary of Organic Vaccines Plc, entered into a commercial evaluation license agreement with the US National Institutes of Health and a three-year collaborative agreement with the US National Cancer Institute, with a principal goal of developing human monoclonal antibody-based techniques targeting the Middle East Respiratory Syndrome Coronovirus (MERS-CoV).

Patrick Rambaud, President and CEO of Organic Vaccines Plc commented: "These agreements shall enable OV to complement its strategy against MERS CoV. During our meeting of September 18th at the control and command center of the Ministry of Health in Jeddah (Saudi Arabia), we have explained the science and exposed our strategy. Our objective is to be at the earliest in a position to offer a stopgap treatment on a compassionate basis.

"We have already started complementary studies to meet WHO requirements and submit our dossier."

Organic Vaccines Plc is a biopharmaceutical company focusing on the development of preventive and therapeutic vaccines produced using the patient's own white blood cells. Areas of vaccine development cover children vaccines, flu vaccines and HPV adult vaccines (preventive and therapeutic) as well as the implementation of white blood cell banks. Vaccines should avoid side effects and will be developed using the AAPC technology (artificial antigen presenting cells). Organic Vaccines' scientific team is a world renowned team of scientists, including Professor Bruce Beutler, recipient of the 2011 Nobel Prize for medicine.

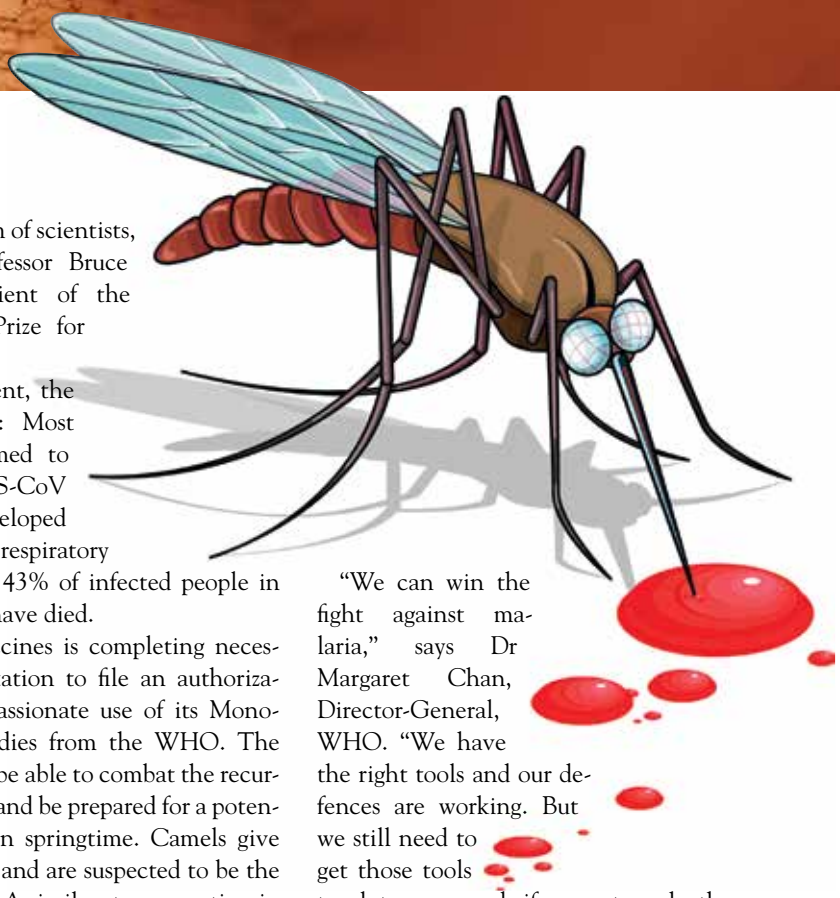
In a statement, the company said: Most people confirmed to have MERS-CoV infection developed severe acute respiratory illness. About 43% of infected people in Saudi Arabia have died.

Organic-Vaccines is completing necessary documentation to file an authorization for compassionate use of its Monoclonal Antibodies from the WHO. The objective is to be able to combat the recurrent mortality and be prepared for a potential outbreak in springtime. Camels give birth in spring and are suspected to be the virus reservoir. A similar stopgap action in Queensland, Australia, with similar antibodies was applied successfully on humans against Nipah and Hendra viruses without any side effects. Queensland Ministry of Health has demonstrated an efficient strategy for emergency prior to develop a vaccine to be available later. Organic-Vaccines is counting on full cooperation from Jeddah's Control and Command Center and from the Saudi MOH to meet deadlines and fasten its process for being able to protect first responders and avoid disorganization of the health system in case of emergence of a MERS CoV outbreak.

Global malaria mortality rate falls by nearly 50%

The number people dying from malaria has fallen dramatically since 2000 and malaria cases are also steadily declining, according to the *World Malaria Report 2014*. Between 2000 and 2013, the malaria mortality rate decreased by 47% worldwide and by 54% in the WHO African Region - where about 90% of malaria deaths occur.

New analysis across sub-Saharan Africa reveals that despite a 43% population increase, fewer people are infected or carry asymptomatic malaria infections every year: the number of people infected fell from 173 million in 2000 to 128 million in 2013.



"We can win the fight against malaria," says Dr Margaret Chan, Director-General, WHO. "We have the right tools and our defences are working. But we still need to get those tools to a lot more people if we are to make these gains sustainable."

Between 2000 and 2013, access to insecticide-treated bed nets increased substantially. In 2013, almost half of all people at risk of malaria in sub-Saharan Africa had access to an insecticide-treated net, a marked increase from just 3% in 2004. And this trend is set to continue, with a record 214 million bed nets scheduled for delivery to endemic countries in Africa by year-end.

Access to accurate malaria diagnostic testing and effective treatment has significantly improved worldwide. In 2013, the number of rapid diagnostic tests (RDTs) procured globally increased to 319 million, up from 46 million in 2008. Meanwhile, in 2013, 392 million courses of artemisinin-based combination therapies (ACTs), a key intervention to treat malaria, were procured, up from 11 million in 2005.

Globally, an increasing number of countries are moving towards malaria elimination, and many regional groups are setting ambitious elimination targets, the most recent being a declaration at the East Asia Summit to eliminate malaria from the Asia-Pacific by 2030.

In 2013, two countries reported zero indigenous cases for the first time (Azer-

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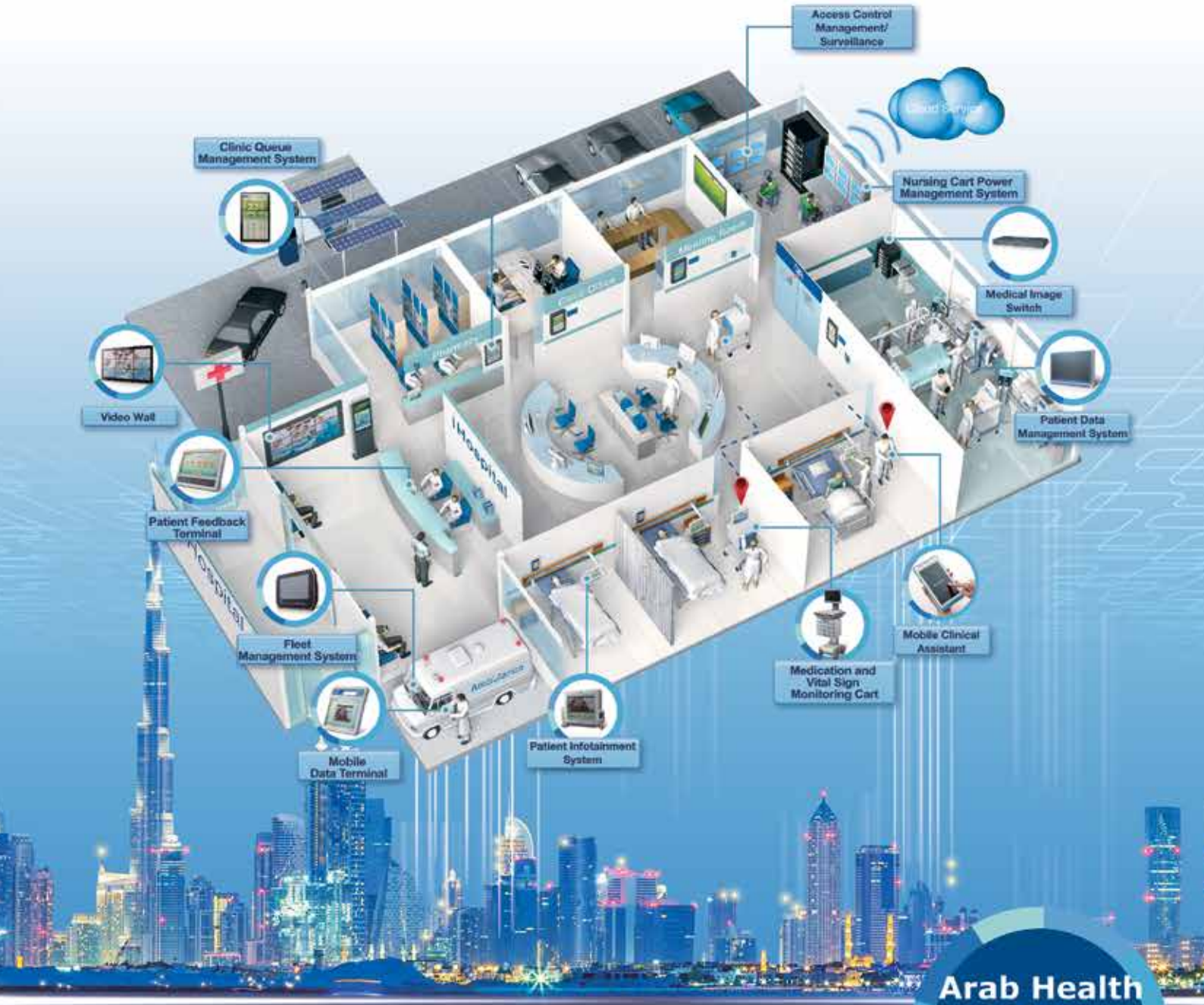
see page 79 for details



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baijan and Sri Lanka), and 11 countries succeeded in maintaining zero cases (Argentina, Armenia, Egypt, Georgia, Iraq, Kyrgyzstan, Morocco, Oman, Paraguay. Uzbekistan and Turkmenistan). Another four countries reported fewer than 10 local cases annually (Algeria, Cabo Verde, Costa Rica and El Salvador).

But significant challenges remain: "The next few years are going to be critical to show that we can maintain momentum and build on the gains," notes Dr Pedro L Alonso, Director of WHO's Global Malaria Programme.

In 2013, one third of households in areas with malaria transmission in sub-Saharan Africa did not have a single insecticide treated net. Indoor residual spraying, another key vector control intervention, has decreased in recent years, and insecticide resistance has been reported in 49 countries around the world.

Even though diagnostic testing and treatment have been strengthened, millions of people continue to lack access to these interventions. Progress has also been slow in scaling up preventive therapies for pregnant women, and in adopting recommended preventive therapies for children under five years of age and infants.

In addition, resistance to artemisinin has been detected in five countries of the Greater Mekong subregion and insufficient data on malaria transmission continues to hamper efforts to reduce the disease burden.

on the WEB World Malaria Report 2014
www.who.int/malaria/publications/world_malaria_report_2014

WHO updates guidelines for cervical cancer control

Cervical cancer is responsible for some 270,000 deaths annually worldwide with nearly nine out of 10 occurring in developing countries, but it is the most easily preventable form of cancer for women, the World Health Organization (WHO) said early December.

WHO revealed these findings in the newest version of the Comprehensive Cervical Cancer Control: A guide to essential practice, launched at the World Cancer Leaders' Summit in Melbourne, Australia.

"WHO's updated cervical cancer guidance can be the difference between life and death for girls and women worldwide," Dr Nathalie Broutet, a leading WHO expert on cervical cancer prevention and control, said.

"There are no magic bullets, but the combination of more effective and affordable tools to prevent and treat cervical cancer will help release the strain on stretched health budgets, especially in low-income countries, and contribute drastically to the elimination of cervical cancer," he added.

The main elements to prevent and control cervical cancer are to: vaccinate 9 to 13-year-old girls with two doses of the Human papillomavirus (HPV) vaccine; use HPV tests to screen women for cervical cancer prevention; and communicate more widely, according to WHO.

"The disease is one of the world's deadliest – but most easily preventable – forms of cancer for women, responsible for more than 270,000 deaths annually, 85% of which occur in developing countries," the UN health agency said. "An estimated 1 million-plus women worldwide are currently living with cervical cancer."

Girls in more than 55 countries are protected by routine administration of the vaccine and encouragingly, a growing number of low- and middle-income countries are introducing the vaccine in the routine schedule, WHO said.

As for the testing to screen for the virus, once a woman has been screened negative, she should not be rescreened for at least 5 years, but should be rescreened within 10. "This represents a major cost saving for health systems, in comparison with other types of tests," WHO said.

The new guidance, known as the "Pink Book," provides a comprehensive cervical cancer control and prevention approach for governments and healthcare providers and underlines recent developments in technology and strategy for improving women's access to health services to prevent and control cervical cancer.

on the WEB Comprehensive cervical cancer control
www.who.int/reproductivehealth/publications/cancers/cervical-cancer-guide

WHO publishes new HIV antiretrovirals guidelines

On World AIDS Day 2014, the World Health Organization issued new recommendations to help countries close important gaps in HIV prevention and treatment services.

Despite tremendous progress in recent years, with a record 13 million people accessing antiretroviral treatment in 2013, many people still lack access to comprehensive HIV treatment and prevention services. In 2013, 2 million people were newly infected with HIV. In low and middle income countries, around 1 in 3 adults living with HIV had access to treatment. Only 1 in 4 children could get the medicines they needed, and many people with HIV still lacked the means to prevent and treat other infections.

The guidelines include advice on providing antiretroviral drugs for people who have been exposed to HIV – such as health workers, sex-workers, and survivors of rape – what is often described as "post-exposure prophylaxis", or PEP. They also include recommendations on preventing and managing common "opportunistic infections" and diseases such as severe bacterial and malaria infections.

The guidelines are published as a supplement to WHO's 2013 consolidated guidelines on the use of antiretrovirals. The guidelines promote earlier, simpler and less toxic interventions to keep people healthier for longer, and to help prevent transmission.

on the WEB On post-exposure prophylaxis for HIV and the use of Co-Trimoxazole prophylaxis for HIV-related infections
http://tinyurl.com/lxwj8g6

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the laboratory

Medical research news from around the world

Shaking up cell biology

Elvis did it, Michael Jackson did it, and so do the mitochondria in our cells. They shake. While Elvis and Michael shook for decades before loud and appreciative audiences, mitochondrial oscillations have quietly bewildered scientists for more than 40 years.

Now, a team of scientists at US National Institutes of Health's National Institute of Dental and Craniofacial Research (NIDCR) has imaged mitochondria for the first time oscillating in a live animal, in this case, the salivary glands of laboratory rats. The report, published online in the journal *Cell Reports*, shows the oscillations occur spontaneously and often in the rodent cells, which leads the researchers to believe the oscillations almost surely also occur in human cells.

"The movements could last from tens of seconds to minutes, which was far longer and frequently at a faster tempo than observed previously in cell culture," said Roberto Weigert, Ph.D., an NIDCR scientist and senior author on the study. The mitochondria also appear to synchronize their movements not only in an individual cell but, quite unexpectedly, into a linked network of oscillators vibrating throughout the tissue.

"You look through the microscope, and it almost looks like a synchronized dance," said Weigert. "The synchronization, to borrow an old cliché, tells us that we need to differentiate the forest from the trees – and vice versa – when studying mitochondria. It may be that the forest holds the key to understanding how mitochondria function in human health and disease."

The mitochondrion is of one of several distinct compartments, or organelles, in the cell cytoplasm. Although mitochondria are jacks of many biochemical trades, they are best known as the power plants of the cell. They generate a continuous supply of the molecule ATP that, like bits of coal, serve as the cell's main source of energy to power the heart to beat, muscles to stretch, and virtually every movement that the body makes.

To keep cells fully charged, mitochondria operate four biochemical production lines that coalesce with oxygen molecules from normal respiration to produce ATP. One of these production lines starts with processing the molecule nicotinamide adenine dinucleotide, or NADH. Weigert and colleagues recognized that they could use their high-magnification microscope to visualize NADH as it naturally emits electrons as part of the ATP production process.

The key was their choice of microscopy. Weigert and colleagues are masters of intravital microscopy, an extremely high-resolution technique that dates back to the 19th century. It had been too powerful to use in live animals until recently.

"Animals breathe, their hearts beat, and their appendages twitch," said Weigert. "The combined effect under very high magnification is like watching a 6.0 earthquake. Everything shakes and blurs out of focus. We have developed approaches to better stabilize our organ of interest and minimize the motion artifacts. At this point, it is just a matter of generating more powerful optics to visualize the chemistry of life that really unfolds in the body, not under artificial laboratory conditions that stress cells and likely modify their behaviour."

The powerful optics allowed the scientists to visualize the oscillations in their native milieu and to puzzle over their cause. Based on a series of subsequent experiments and observations, the researchers discovered that the oscillations are linked to the production of reactive oxygen species, a chemically interactive by-product of making ATP. This finding suggests that the oscillations likely are not inherent to mitochondria but a response to conditions in their environment.

"These findings emphasize how important it is scientifically to study biology on its own terms, not under artificial laboratory conditions," said Natalie Porat-Shliom, an NIDCR scientist and lead author on the paper. "We saw things in live animals that you don't see in cell culture. The reasons, in this case, very well may be that the mitochondria continue to receive an influx of signals from the blood vessels, the nervous system, and their surrounding environment. The entire system can't be reassembled in cell culture."

Porat-Shliom noted that these findings should be of broad interest scientifically in framing studies of mitochondria, and may have future clinical implications. An estimated 2 million Americans have mitochondrial disease, an energy-depleting failure of mitochondria to function properly, which can have disabling effects on the brain, heart, kidneys, and other body systems. Many scientists also suspect that as mitochondria become better understood, they likely will be understood to play a more prominent role in human health and disease.

Link between breast implants and cancer under investigation

An international research group including Viennese pathologist Lukas Kenner has reviewed cases of possible association between breast implants and a form of lymphoma that may develop tumours at

a later stage. The researchers conclude that breast implants can cause a new subtype of the rare yet malignant lymphoma known as ALCL. The research results have been published in the journal *Mutation Research*.

Worldwide there have been 71 documented cases of patients with anaplastic large cell lymphoma (ALCL) in which researchers suspected breast implants to be the cause. ALCL is normally found in the lymph nodes, as well as in skin, lung, liver and soft tissue, but not usually in the breast. Cases in which ALCL developed in the breast region almost exclusively involved patients who have had breast surgery. In these cases, ALCL developed around ten years after the operation. The tumours grew in the scar tissue around the implant.

Breast implants are generally safe and studies have found no association between breast surgery and other forms of cancer. ALCL itself is also an extremely rare occurrence. Among three million breast implants, there are between one and six reported cases of ALCL.

ALCL is divided into two subtypes. In one subtype, the cancerous cells produce an abnormal form of the protein ALK (anaplastic lymphoma kinase). The other type does not express ALK in tumour cells at all. While patients with ALK-positive lymphoma have a better chance of survival, the cancer is considerably more aggressive in ALK-negative cases.

Implant-related ALCL appears to form a third group. The cells do not express ALK, but patients have good survival rates. "This is a previously unrecognized, new subtype of ALCL," Lukas Kenner explains. "We must now determine the exact causes behind its occurrence."

The actual reasons why implants can cause lymphoma remain unclear. While some patients were successfully treated with chemotherapy and radiation therapy, the lymphoma in many cases subsided on its own following removal of the implant and the surrounding tissue. An abnormal immune response from the body could therefore be a cause of the cancer. Kenner and his team are now preparing for further studies in which implants and dentures will be examined in other parts of the body.

New discovery concerning glucose uptake in brown fat could help treat type 2 diabetes

Research findings that can likely be used to develop a new type of medicine for type 2 diabetes are published today in the *Journal of Cell Biology*. Researchers at Stockholm University have discovered a new mechanism that stimulates glucose uptake in brown fat – a tissue whose primary function is to generate heat by burning fat and sugar.

The major breakthrough of this discovery is of how glucose uptake is stimulated in brown fat. This knowledge can be used to pharmacologically stimulate this signalling pathway and lower blood sugar levels, which could lead to a cure for type 2 diabetes.

"One of the most interesting characteristics of this newly discovered signal pathway is that it differs from the signal pathway triggered by insulin. This means that the signal pathway in brown fat can most likely be activated even in patients with type 2 diabetes, where the insulin signalling is impaired," says Professor Tore Bengtsson from the Department of Molecular Biosciences, the Wenner-Gren Institute, Stockholm University.

Although type 2 diabetes is a very serious and growing disease, there is still no definitive treatment or cure.

"Finding new ways to stimulate glucose uptake in tissues and thereby lower blood sugar levels is thus a matter of great interest," says Prof Bengtsson.

Brown fat has been shown to be active in adults and is one of the tissues in the body that can be stimulated to the highest uptake of glucose per gram of tissue. Consequently, an increase in the uptake of glucose in brown fat can rapidly lower blood sugar levels.

"Our study shows that the body's own stress hormones, epinephrine and norepinephrine, increase the uptake of glucose in brown fat. Epinephrine and norepinephrine can affect almost all our bodily organs by binding to receptors on the surface of a cell. We have shown how, and by what mechanism, adrenergic receptors found on brown fat stimulate the uptake of glucose. This is completely new and ground-breaking research," says Prof Bengtsson.

Low carb diet shows benefits for diabetics compared to low fat diet

A low-carbohydrate diet has a good effect not only on blood glucose, but also on physical functions, bodily pain and general health, according to a diet study including patients with type 2 diabetes, which looked at the effects on blood glucose and blood lipids of a low-carbohydrate diet compared to a low-fat diet.

The results of a two-year clinical trial in patients with type 2 diabetes, led by Dr Hans Guldbrand, general practitioner, and Fredrik Nystrom, professor of internal medicine at Linköping University, was published in *Diabetologia*.

The 61 enrolled patients were randomly divided into two groups – one for each diet type and were expected to adhere to the respective diet throughout the study period. It was found that both diet-groups reduced weight equally but the effect on blood glucose was better in the low-carbohydrate group.

The effects of a low-carbohydrate diet and a low-fat diet on wellbeing have now been analysed in a study led by Associate Professor Margareta Bachrach-Lindström. A standardised analysis based on the SF-36 questionnaire was performed. After 12 months in the trial, the low-carbohydrate group improved in regard to the physical component, which includes physical function, bodily pain and general health. No improvements were seen in the low-fat group, despite weight loss. Mental health was similar for both groups and remained unchanged during the study period and did not differ between the groups.

"The result is interesting; it provides an additional argument that a low-carbohydrate diet is beneficial in diabetes," said Hans Guldbrand. "We also found no adverse effects on mental health with the low-carbohydrate diet, which an earlier

study had indicated," he added.

The interview with the study patients revealed that for both groups there were difficulties adhering to the diet when they ate elsewhere than at home. It could also be problematic if not all family members followed the same diet. Both groups expected health gains by adhering to given dietary advice. The low-carbohydrate diet group expressed that it could be difficult to refrain from potatoes and pasta. The diet for the low-fat group was described as relatively inexpensive and tasty. Benefits of the low-carbohydrate diet were that the patients felt less hungry and that their appetite for sweets disappeared.

● **doi**: 10.1016/j.diabres.2014.08.032

Cause of donor death should not automatically exclude lungs from transplant consideration

Patients receiving lungs from donors whose cause of death was asphyxiation or drowning have similar outcomes and long-term survival as patients receiving lungs from traditional donors, according to a study in the October 2014 issue of *The Annals of Thoracic Surgery*.

Lungs from donors who died from asphyxiation or drowning are not routinely utilized because of potential damage sustained by the organs. However, the researchers show that lungs from donors whose cause of death was asphyxiation or drowning can be safely transplanted into patients with end-stage lung disease. They note that patient survival rates were not affected when lungs from cases involving asphyxiation and drowning were used.

They point out that if centres wanted to expand their individual criteria for donation, they could successfully expand their donor pool.

"For most patients with end-stage lung disease, transplant offers the only hope for survival, but there is a critical organ shortage, especially for patients on the lung transplant list. Increasing the potential donor pool would help reduce the number of patients who die while on the waiting list and help expand this lifesaving treatment to those who need it," said Bryan A. Whitson, MD, PhD, from The Ohio State University Wexner Medical Center in Columbus.

Dr Whitson and colleagues searched the United Network for Organ Sharing (UNOS) Standard Transplant Analysis and Research registry for lung transplants from 1987 to 2010 and assessed the association between donor cause of death and recipient survival, focusing on asphyxiation or drowning as the cause of death.

The researchers found 18,250 adult primary lung transplants, including 309 cases that involved asphyxiation or drowning. They also found that although the hospital stay was slightly longer (0.8 day) for recipients of lungs from asphyxiation or drowning deaths when compared with patients who received lungs from all other causes of donor death, survival rates were the same and there were no differences in treatment for rejection within the first year, post-transplant dialysis, or post-transplant stroke.

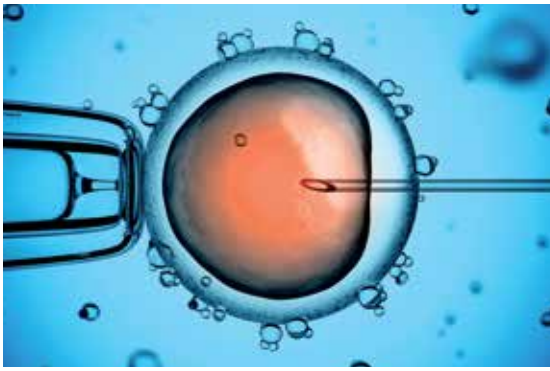
● **doi**: 10.1016/j.athoracsur.2014.05.065

Study provides first evidence of long-term safety of transplanting human embryonic stem cells in humans

New research published in *The Lancet* provides the first evidence of the medium-term to long-term safety and tolerability of transplanting human embryonic stem cells (hESCs) in humans.

hESC transplants used to treat severe vision loss in 18 patients with different forms of macular degeneration appeared safe up to 3 years post-transplant, and the technology restored some sight in more than half of the patients.

"Embryonic stem cells have the potential to become any cell type in the body, but transplantation has been complicated by problems including the risk of teratoma formation (a type of cancer that occurs when stem cells differentiate into multiple cell types and form incompatible tissues that can include teeth and hair) and immune rejection," explained lead author Professor Robert Lanza, Chief Scientific officer at Advanced Cell Technology in the USA. "As a result, immunoprivileged sites such as the eye have become the first parts of the human body to benefit from this technology."



In the two phase 1/2 studies, hESCs were differentiated into retinal pigment epithelium cells and transplanted into nine patients with Stargardt's macular dystrophy and nine patients with dry atrophic age-related macular degeneration, the leading causes of juvenile and adult blindness in the developed world, respectively. No effective treatments exist for either condition, and eventually the photoreceptor cells of the retina degenerate leading to complete blindness.

All participants were injected with one of three different doses of retinal cells (50,000, 100,000 and 150,000 cells) into the subretinal space of the eye with the worse vision.

The hESC-derived cells were well tolerated for up to 37 months after transplantation. No safety concerns (eg. hyperproliferation or rejection) in the treated eyes were detected during a median follow-up of 22 months. Adverse events were associated with vitreoretinal surgery and immunosuppression, but none were deemed to be related to the hESC-derived cells.

Follow-up testing showed that 10 out of 18 treated eyes had substantial improvements in how well they could see, with 8 patients reading over 15 additional letters in the first year after transplant. Visual acuity remained the same or improved in seven patients, but decreased by more than 10 letters in one patient. Importantly, untreated eyes did not show similar visual improvements.

According to co-lead author Professor Steven Schwartz from the Jules Stein Eye Institute, Los Angeles, USA: "Our results suggest the safety and promise of hESCs to alter progressive vision loss in people with degenerative diseases and mark an exciting step towards using hESC-derived stem cells as a safe source of cells for the treat-

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ment of various medical disorders requiring tissue repair or replacement."

Writing in a linked Comment, Anthony Atala, Director of the Wake Forest Institute for Regenerative Medicine, Wake Forest School of Medicine, Winston-Salem, NC, USA says, "The work by Schwartz and colleagues is a major accomplishment, but the path to get to this point has not been smooth. Since the discovery of hESC in 1998, much has transpired, including political, ethical, and scientific debates, with an overall push to achieve the promise of human therapies. Now, we have follow-up that extends to longer than 3 years in patients treated with hESC-derived stem cells, showing both safety and apparent efficacy. Much work remains to be done before hESC and induced pluripotent stem cell therapies go beyond regulatory trials, but the path is now set in motion."

● **doi**: 10.1016/S0140-6736(14)61376-3

New test can help doctors choose best treatment for ovarian cancer

Researchers have devised a new test to help doctors diagnose ovarian tumours and choose the most appropriate treatment.

Successful treatment depends in part on accurately identifying the type of tumour, but this can be difficult. As a result, many women with cancer are not sent to the right specialist surgeon, or those with a benign cyst may have a more serious operation than they need.

In a study published in October 2014 the *British Medical Journal*, an international team led by Imperial College London and KU Leuven, Belgium describe a new test, called ADNEX, which can discriminate between benign and malignant tumours, and identify different types of malignant tumour, with a high level of accuracy.

The test is based on the patient's clinical information, a simple tumour marker blood test and features that can be identified on an ultrasound scan. As well as identifying the type of tumour, the test expresses the confidence of the diagnosis as a percentage.

Doctors can use the test in a clinical database or by entering the patient's details into a smartphone app, which was demonstrated to gynaecologists at the International Society for Ultrasound in Obstetrics and Gynecology World Congress in Barcelona in September 2014. The authors of the study say doctors could start using ADNEX straight away.

Professor Tom Bourne, from the Department of Surgery and Cancer at Imperial College London, said: "It's very important to get the preoperative diagnosis right. If it isn't right, the patient might have a more extensive operation than they need, for example having an ovary removed unnecessarily.

"If a tumour is benign, a woman might not need any treatment at all. If it is malignant, you need to know what type of tumour it is to choose the best treatment and that treatment needs to be carried out by specialist gynaecological cancer surgeon"

"At the moment, the way we assess women with ovarian cysts for the presence of cancer and select treatment lacks accuracy. This new approach to classifying ovarian tumours can help doctors make the right management decisions, which will improve the outcome for women with cancer. It will also reduce the likelihood of women with all types of cysts having excessive or unnecessary treatment that may impact on their fertility."

The researchers developed the test using data from 3,506 patients from 10 European countries from 1999 to 2007, looking at which information available before the operation could be used to predict the diagnosis. They then tested the model on a further 2,403 patients between 2009 and 2012.

Studies have shown that ovarian cancer patients have a better chance of survival if they are referred to a specialised gynaecological cancer unit, but this only happens for a minority of women seeking treatment in the US and Europe.

Apart from the tumour type, the choice of treatment sometimes has to take into account implications for the woman's fertility.

Existing prediction models discriminate between benign and malignant tumours but lack accuracy and don't sub-classify malignant tumours. The ADNEX model can discriminate between benign, borderline, stage I invasive, stage II-IV invasive, and secondary metastatic tumours.

The study was funded by the Flemish Government: Research Foundation - Flanders (FWO), Flanders' Agency for Innovation by Science and Technology (IWT), iMinds and the National Institute for Health Research (NIHR) Imperial Biomedical Research Centre.

● **doi**: 10.1136/bmj.g5920

New drug shows promise for treating spinal cord injuries

Injections of a new drug may partially relieve paralyzing spinal cord injuries, based on indications from a study in rats.

"We're very excited at the possibility that millions of people could, one day, regain movements lost during spinal cord injuries," said Jerry Silver, Ph.D., professor of neurosciences, Case Western Reserve University School of Medicine, Cleveland, and a senior investigator of the study published in *Nature*.

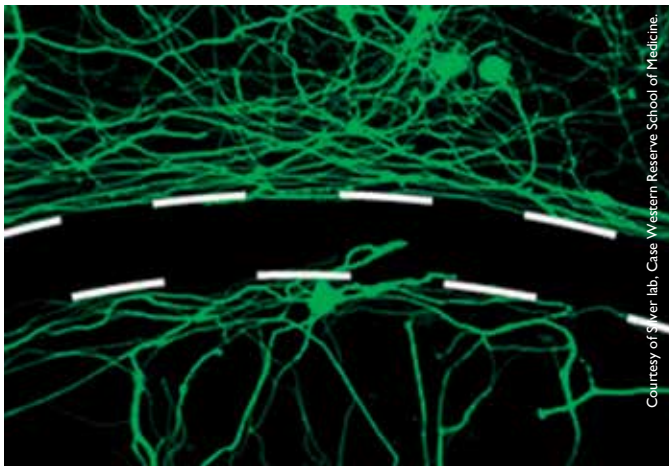
Every year, tens of thousands of people are paralyzed by spinal cord injuries. The injuries crush and sever the long axons of spinal cord nerve cells, blocking communication between the brain and the body and resulting in paralysis below the injury.

On a hunch, Bradley Lang, Ph.D., the lead author of the study and a graduate student in Dr Silver's lab, came up with the idea of designing a drug that would help axons regenerate without having to touch the healing spinal cord, as current treatments may require.

"Originally this was just a side project we brainstormed in the lab," said Dr Lang.

After spinal cord injury, axons try to cross the injury site and reconnect with other cells but are stymied by scarring that forms after the injury. Previous studies suggested their movements are blocked when the protein tyrosine phosphatase sigma (PTP sigma), an enzyme found in axons, interacts with chondroitin sulfate proteoglycans, a class of sugary proteins that fill the scars.

Dr Lang and his colleagues designed a drug called ISP to block the enzyme and facilitate the drug's entry into the brain and spinal cord. Injections of the drug under the skin of paralyzed rats near the injury site partially restored axon growth and improved movements and bladder functions.



Scientists developed a drug that allows axons to cross impenetrable barriers leading to the treatment of spinal cord injuries.

"There are currently no drug therapies available that improve the very limited natural recovery from spinal cord injuries that patients experience," said Lyn Jakeman, Ph.D., a program director at the US National Institutes of Health's National Institute of Neurological Disorders and Stroke. "This is a great step towards identifying a novel agent for helping people recover."

Initially, the goal of the study was to understand how interactions between PTP sigma and chondroitin sulfate proteoglycans prevent axon growth. Drugs were designed to mimic the shape of a critical part of PTP sigma, called the wedge. Different designs were tested on neurons grown in petri dishes alongside impenetrable barriers of proteoglycans. Treatment with ISP freed axon growth.

"It was amazing. The axons kept growing and growing," said Dr Silver.

Next the researchers tested the potential of the drug on a rat model of spinal cord injury. For seven weeks they injected rats with the drug or a placebo near the site of injury. A few weeks later the rats that received the drug showed improvements in walking and urinating while the placebo treatments had no effect. The results suggested the drug passed into the brain and spinal cord.

When the researchers looked at the spinal cords under a microscope they found that the drug induced sprouting of axons that use the neurochemical serotonin to communicate. The sprouting axons were seen below the injury site. Treating some rats with a blocker of serotonin communication partially reversed the beneficial effects of ISP injections, suggesting the newly sprouting axons helped the rats recover.

The ISP drug did not cause spinal cord axons known to control movements to cross the scar and reconnect with brain neurons above the injury site. Dr Silver and his colleagues think this means the ISP-induced sprouting helped the rats recover by increasing the signal sent by the few remaining intact axons.

"This is very promising. We now have an agent that may work alone or in combination with other treatments to improve the lives of many," said Dr Silver. He and his colleagues are seeking to test the ISP drug in preclinical trials.

● **doi**: 10.1038/nature13974 ### MEH

Researchers find camels emit volumes of MERS virus

Researchers at Colorado State University (CSU) have confirmed for the first time that camels vent volumes of the deadly Middle East Respiratory Syndrome (MERS) virus, making them the likeliest suspect for spreading the pathogen to people.

The research team is now testing a vaccine that could keep camels from shedding the MERS virus, which has caused acute respiratory illness in about 900 people across the Arabian Peninsula since it was identified in 2012.

The CSU researchers, partnering with an arm of the US National Institutes of Health, demonstrated that infected camels shed large amounts of MERS virus, primarily through their nostrils. They also established for the first time that the virus develops in the animals' upper respiratory system, and that camels shed infectious virus for up to a week.

The findings were not surprising to many scientists who study viral infectious disease – camels have been a primary suspect as a source of MERS – yet confirming the source is essential to advancing science, knowledge and solutions.

"This is a necessary step in looking at the interaction between the virus and the host species, the camel," said Mark Pallansch, director of the Division of Viral Diseases in the Center for Disease Control and Prevention's National Center for Immunization and Respiratory Diseases.

"We don't have an effective intervention for stopping the spread of the virus other than standard hygiene precautions and avoiding contact with infected individuals," Pallansch added. "This does provide a possible intervention to keep the host from infecting humans."

MERS, a coronavirus, has proved fatal to about 30% of those who have contracted it.

Danielle Adney, a Ph.D. student in CSU's Department of Microbiology, Immunology and Pathology, was lead author on a study published in the December issue of *Emerging Infectious Diseases*. Adney's paper shows that three infected dromedary camels, housed at a CSU research facility, expelled high levels of MERS virus, mainly from the nose.

Research authors Danielle Adney, left, and Vienna Brown with two of the camels in the MERS vaccine project at CSU.

"It would be very surprising, given the amount they are shedding, if they were not able to infect other camels and humans," said principal investigator Richard Bowen, a professor in CSU's Department of Biomedical Sciences. "It strongly supports the theory of camels being the primary reservoir for this virus. Until this study, people knew infected camels shed some virus and carried it, but it was mostly circumstantial evidence."

The animals with MERS overcame the virus within weeks, as if it were a common cold. The camels were cared for at CSU's Animal Reproduction and Biotechnology Laboratory, and research tests were conducted in the university's sealed Biosafety Level 3 Laboratory.

Now the team of CSU and NIH researchers has procured additional camels, and in early August gave them the experimental vaccine in hopes it will reduce or eliminate the amount of virus the camels shed.

"The concept is to vaccinate the camels to protect the people," Bowen said. "If this is effective, we'd have tools to vaccinate camels and prevent transmission from occurring."

Adney and co-author Vienna Brown, also a CSU doctoral student in Microbiology, Immunology and Pathology, said the NIH-developed vaccine contains a harmless protein found in MERS that is expected to trigger antibodies to fight the virus.

Vincent Munster, chief of virus ecology in the NIH National Institute of Allergy and Infectious Disease, is a co-principal investigator and is examining virus-host interactions at a molecular level, which is central to vaccine development.

Other research groups are working on MERS vaccines, but the CSU and NIH team is the only group testing the preventives on camels. CSU is one of the only research institutions in the country equipped to safely conduct necessary tests, Munster said.

"I think this would be a pretty big step, that you could use a vaccine in camels to control human disease," he said. "The bigger step would be to get countries like Saudi Arabia and Qatar to begin administering the vaccine to tens of thousands of camels." MEH

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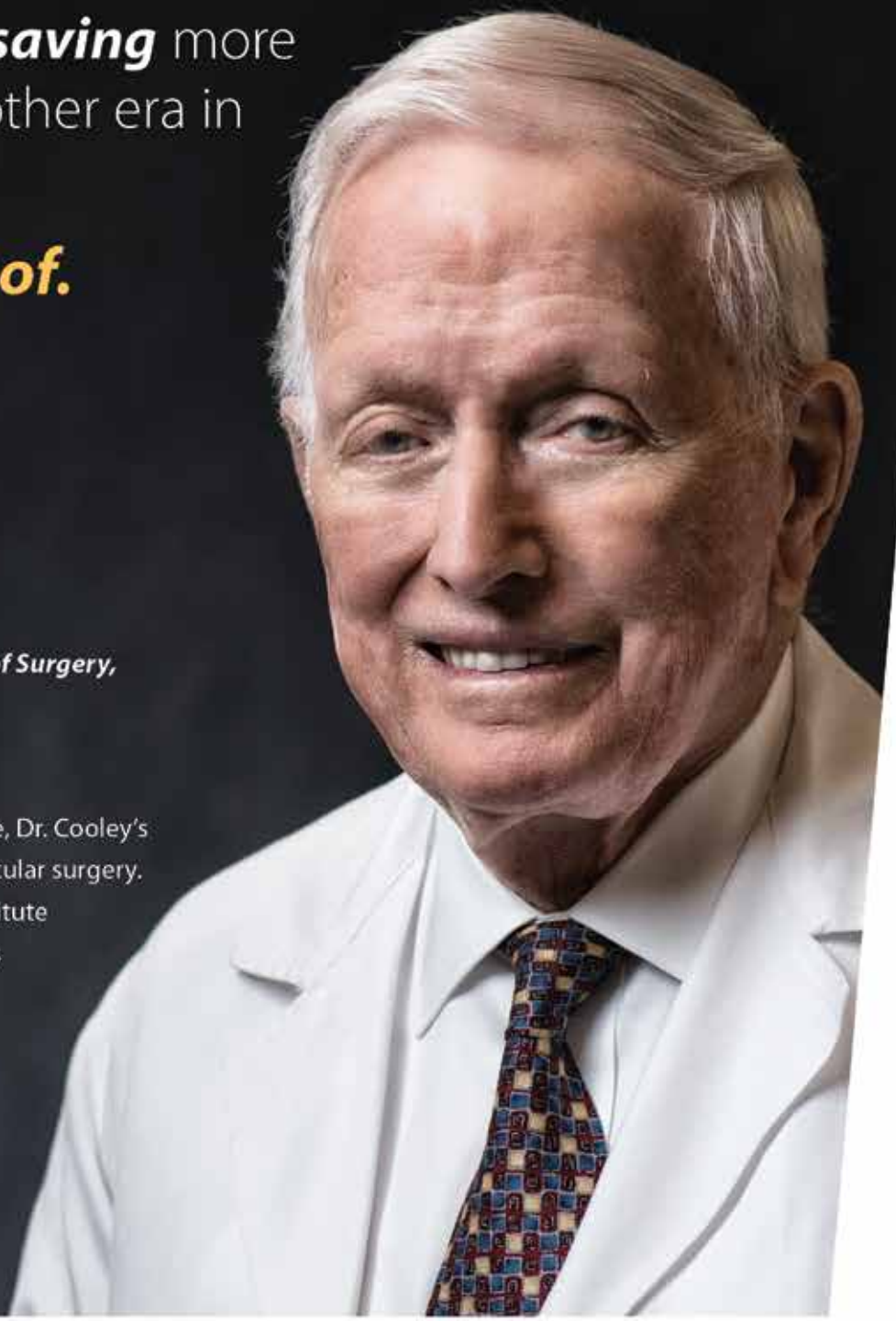

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Cases continue to escalate in West Africa

Keeping track of the still rapidly escalating Ebola case count in West Africa is not feasible with this bimonthly publication. So instead we cover other Ebola-related news in this section and refer you to this website to get the latest figures on Ebola http://healthmap.org/ebola/#timeline

As of 16 December, the following countries had suspected case and death counts reported by WHO.

In West Africa, Guinea, Sierra Leone and Liberia remain the worst affected with the number of cases continuing to escalate. Mali released from quarantine the last 13 people being monitored for Ebola, and the country was due to be declared free of the virus in January if no further cases were recorded.

Outside of West Africa there has been one case reported in Spain and four in the United States.

Ebola appears to persist in semen of men who have recovered

The WHO issued a statement on 26 November saying that researchers have found that the Ebola virus appears to persist in the semen of men who have recovered from the virus. However, no sexual transmission of the virus has been documented.

The organisation notes that in four studies that investigated persistence of Ebola virus in seminal fluid from convalescent patients (a total of 43 patients), three men who had recovered from Ebola virus disease were reported to shed live virus in semen 40 days, 61 days and 82 days after onset of symptoms, respectively.

The WHO says "men who have recovered from Ebola virus disease should be aware that seminal fluid may be infectious for as long as three months after onset of symptoms. Because of the potential to transmit the virus sexually during this time, they should maintain good personal hygiene after masturbation, and either abstain from sex (including oral sex) for three months after onset of symptoms, or use condoms if abstinence is not possible".

The Ebola virus is shed in bodily fluids such as blood, vomit, faeces, saliva, urine, tears, and vaginal and seminal fluids.

Amiodarone to be trialled on Ebola patients

The BMJ reports that Ebola patients in Sierra Leone will receive amiodarone, a well-known and cheap anti-arrhythmia drug, in a randomised controlled trial led by the Italian non-governmental organisation Emergency.

According to the report, amiodarone, a multi-ion channel inhibitor and adrenoceptor antagonist, showed in preclinical studies to be a potent inhibitor of filovirus cell entry [Ebolavirus is a filovirus]. It has been used for many decades on millions of patients, so its safety profile is well known.

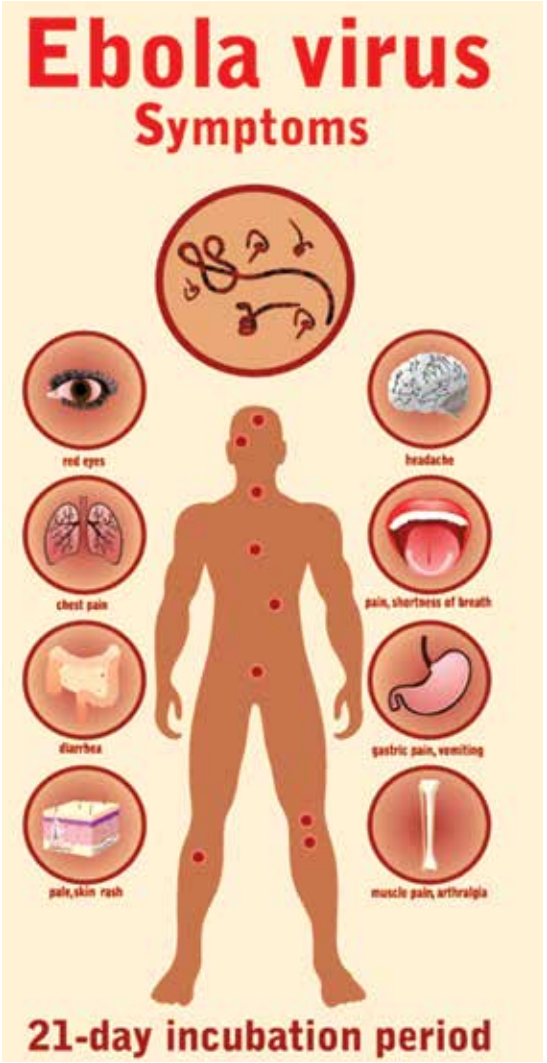
The phase III trial was due to begin in December.

Candidate vaccine shows promise in phase I trial

An experimental vaccine to prevent Ebola virus disease was well-tolerated and produced immune system responses in all 20 healthy adults who received it in a phase 1 clinical trial conducted by researchers from the US National Institutes of Health, according to a 28 November statement by the NIH. The candidate vaccine, which was co-developed by the NIH's National Institute of Allergy and Infectious Diseases (NIAID) and GlaxoSmithKline (GSK), was tested at the NIH Clinical Center in Bethesda, Maryland, United States.

NIAID Director Anthony S. Fauci, M.D. said: "Based on these positive results from the first human trial of this candidate vaccine, we are continuing our accelerated plan for larger trials to determine if the vaccine is efficacious in preventing Ebola infection."

The candidate vaccine contains segments of Ebola virus genetic material from two virus species, Sudan and Zaire. The Ebola virus genetic material is delivered by a carrier virus (chimpanzee-derived adenovirus 3 or cAd 3) that causes a common cold in chimpanzees but causes no illness in humans. The candidate vaccine does not contain Ebola virus and cannot cause Ebola virus disease.



- Additional details about this trial, VRC 207, are available at <www.clinicaltrials.gov> using the identifier NCT02231866

Gavi commits to purchasing Ebola vaccine for affected countries

Plans to purchase millions of doses of an Ebola vaccine to support large-scale vaccination efforts were agreed on December 11 by the board of Gavi, the Vaccine Alliance. The decision means that Gavi will be ready to act as soon as a safe, effective vaccine is recommended for use by the World Health Organization.

The Gavi Board endorsed plans that could see up to US$300 million committed to procure the vaccines, to be used to immunise at risk populations in affected countries. An additional $90 million could be used to support countries to introduce the vaccines and to rebuild devastated health systems and restore immunisation services for all vaccines in Ebola-affected countries. MEH

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An HIV epidemic is emerging among injecting drug users in the MENA

It is known that HIV infection is a major issue among people who inject drugs (PWID) and with an abundance of cheap heroin pouring out of Afghanistan injecting drug use in the Middle East North Africa (MENA) region is on the increase. *Middle East Health* looks a recent study which aims to assess the current situation.

An article published in *Global Research* (February 15, 2014) notes that in the "course of the last four years, there has been a surge in Afghan opium production (heroin is made from opium). The Vienna-based UN Office on Drugs and Crime (UNODC) reveals that poppy cultivation in 2012 extended over an area of more than 154,000 hectares, an increase of 18% over 2011".

Most of this Afghan heroin is trafficked through Iran and Pakistan, both MENA countries. The increased availability and purity of heroin at lower prices in MENA appears to have led to a subsequent rise in injecting drug use.

However, until recently, very little was known about the epidemiology of HIV infection among people who inject drugs (PWID) in the MENA region. This has now changed to some degree following the publication of an important and comprehensive study which looks to address this issue.

The study provides robust evidence for growing HIV epidemics, most of which have emerged within the past decade, among PWID in several MENA countries.

"HIV among People Who Inject Drugs in the Middle East and North Africa: Systematic Review and Data Synthesis" by Ghina R Mumtaz, et al. was published in *PLOS Medicine* June 17, 2014. The primary objective of this study was to assess the status of the HIV epidemic among PWID in MENA by describing HIV prevalence and incidence.

They point out that they conducted the study to maximize the effect of harm-reduction strategies in specific regions. To do this they say it is "important to understand the status of the HIV epidemic among PWID".

These harm-reduction strategies – designed by the Joint United Nations Programme on HIV/AIDS (UNAIDS) – include education and the provision of clean needles, syringes, and opioid substitution therapy.

The researchers estimate that there are 626,000 PWID in the MENA. They found evidence of HIV epidemics among PWID in at least one-third of MENA countries, most of which are emerging concentrated epidemics and with HIV prevalence overall in the range of 10%-15%.

The authors note that "some of the epidemics have however already reached considerable levels including some of the highest HIV prevalence among PWID globally (87.1% in Tripoli, Libya)".

The data also revealed a high injecting and sexual risk environment among PWID in MENA (for example, on average, about a quarter of PWID shared a needle or syringe in their most recent injection and only a third reported ever using condoms) that, together with a high prevalence of Hepatitis C and sexually transmitted infections among PWID, indicates the potential for more and larger HIV epidemics.

Analysis of notified HIV cases indicated that in 2011, injecting drug use contributed 20%, 23%, 38%, 49%, and 60% of all newly notified cases in this year in Egypt, Pakistan, Bahrain, Afghanistan, and Iran, respectively. A smaller contribution was reported in the remaining countries.

The researchers note that 'concentrated HIV epidemics among PWID' were observed in Iran, Pakistan, Afghanistan, Egypt, Morocco, and Libya. They point

out that Iran is the only country with conclusive evidence for an established concentrated epidemic at the national level. The first HIV outbreaks among PWID in Iran were reported around 1996. HIV prevalence then increased considerably in the early 2000s, reaching a peak by the mid-2000s. HIV prevalence in the 2006 and 2010 multi-city IBBSS (Integrated Biological and Behavioural Surveillance Survey) was stable at 15%. The evidence suggests that the HIV epidemic among PWID in Iran is now established at concentrated levels of about 15%.

Emerging concentrated epidemics were seen in Pakistan, Afghanistan, Egypt, and Morocco. For example, in Pakistan, after almost two decades of very low HIV prevalence among PWID, a trend of increasing prevalence was observed after 2003. The authors say this trend is national and ongoing, reaching over 40% in recent studies and with no evidence yet of stabilization.

The researchers found that the HIV epidemic among PWID is low-level in Jordan, Lebanon, Tunisia, Occupied Palestinian Territory, and Syria.

They note that in Bahrain and Oman, data show that there are, or have been, at least some pockets of HIV infection among PWID, with reported prevalence up to 21.1% in Bahrain and 27% in Oman, but hasten to add that the quality of evidence is insufficient to indicate whether there is a concentrated epidemic in these two countries.

Interestingly, they point out that levels of basic HIV/AIDS knowledge among PWID in MENA was high overall with more than 90% having some knowledge of HIV/AIDS, but add that there was considerable variation in the proportion of PWID who correctly identified reuse of non-sterile needles as a mode of HIV transmission.

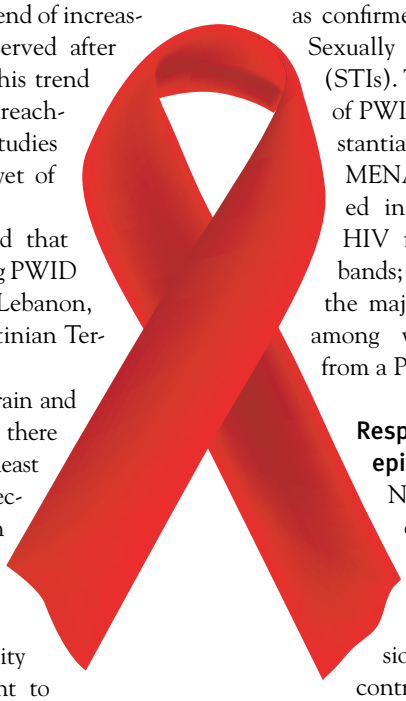
Overlap of risk behaviour

An important finding made by the study authors is that they found considerable overlap of risk behaviour between PWID and other high-risk groups in MENA.

"This could play a role in emerging HIV epidemics, as it creates opportunities for an infection circulating in one population to be bridged to another one."

In Pakistan, the rapidly growing HIV epidemic among PWID was followed closely by an emerging epidemic among transgender sex workers. A similar pattern, but in the opposite direction, may have occurred in Egypt where an emerging epidemic among MSM (males who have sex with males) preceded the nascent epidemic among PWID.

The majority of PWID are sexually active and about half are married. They often engage in risky sexual behaviour as confirmed by the prevalence of Sexually Transmitted Infections (STIs). This puts sexual partners of PWID at risk of HIV. A substantial number of infections in MENA have been documented in women who acquired HIV from their PWID husbands; and in some countries, the majority of HIV infections among women were acquired from a PWID sexual partner.



Response to emerging epidemic

Not only does the region overall lag behind in responding to the emerging HIV epidemics among PWID; on occasions misguided policy has contributed to these epidemics. Most notably in Libya, the large HIV epidemic among PWID appears to have been exacerbated by restrictions imposed on the sale of needles and syringes at pharmacies in the late 1990s.

Overall, harm reduction programs still remain limited in MENA, and there is a need to integrate such programs within the socio-cultural framework of the region. Several countries though have made significant strides in initiating such programs in recent years. Needle/syringe exchange programs are currently implemented in nine countries, and opioid substitution therapy in five. Iran remains the leader in the provision of harm reduction services to PWID with the highest coverage of needle/syringe exchange programs in the region. It appears also to be the only country in MENA to provide such services in prisons and to provide female-operated harm reduction services targeted at female drug users.

Not only does the region overall lag behind in responding to the emerging HIV epidemics among PWID; on occasions misguided policy has contributed to these epidemics.

The researchers note that other countries in the region have also made progress in revising their policies, adopting harm reduction programs, and integrating such programs in their national strategic plans such as Afghanistan, Egypt, Lebanon, Morocco, Pakistan, and Tunisia.

They point out that non-governmental organizations (NGOs) have been instrumental to the success in harm reduction in MENA. "In countries where NGOs are strong, HIV response has been also strong."

Window of opportunity

The authors conclude that the window of opportunity to control the emerging epidemics should not be missed. HIV prevention among PWID must be made a priority for HIV/AIDS strategies in MENA; and obstacles must be addressed for the provision of comprehensive services and enabling environments for PWID.

"There is need to review current HIV programs among PWID in light of the emerging epidemics, and to develop service delivery models with embedded links between community-based prevention (needle/syringe exchange programs and condom provision), HIV testing, and treatment (opioid substitution and Antiretroviral Therapy)."

Reference

HIV among People Who Inject Drugs in the Middle East and North Africa: Systematic Review and Data Synthesis. Ghina R Mumtaz, et al. *PLOS Medicine*. June 17, 2014.
doi: 10.1371/journal.pmed.1001663

Transforming health care in Tunisia with community-driven programmes

Dr Chedly Maksoudi volunteered to participate in the Citizens' Jury for health because he was concerned that health services were distributed unevenly between different regions of Tunisia: "The inequality of the system leaves people uncared for and that is simply unacceptable. There is also a vast difference in quality of care between the public and private sector. I see sick people who are dying of things that are preventable, because of a lack of health care workers, medicines, and in some cases delayed diagnosis due to a break-down in service delivery."

Dr Maksoudi works in the Intensive Care Unit at the Regional Hospital of Kasserine, Tunisia; an area without many resources for health care, which causes delayed diagnosis. This summer Dr Maksoudi was one of 100 volunteers selected out of 3600 lottery contestants to form the Jury. Jury members were asked to guide the government on: health system-financing, neighbourhood health services, revitalizing and rebuilding confidence in the health sector, and promoting healthy lifestyle choices.

People-centred approach

The 'Citizens' Jury' is part of a new Social Dialogue Programme supported by the WHO through the Universal Health Coverage Partnership. Dr Marie-Paule Kieny, Assistant Director-General at WHO, explains that: "Involving the community is part of a people-centred approach to health systems that aims to motivate individuals to make decisions about their own health – making health systems more efficient and effective."

Dr Maksoudi, who has been in the public health sector for 15 years, says that the health-care system needs to adjust to better serve the people of Tunisia because: "I am a citizen before being a doctor and there have been a lot of flaws in the health care system of Tunisia for many years now."

This Programme builds on evidence-based research, coupled with workshops, focus groups, and town hall meetings. Dr

Ann Lise Guisset, the Health Systems Advisor for WHO in Tunisia, explains that the programme made it a priority to include the entire community: "We had medical students go into each region and hand out invitations to citizens in parks and cafes explaining that people could to get involved and represent their community to help initiate change in the health system of Tunisia."

Faical Ben Salah, President of the Technical Committee on Societal Dialogue, was amazed by the population's enthusiasm: "The dynamic created by this programme has gone well beyond our expectations – we are hearing views from cross-sections of the population, from coastal fisherman to single mothers, schoolteachers, students, and health professionals."

Citizens' Jury's recommendations

Dr Maksoudi summarizes the findings saying that: "The 'Citizens' Jury's' recommendations focus on increasing solidarity in health financing to provide a more equitable health system with balanced care that respects all citizens."

The Social Dialogue Programme has brought together more than 4200 people from all walks of life in Tunisia since it started in 2012. In September 2014 the National Health Conference agreed unanimously to use the Citizens' Jury report in a formal declaration.

> When everyone stood up in favour of the declaration and the national anthem started playing in celebration – I had tears in my eyes because we have been working on this for so long and I could see that it would truly make a difference.

Interim Prime Minister, Mehdi Jomâa, announced at the Conference that: "The government pledges to establish an efficient and quality health system that is accessible to all citizens in all regions."

Next steps will involve creating a committee that includes citizens and oversees the implementation of pilot programmes based on the declaration. With financial and technical support from WHO and other partner organizations, the Programme will work to strengthen service delivery and community based activities.

Dr Guisset describes an emotional moment from the Conference saying: "When everyone stood up in favour of the declaration and the national anthem started playing in celebration – I had tears in my eyes because we have been working on this for so long and I could see that it would truly make a difference." MEH

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Expansion of health facilities in Iraq a decade after the US-led invasion, 2003–2012

By Valeria Cetorelli, and Nazar P Shabila

Abstract

Background
In the last few decades, Iraq's health care capacity has been severely undermined by the effects of different wars, international sanctions, sectarian violence and political instability. In the aftermath of the 2003 US-led invasion, the Ministry of Health has set plans to expand health service delivery, by reorienting the public sector towards primary health care and attributing a larger role to the private sector for hospital care. Quantitative assessments of the post-2003 health policy outcomes have remained scant. This paper addresses this gap focusing on a key outcome indicator that is the expansion of health facilities.

Methods
The analysis is based on data on health facilities provided by the World Health Organisation and Iraq's Ministry of Health. For each governorate, we calculated the change in the absolute number of facilities by type from early 2003 to the end of 2012. To account for population growth, we computed the change in the number of facilities per 100,000 population. We compared trends in the autonomous northern Kurdistan region, which has been relatively stable from 2003 onwards, and in the rest of Iraq (centre/south), where fragile institutions and persistent sectarian strife have posed major challenges to health system recovery.

Results
The countrywide number of primary health care centres per 100,000 population rose from 5.5 in 2003 to 7.4 in 2012. The extent of improvement varied significantly within the country, with an average increase of 4.3 primary health care centres per 100,000 population in the Kurdistan region versus an average increase of only 1.4 in central/southern Iraq. The average number of public hospitals per 100,000 population rose from 1.3 to 1.5 in Kurdistan, whereas it remained at 0.6 in centre/south. The average number of private hospitals per 100,000 population rose from 0.2 to 0.6 in Kurdistan, whereas it declined from 0.3 to 0.2 in centre/south.

Conclusions
The expansion of both public and private health facilities in the Kurdistan region appears encouraging, but still much should be done to reach the standards of neighbouring countries. The slow pace of improvement in the rest of Iraq is largely attributable to the dire security situation and should be a cause for major concern.

Whole Exome Sequencing in the clinical context

Genomics is making faster progress than any other area of biomedical research. Especially the advances in the field of Next Generation Sequencing (NGS) development and its clinical applications make this an exciting time for the study of how genetic variations affect health and disease. The ultimate game changer in clinical genetics will be the routine sequencing of individual genomes, but until this becomes feasible, targeted approaches are the more convenient interim solution.

It has been suggested that the impact that NGS technologies will have on clinical genetics during the upcoming years will be comparable to the introduction of X-rays to medicine many decades ago. After the tremendous impact of NGS technologies on the discovery of disease-causing genes during the last four years, we are now witnessing the introduction of these technologies for diagnostic applications. Although Whole Genome Sequencing (WGS) is becoming part of the clinical practice for some specific medical problems, until it can offer the sensitivity required for routine diagnostic purposes at an affordable price, where depth is preferred instead of width in terms of sequence coverage, targeted NGS will be the preferred method in diagnostic companies, as it exploits the full potential of the NGS devices to process several samples and loci in parallel.

NGS, combined with targeted enrichment and robust bioinformatics analyses, represents an important milestone in genomics, revolutionizing the way geneticists screen for mutations in human disorders which cause diseases.

When exome sequencing is applied to the study of Mendelian diseases, it is done under the assumption that this group of diseases is caused by rare genetic variants with complete or very high penetrance. Exome sequencing has achieved ground-breaking success in identifying those genes associated with Mendelian diseases, as demonstrated by numerous recent publications.

The transition of NGS technologies over the next years, from basic research to the routine detection of mutations in genetic loci with well documented diagnostic value, will take advantage not only of the new benchtop NGS platforms, but also of automated workflows and simplified bioinformatics analyses able to generate medical report-like outputs adapted to clinical laboratories. However, the correct interpretation, storage, and dissemination of the large amount of the datasets generated remain a major challenge on the path of NGS to medical applications.

Genomics as an enhanced approach to healthcare has the potential to transform the quality of life worldwide, allowing the widespread implementation of more tailored medical care based on individual risk. It seems quite likely that whole human genome sequencing will be a routine component of each and every health record available to both patients and physicians for predictive and preventive healthcare purposes. This is poised to have a transforming effect in clinical practice, including diagnosis and decision-making for appropriate therapeutic procedures.

by Daniel Trujillano, Director of Bioinformatics, Centogene AG

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› Genomics as an enhanced approach to healthcare has the potential to transform the quality of life worldwide, allowing the widespread implementation of more tailored medical care based on individual risk.

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Background

Health systems suffer a heavy toll in fragile and conflict affected states[1]. Iraq is an exemplifying case. Throughout the 1970s and 1980s, Iraq's health system used to be one of the most advanced in the Middle East[2]. The system was highly centralised, hospital-oriented and fully government-subsided with revenues from the nationalised oil industry[3]. However, in the last few decades the country's health care capacity has been severely undermined by the effects of different wars, international sanctions, sectarian violence and political instability.

Since the 1980–1988 Iran-Iraq War, resources were progressively diverted from the health sector[2]. During the 1990–1991 Gulf War and the following 13 years of embargo and economic sanctions, public health budget was cut by 90% and buildings and equipment fell into disrepair[2]. At the time of the 2003 US-led invasion, serious damages occurred from widespread looting and destruction of facilities[4]. The violence-induced exodus of thousands of doctors and nurses in the subsequent years further weakened the health system[5].

The urgency of health care rehabilitation was clear in the aftermath of the invasion. After 2003, Iraq's Ministry of Health has set plans to expand health service delivery, moving towards a decentralised primary health care model[6]. National development plans have also called for the emergence of a private sector, which may potentially contribute to enhance the provision of secondary and tertiary care[7]. The separate Ministry of Health of the autonomous Iraqi Kurdistan region has shared a similar approach, namely a reorientation of the public sector towards primary health care and a larger role to the private sector for hospital care[8].

The shortcomings of the post-2003 health policy framework have been discussed extensively, in particular its lack of specificity and commitment to clear long-term objectives[9,10]. Nevertheless, quantitative assessments of the policy outcomes have remained scant. This paper addresses this gap focusing on a key outcome indicator that is the expansion in number, type and location of health facilities per population. The study intends to contribute to the growing body of academic and policy literature on post-conflict health system recovery.

Street scene, Najaf.

Strengthening health infrastructure is deemed a critical component for health system recovery in Iraq as elsewhere[11]. Virtually all health strategies in countries emerging from conflict include plans for an adequate network of equitably distributed health facilities to meet the population's health needs[12-16]. Studies have shown that successful infrastructure programmes, such as the expansion of health facilities in underserved areas, increase access to services and may also foster the process of peace building and state legitimacy[17-20].

However, this is an arduous and complex undertaking[21]. Previous research has stressed the importance of inclusive political settlements to bring the stability required to allow a successful implementation of any reconstruction and development plans[22,23]. Such stability has clearly lacked in post-2003 Iraq, characterised by fragile institutions and persistent sectarian strife[24,25]. The situation has been different in the autonomous Kurdistan region. Unlike the rest of the country, this region has not suffered from generalised violence and political uncertainty, and this has guaranteed more favourable conditions for development[9].

These differences in political context within the country make Iraq a useful case study to assess variation in health policy outcomes. The following analysis compares changes in the number of health facilities per population in the autonomous Kurdistan region, which has been relatively stable from 2003 onwards, and in the rest of Iraq, where persistent insecurity has posed major challenges to health system recovery. The focus is on the expansion of primary health care centres (PHCCs), public hospitals and private hospitals a decade after the US-led invasion. We discuss the insights gained from such comparison and suggest policy implications for the coming years.

Iraq's health system

The organisational structure of the Iraqi health system dates back to 1970s and consists of two main levels: the Ministry of Health as a central planning level, and the Directorates of Health as a local administrative level in each governorate[3]. After the Gulf War, the three northern Kurdish governorates of Dohouk, Erbil and Al-Sulaimaniya became a de facto autonomous region under UN auspices, and a separate Ministry of Health was established for the Kurdistan regional government with much the same structure[26].

In the public sector, health services are provided through a network of PHCCs and public hospitals at very low charges. The PHCCs provide preventive and basic curative services. The main centres are located in urban areas and are typically administered by doctors, while smaller centres are located in rural areas and are generally staffed with medical auxiliaries only[27]. Recent surveys have highlighted significant impediments to delivering adequate services in the PHCCs, including poor or-

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ganisation and shortage of manpower and medications[28,29]. Despite numerous problems, the PHCCs are recognised as very important sources of health care provision, particularly for the poor[30].

For secondary and tertiary care, patients are referred from PHCCs to hospitals. However, it is estimated that only about 40% of Iraqis have access to referral services due to the inadequate number and uneven distribution of public hospitals[31]. Secondary and tertiary care are also provided by small private hospitals. Since there are no health insurance schemes in Iraq, private health care is met out-of-pocket and is well beyond the reach of many Iraqis[21]. Moreover, although private hospitals are licensed by the Ministry of Health, they are still largely outside the national health supervision system[32].

Methods

This study is based on data on health facilities provided by the World Health Organisation (WHO) and Iraq's Ministry of Health for the years 2003 and 2012 respectively. In early 2003, the WHO published a detailed record of all functioning health facilities for each Iraqi governorate by type. The inventory and categorisation of facilities was carried out by the WHO staff a few months before the US-led invasion and was part of a broad attempt to evaluate the country's health care status[33]. Comparable data on the number and types of functioning health facilities were extracted from the 2012 Annual Report of Iraq's Ministry of Health. This is the latest report available and is mainly a compilation of institutional and administrative records received from the Directorates of Health[34].

We did not find any discrepancy in the classification of facilities between the two sources that might affected the comparison. Data from both sources appear accurate. The 2003 WHO data were very detailed, including facility name and district code. The 2012 Ministry of Health report did not provide such level of details. To ascertain data quality, we crosschecked information with other reports from previous years and we did not detect any inconsistencies.

The population of each governorate for the year 2003 and 2012 was also obtained from the WHO and Ministry of Health reports. Since no census has been conducted in Iraq after 1997, population data for both years rely on government estimates (see Additional file 1: Table S1)[33,34].

Table S1. Estimated population of Iraq according to governorates in 2003 and 2012.

Governorates	Population (thousand)		Annual growth rate (%)
	2003	2012	2003-2012
Baghdad	6,500	7,255	+1.2
Basrah	1,982	2,602	+3.1
Nineveh	2,521	3,354	+3.3
Maysan	848	997	+1.8
Al-Dewaniya	916	1,162	+2.7
Diala	1,271	1,478	+1.6
Al-Anbar	1,271	1,599	+2.6
Babylon	1,409	1,864	+3.2
Kerbala	742	1,094	+4.7
Kirkuk	881	1,433	+6.3
Wasit	939	1,241	+3.2
Thi-Qar	1,539	1,883	+2.2
Al-Muthanna	570	736	+2.9
Salah Al-Deen	976	1,441	+4.8
Al-Najaf	950	1,320	+3.9
Centre/South	23,315	29,459	+2.6
Erbil	1,334	1,658	+2.4
Dohouk	817	1,159	+4.2
Al-Sulaimaniya	1,606	1,932	+2.0
Kurdistan	3,757	4,749	+2.6
Total Iraq	27,072	34,208	+2.6

We used these data to quantify progress and setbacks in expanding health service delivery infrastructure. Firstly, we calculated the change in the absolute number of health facilities from early 2003 to the end of 2012. To account for population growth, we computed the change in the number of facilities per 100,000 population. We compared the prevalence of each type of facilities in the autonomous northern Kurdistan region and in the rest of Iraq (centre/south), and among the different governorates. We analysed trends in light of the national plans of reorienting the public health system towards primary health care and attributing a larger role to the private sector for hospital care.

The types of health facilities included in the analysis are: PHCCs (both large and small), public hospitals (all general hospitals at city, district and sub-district levels –if existing– and all specialty hospitals like paediatric, maternity, emergency, surgical, psychiatric and cardiology hospitals), and private hospitals (both secondary and tertiary). Since complete information about types of health services and personnel at each facility and number of beds at each hospital were not available, these important aspects could not be addressed in this paper.

Results

Expansion of primary health care centres

Table 1 shows changes in the number of PHCCs between 2003 and 2012. In 2003, there was an average of 5.5 PHCCs per 100,000 population, 2.7 small centres administered by medical auxiliaries and 2.8 large centres administered by doctors. These facilities were unevenly distributed across the country, ranging from 1.9 per 100,000 population in Baghdad to 21.6 in Al-Sulai-

maniya. On average, the Kurdistan region exhibited a higher number of PHCCs per 100,000 population than the rest of Iraq.

After a decade, the absolute number of PHCCs increased in all governorates although not everywhere at the same pace. Improvements in the absolute number of facilities were partially, and in a few cases totally, offset by the high rate of population growth. On average, there were 7.4 PHCCs per 100,000 population in 2012, about half of which were large centres administered by doctors. Although the rate of population growth was approximately the same in Kurdistan and central/southern Iraq, the gap in the number of PHCCs per 100,000 population widened from 2003 to 2012, with an average increase of 4.3 PHCCs per 100,000 population in Kurdistan versus an average increase of only 1.4 PHCCs per 100,000 population in centre/south. Differences across governorates also persisted. In 2012, the number of small PHCCs ranged from 0.1 to 5.9 per 100,000 population in the central/southern governorates and from 6.7 to 20.2 in the Kurdish governorates. The number of large centres ranged from 2.6 to 4.3 in the central/southern governorates and from 5.4 to 6.8 in the Kurdish governorates.

Expansion of public and private hospitals

Changes in the number of public and private hospitals are reported in Table 2. In 2003, there was an average of 0.7 public hospitals per 100,000 population. Differences across governorates were less pronounced than for PHCCs. The number of public hospitals ranged from 0.4 per 100,000 population in Thi-Qar to 1.8 in Al-Sulaimaniya. On average, the number of public hospitals per 100,000 population was higher in the Kurdistan region than in the rest of Iraq.

In 2012, the countrywide average number of public hospitals per 100,000 population was still 0.7. However, the distribution of hospitals across governorates changed significantly. In most central/southern governorates, the limited improvements in the absolute number of public hospitals were completely offset by population growth. As a result, the average number of public hospitals per 100,000 population in centre/south was 0.6 in 2012 as in 2003. By contrast, the Kurdistan region experienced some progress, with the average number of public hospitals per 100,000 population rising from 1.3 to 1.5. At the governorate level, the number of public hospitals in 2012 ranged from 0.4 to 0.8 per 100,000 population in the central/southern governorates and from 1.1 to 1.7 in the Kurdish governorates.

Private hospitals in 2003 were very few and mostly concentrated in Baghdad, where the number per 100,000 population was 0.6. In the other governorates, the number of private hospitals per 100,000 population ranged from 0.0 in Kerbala, Al-Muthanna, Salah Al-Deen and Al-Najaf to 0.3 in Erbil. At that time, the average number of private hospitals per 100,000 population was relatively similar in Kurdistan and centre/south.

Over the period 2003–2012, the num-

Table 1. Number of primary health care centres (PHCCs) in Iraq according to governorates in 2003 and 2012

Governorates	Small PHCCs per 100,000 population (number)		Large PHCCs per 100,000 population (number)		Total PHCCs per 100,000 population (number)		Change in PPHCs per 100,000 population (number)
	2003	2012	2003	2012	2003	2012	2003-2012
Baghdad	0.1 (5)	0.1 (9)	1.8 (119)	2.9 (207)	1.9 (124)	3.0 (216)	+1.1 (+92)
Basrah	0.4 (8)	0.3 (8)	3.1 (62)	4.3 (113)	3.5 (70)	4.6 (121)	+1.1 (+51)
Ninaveh	1.7 (44)	1.6 (54)	2.9 (73)	3.0 (102)	4.6 (117)	4.6 (156)	+0.0 (+39)
Maysan	1.3 (11)	5.1 (51)	2.1 (18)	2.9 (29)	3.4 (29)	8.0 (80)	+4.6 (+51)
Al-Dewaniya	2.3 (21)	2.8 (33)	2.7 (25)	3.3 (38)	5.0 (46)	6.1 (71)	+1.1 (+25)
Diala	1.9 (24)	2.2 (32)	2.3 (29)	4.3 (64)	4.2 (53)	6.5 (96)	+2.3 (+43)
Al-Anbar	5.3 (67)	5.9 (95)	3.9 (50)	4.1 (66)	9.2 (117)	10.0 (161)	+0.8 (+44)
Babylon	2.6 (36)	3.2 (59)	2.3 (32)	2.8 (52)	4.9 (68)	6.0 (111)	+1.1 (+43)
Kerbala	0.5 (4)	2.1 (23)	2.7 (20)	2.6 (28)	3.2 (24)	4.7 (51)	+1.5 (+27)
Kirkuk	2.6 (23)	4.2 (60)	4.1 (36)	3.8 (54)	6.7 (59)	8.0 (114)	+1.3 (+55)
Wasit	0.6 (6)	1.7 (21)	2.7 (25)	3.4 (42)	3.3 (31)	5.1 (63)	+1.8 (+32)
Thi-Qar	1.9 (29)	3.7 (70)	2.1 (32)	3.6 (68)	4.0 (61)	7.3 (138)	+3.3 (+77)
Al-Muthanna	0.2 (1)	3.5 (26)	3.9 (22)	4.2 (31)	4.1 (23)	7.7 (57)	+3.6 (+34)
Salah Al-Deen	3.4 (33)	3.4 (49)	4.0 (29)	3.4 (49)	7.4 (72)	6.8 (98)	-0.6 (+26)
Al-Najaf	2.1 (20)	2.5 (33)	1.5 (14)	3.3 (43)	3.6 (34)	5.8 (76)	+2.2 (+42)
Centre/South	**1.4 (332)**	**2.1 (623)**	**2.6 (596)**	**3.3 (986)**	**4.0 (928)**	**5.4 (1,609)**	**+1.4 (+681)**
Erbil	6.4 (86)	10.9 (180)	4.6 (61)	5.4 (90)	11.0 (147)	16.3 (270)	+5.3 (+123)
Dohouk	3.9 (32)	6.7 (78)	5.9 (48)	6.8 (79)	9.8 (80)	13.5 (157)	+3.7 (+77)
Al-Sulaimaniya	17.7 (284)	20.2 (391)	3.9 (63)	5.7 (111)	21.6 (347)	25.9 (502)	+4.3 (+155)
Kurdistan	**10.7 (402)**	**13.7 (649)**	**4.6 (172)**	**5.9 (280)**	**15.3 (574)**	**19.6 (929)**	**+4.3 (+355)**
Total Iraq	**2.7 (734)**	**3.7 (1,272)**	**2.8 (768)**	**3.7 (1,266)**	**5.5 (1,502)**	**7.4 (2,538)**	**+1.9 (+1,036)**

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Table 2. Number of public and private hospitals in Iraq according to governorates in 2003 and 2012

Governorates	Public hospitals per 100,000 population (number)		Change in public hospitals per 100,000 population (number)	Private hospitals per 100,000 population (number)		Change in private hospitals per 100,000 population (number)
	2003	2012	2003-2012	2003	2012	2003-2012
Baghdad	0.6 (38)	0.6 (46)	+0.0 (+8)	0.6 (41)	0.5 (36)	-0.1 (-5)
Basrah	0.5 (10)	0.5 (13)	+0.0 (+3)	0.2 (4)	0.2 (4)	+0.0 (+0)
Nineveh	0.5 (13)	0.4 (14)	-0.1 (+1)	0.2 (4)	0.1 (3)	-0.1 (-1)
Maysan	0.8 (7)	0.6 (6)	-0.2 (-1)	0.1 (1)	0.0 (0)	-0.1 (-1)
Al-Dewaniya	0.8 (7)	0.5 (6)	-0.3 (-1)	0.2 (2)	0.3 (3)	+0.1 (+1)
Diala	0.6 (8)	0.7 (10)	+0.1 (+2)	0.2 (2)	0.2 (3)	+0.0 (+1)
Al-Anbar	0.9 (11)	0.7 (11)	-0.2 (+0)	0.1 (1)	0.1 (2)	+0.0 (+1)
Babylon	0.6 (8)	0.8 (15)	+0.2 (+7)	0.1 (2)	0.2 (4)	+0.1 (+2)
Kerbala	0.7 (5)	0.5 (5)	-0.2 (+0)	0.0 (0)	0.2 (2)	+0.2 (+2)
Kirkuk	0.7 (6)	0.5 (7)	-0.2 (+1)	0.2 (2)	0.1 (2)	-0.1 (+0)
Wasit	1.0 (9)	0.6 (8)	-0.4 (-1)	0.1 (1)	0.0 (0)	-0.1 (-1)
Thi-Qar	0.4 (6)	0.5 (9)	+0.1 (+3)	0.1 (1)	0.1 (2)	+0.0 (+1)
Al-Muthanna	0.7 (4)	0.5 (4)	-0.2 (+0)	0.0 (0)	0.0 (0)	+0.0 (+0)
Salah Al-Deen	0.7 (7)	0.6 (9)	-0.1 (+2)	0.0 (0)	0.1 (2)	+0.1 (+2)
Al-Najaf	0.6 (6)	0.5 (7)	-0.1 (+1)	0.0 (0)	0.2 (3)	+0.2 (+3)
Centre/South	**0.6 (145)**	**0.6 (170)**	**+0.0 (+25)**	**0.3 (61)**	**0.2 (66)**	**-0.1 (+5)**
Erbil	0.9 (12)	1.4 (23)	+0.5 (+11)	0.3 (4)	0.8 (13)	+0.5 (+9)
Dohouk	0.9 (7)	1.1 (12)	+0.2 (+6)	0.1 (1)	0.3 (3)	+0.2 (+2)
Al-Sulaimaniya	1.8 (29)	1.7 (33)	-0.1 (+4)	0.1 (2)	0.7 (14)	+0.6 (+12)
Kurdistan	**1.3 (48)**	**1.5 (69)**	**+0.2 (+21)**	**0.2 (7)**	**0.6 (30)**	**+0.4 (+23)**
Total Iraq	**0.7 (193)**	**0.7 (239)**	**+0.0 (+46)**	**0.3 (68)**	**0.3 (96)**	**+0.0 (+28)**

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ber of private hospitals exhibited diverging trends in Kurdistan and central/southern Iraq. In centre/south, the number of private hospitals per 100,000 population declined from 0.3 to 0.2. Some central/southern governorates, including Baghdad, experienced a reduction even in the absolute number of these hospitals. By contrast, in Kurdistan the number of private hospitals per 100,000 population rose from 0.2 to 0.6.

Discussion

This study has been the first to analyse the expansion of health facilities in post-2003 Iraq. The analysis has revealed some progress, but also many persistent challenges. Over 1,000 new PHCCs and 46 public hospitals were functioning in 2012 compared with 2003. The relatively larger amount of investments in PHCCs than in public hospitals is consistent with the Ministry of Health plan of reorienting the public health sector towards primary care[7,8]. Still in 2012 there was a countrywide average of only 7.4 PHCCs per 100,000 population compared with over 20 PHCCs per 100,000 population in neighbouring Jordan and Iran[35,36]. Efforts to expand the provision of health services were hindered by the high rate of population growth, averaging 2.6% per annum. Due to population growth, the countrywide average number of public hospitals per 100,000 population in 2012 was still 0.7 as in 2003.

There were significant differences in the extent of improvement within the country. In particular, the gap in the average number of PHCCs and public hospitals per 100,000 population between the autonomous Kurdistan region and the rest of Iraq widened. The relatively better status of health infrastructure in Kurdistan originated in the post-1991 period and especially in the years of the Oil for Food Programme (OFFP) between 1996 and 2003. The OFFP was approved by the UN Security Council after 5 years of strict international sanctions and allowed Iraq to use revenues of oil sales for humanitarian needs[37]. The programme was managed directly by UN agencies in Kurdistan and by the Iraqi government in the rest of the country. During this period, new health facilities, particularly PHCCs, were built in Kurdistan by UNICEF and UN-Habitat[38], whereas government investments in health infrastructure in central/southern Iraq were very limited[2].

After 2003, central/southern Iraq has been affected by widespread insurgent and sectarian violence. Security concerns had dramatic consequences on budget allocation and feasibility of health infrastructure projects. For example, almost 50% of Baghdad governorate budget during the years of the occupation was devoted to security, with the health sector receiving only 1% of governorate funds[39]. Since most existing health facilities in centre/south had fallen into disrepair during the sanctions and had suffered further damages following the 2003 invasion, a substantial proportion of total health expenditure had to be used for repairs and renovations[40]. By contrast, the Kurdistan region has remained relatively safe from 2003 onwards. Since there was no fighting in the region, funds from coalition forces were invested mainly in humanitarian fields, including construction of new health facilities[41]. The more secure and stable situation has also allowed the Kurd-

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istan regional government to achieve a higher health expenditure than the central government of Baghdad[39].

The widening gap in health infrastructure between the Kurdistan region and the rest of Iraq is also related to the expansion of the private sector as 23 new private hospitals were opened in Kurdistan. Since 2007, the Kurdistan regional government has adopted a flexible investment policy which has attracted an increasing number of local and foreign investors in a variety of sectors, including health care[42]. The Ministry of Health of Baghdad has also recognised that the private sector has a potentially important role in improving health service provision[7]. However, insecurity and political instability continue to discourage private investments in central/southern Iraq, and the violence-induced outmigration of doctors has led to the closure of a few private hospitals operating during the pre-2003 period[8].

This study adds to the limited documented knowledge about the expansion of health facilities in countries emerging from conflict. It provides an insight into the adverse effect of continuing insecurity and instability on health system recovery, and confirms the importance of inclusive political settlements in enabling successful reconstruction and development plans. The relevance of this paper goes beyond the specific context of Iraq and it can serve as a case study for similar countries where strengthening health infrastructure is a main challenge. A slow pace of reconstruction process due to an uncertain political context has also been noted in other countries emerging from conflict. In the case of Iraq, the comparison between Kurdistan and centre/south makes this particularly evident. For instance, Liberia, Sierra Leone and South Sudan have also experienced disappointingly slow health system rehabilitation efforts in the first few years after the end of major hostilities, due to a lack of legitimacy or weak leadership of the post-conflict governments[15,43,44]. While these countries have gradually overcome the political uncertainty and consolidated their institutions, the political situation of central/southern Iraq a decade after the US-led invasion has remained insecure and fragmented. In fact, the recent wave of violence have further undermined state legitimacy and led to the complete disintegration of health services in the areas controlled by Islamist rebels[45].

Despite the relatively better performance of the Kurdistan region in the expansion of health infrastructure, poor governance, corruption and resource mismanagement have slowed down the pace of development also in this region[26]. More transparent policy-making process and rigorous budgeting and monitoring systems are needed, at both the central and governorate levels, to accelerate progress in the coming years.

The data used in this study have a number of limitations. As noted in the Methods section, information on health facilities for the years 2003 and 2012 were obtained from two different sources, although we did not find any discrepancy or inconsistencies that might undermine the comparison. These data did not permit to address important issues concerning quality of care and equitable access to services. While we assessed changes in the number of health facilities, we could not take into account changes in the size, personnel and types of services provided in these facilities or their distribution between urban and rural areas and between wealthier and poorer districts. Moreover, we could not evaluate the effect that the rapid expansion of a largely unregulated private sector in the Kurdistan region had in terms of high-quality health care provision, and the risk that privatisation may pose in terms of affordability of care and related health inequities. The expansion of facilities is indeed necessary but not sufficient to ensure the right to health care for all Iraqis. Further research is needed to measure the performance and accessibility of public and private health facilities.

Conclusions

Continuing insecurity and political instability hamper both public and private investments in health infrastructure in countries emerging from conflict and thus pose major challenges to health system recovery. This is particularly evident in the case of Iraq a the decade after the 2003 US-led invasion. The autonomous Kurdistan region, which has been relatively stable from 2003 onwards, has experienced significant progress in expanding the number of public and private health facilities, although still much should be done to reach the standards of neighbouring countries. The situation in the rest of Iraq is a cause for major concern. The slow pace of improvement in the expansion of health facilities is largely attributable to the dire security situation. Due to persistent and growing insecurity, it is unlikely that significant private investments in the health sector will occur in the short-term. This highlights the need for the new Iraqi government, together with international donors, to urgently scale-up resources and commit to strengthening the network of health facilities in underserved areas. Promoting political inclusiveness, transparency in decision-making and accountability in public financial management should be priorities, at both the central and governorate levels.

Abbreviations

OFFP: Oil for Food Programme; PHCC: Primary health care centre; WHO: World Health Organisation.

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Competing interests

The authors declare that they have no competing interests.

Authors' contributions

VC and NPS conceptualised and designed the study. VC carried out the data analysis. VC and NPS prepared the manuscript. Both authors read and approved the final manuscript.

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World's largest clinical study of the human mind and consciousness at the time of death shows evidence of Near Death Experience

A four-year international study of 2060 cardiac arrest cases across 15 hospitals looks at the possibility of awareness during resuscitation – so called Near-Death Experiences (NDEs) and Out of Body Experiences (OBEs) – has produced a number of interesting findings which the researchers say deserves further 'genuine investigation without prejudice'.

Some of the study's findings include:

- The themes relating to the experience of death appear far broader than what has been understood so far, or what has been described as so called near-death experiences.
- In some cases of cardiac arrest, memories of visual awareness compatible with so called out-of-body experiences may correspond with actual events.
- A higher proportion of people may have vivid death experiences, but do not recall them due to the effects of brain injury or sedative drugs on memory circuits.
- Widely used yet scientifically imprecise terms such as near-death and out-of-body experiences may not be sufficient to describe the actual experience of death. Future studies should focus on cardiac arrest, which is biologically synonymous with death, rather than ill-defined medical states sometimes referred to as 'near-death'.

Recollections in relation to death, so-called out-of-body experiences or near-death experiences, are an often spoken about phenomenon which have frequently been considered hallucinatory or illusory in nature; however, objective studies on these experiences are limited.

In 2008, a large-scale study involving 2060 patients from 15 hospitals in the United Kingdom, United States and Austria was launched. The AWARE (AWAreness during REsuscitation) study, sponsored by the University of Southampton in the UK, examined the broad range of mental experiences in relation to death. Researchers also tested the validity of conscious experiences using objective markers for the first time in a large study to determine whether claims of awareness compatible with out-of-body experiences correspond with real or hallucinatory events.

Results of the study were published in December 2014 in the journal *Resuscitation* and are available online.

Dr Sam Parnia, Assistant Professor of

Critical Care Medicine and Director of Resuscitation Research at The State University of New York at Stony Brook, USA, and the study's lead author, explained: "Contrary to perception, death is not a specific moment but a potentially reversible process that occurs after any severe illness or accident causes the heart, lungs and brain to cease functioning. If attempts are made to reverse this process, it is referred to as 'cardiac arrest'; however, if these attempts do not succeed it is called 'death'. In this study we wanted to go beyond the emotionally charged yet poorly defined term of NDEs to explore objectively what happens when we die."

Thirty-nine per cent of patients who survived cardiac arrest and were able to undergo structured interviews described a perception of awareness, but interestingly did not have any explicit recall of events.

"This suggests more people may have mental activity initially but then lose their memories after recovery, either due to the effects of brain injury or sedative drugs on memory recall," explained Dr Parnia, who was an Honorary Research Fellow at the University of Southampton when he started the AWARE study.

Among those who reported a perception of awareness and completed further interviews, 46% experienced a broad range of mental recollections in relation to death that were not compatible with the commonly used term of NDE's. These included fearful and persecutory experiences. Only 9% had experiences compatible with NDEs and 2% exhibited full awareness compatible with OBE's with explicit recall of 'seeing' and 'hearing' events.

One case was validated and timed using auditory stimuli during cardiac arrest. Dr Parnia concluded: "This is significant, since it has often been assumed that experiences in relation to death are likely hallucinations or illusions, occurring either before the heart stops or after the heart has been successfully restarted, but not an experience corresponding with 'real' events when the heart isn't beating. In this case, consciousness and awareness appeared to occur during a three-minute period when there was no heartbeat. This is paradoxical, since the brain typically ceases functioning within 20-30 seconds of the heart stopping and doesn't resume again until the heart has been restarted. Furthermore, the detailed recollections of visual awareness in this case were consistent with verified events.

"Thus, while it was not possible to absolutely prove the reality or meaning of patients' experiences and claims of awareness, (due to the very low incidence [2%] of explicit recall of visual awareness or so called OBE's), it was impossible to disclaim them either and more work is needed in this area. Clearly, the recalled experience surrounding death now merits further genuine investigation without prejudice."

The researchers add that further studies are also needed to explore whether awareness (explicit or implicit) may lead to long term adverse psychological outcomes including post-traumatic stress disorder.

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http://dx.doi.org/10.1016/j.resuscitation.2014.09.004

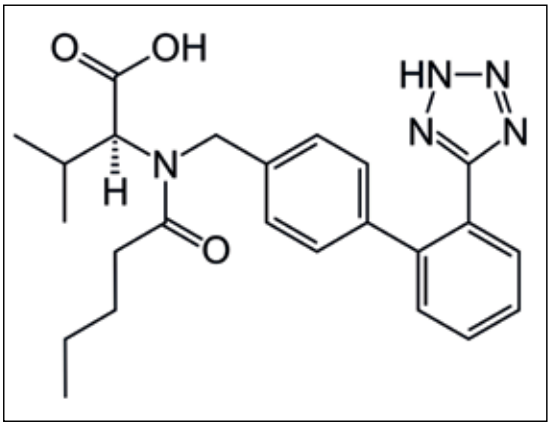
New heart failure drug looks set to become next gold standard

An investigational new heart failure drug could be poised to change the face of cardiology according to results presented at ESC Congress in Barcelona in August 2014.

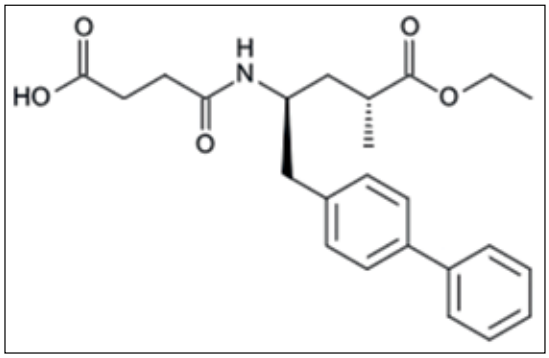
Findings from the PARADIGM-HF trial, published in the *New England Journal of Medicine*, "are extraordinarily powerful and compelling; they are destined to change the management of patients with chronic heart failure for years to come," said Milton Packer, MD, co-primary author of the study from University of Texas Southwestern Medical Center, in Dallas, Texas USA.

"This really is an astonishing result and a real breakthrough for patients with heart failure," added John McMurray, MD, the other co-primary author, from the University of Glasgow, UK.

Valsartan/sacubitril (codenamed LCZ696) is a combination drug consisting of two antihypertensives, valsartan and sacubitril, in a 1:1 mixture by molecule count. As of 2014 it is being developed by Novartis. The combination is often described as a dual-acting angiotensin receptor-neprilysin inhibitor (ARNi). The new agent has been granted Fast Track status by the United States Food and Drug Administration (FDA) – a designation which can expedite the review of new medicines intended to treat serious or life-threatening conditions. Fast Track designation also allows for rolling submission in the US, which Novartis said it expected to complete by the end of 2014. The company said it aims to file in Europe in early 2015.



Valsartan



Sacubitril

"To say that we are excited is an understatement. We are absolutely thrilled," said Dr. Packer.

"Given the survival advantage of LCZ696 over currently available drugs, once this drug becomes available, it would be difficult to understand why physicians would continue to use traditional angiotensin converting-enzyme inhibitors (ACEI) or angiotensin receptor blockers (ARB) for the treatment of heart failure."

PARADIGM-HF (Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in Heart Failure) first made headlines in spring 2014 when the trial was stopped early by an independent data monitoring committee based on evidence of the "overwhelming benefit" of LCZ696 compared to enalapril, an ACE inhibitor.

"We were surprised and delighted that the magnitude of the superiority was so great that the trial was stopped early by the ethical committee. That was an amazing event," said Dr. Packer.

"The magnitude of the advantage of LCZ696 over enalapril on cardiovascular mortality was at least as large as that of enalapril over placebo during long-term treatment," Dr. Packer reported. "This robust finding provides strong support for using this new approach instead of ACE inhibitors or ARBs in the treatment of chronic heart failure."

The trial

PARADIGM-HF randomised 8,399 patients with class II to IV heart failure and an ejection fraction if 40% or less

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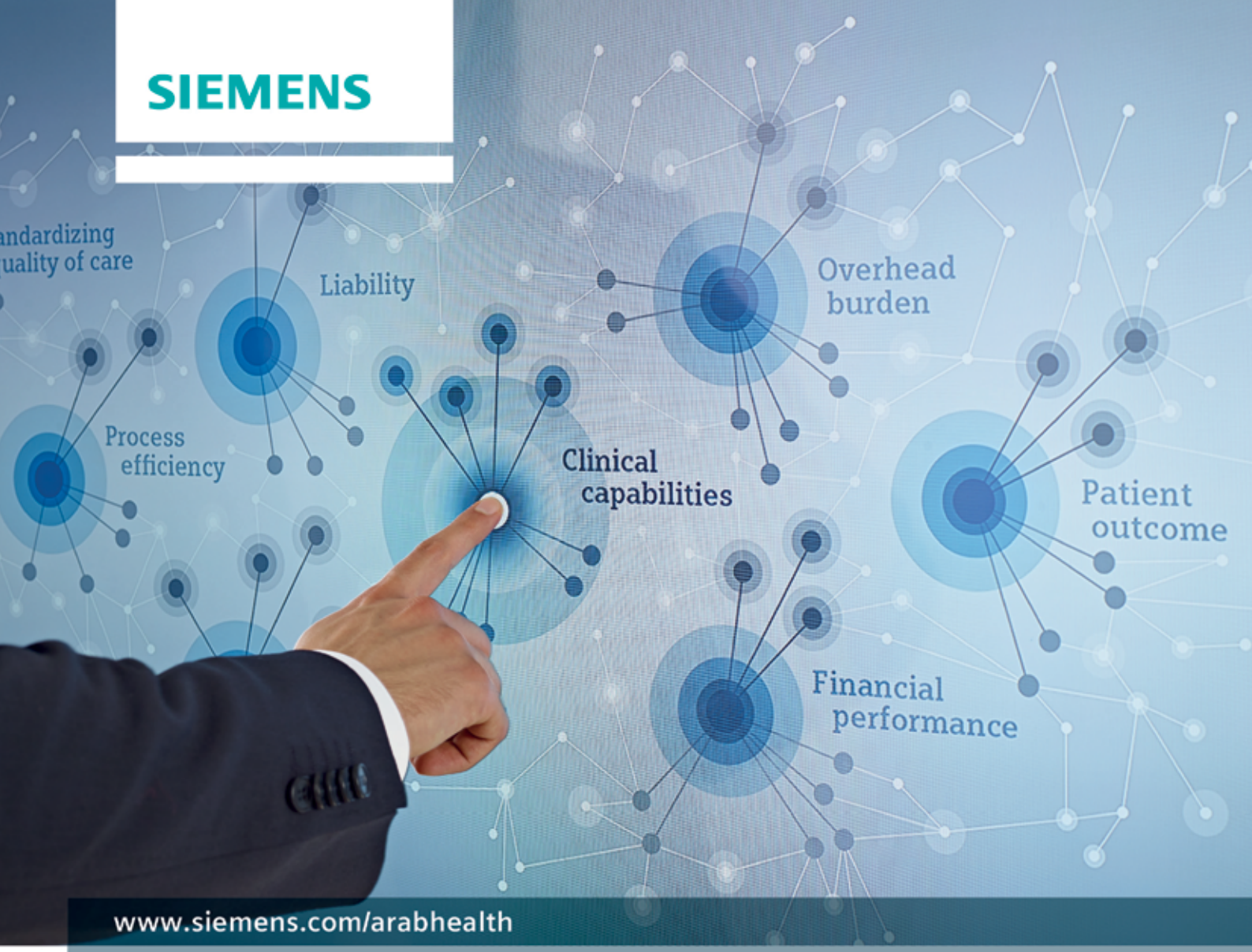

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to either LCZ696 200 mg twice daily (n=4,187), or enalapril 10 mg twice daily (n=4,212), in addition to recommended therapy.

When the trial was stopped early, after a median follow-up of 27 months, death from cardiovascular causes or hospitalisation for heart failure (the primary composite outcome) had occurred in 21.8% of the LCZ696 group and 26.5% of the enalapril group (hazard ratio [HR] 0.80; p=0.0000002).

Compared to enalapril, LCZ696 reduced the risk of death from cardiovascular causes by 20% (13.3% vs 16.5%; HR 0.80; p<0.0001), and the risk of hospitalisation for heart failure by 21% (12.8% vs 15.6%; HR 0.79; p<0.0001), noted Dr. Packer. This effect was consistent across all prespecified subgroups.

Secondary outcomes were also significantly improved by LCZ696, including all-cause mortality (17.0% vs 19.8%; HR 0.84; p<0.001) and symptoms and physical limitations of heart failure measured on the Kansas City Cardiomyopathy Questionnaire (p=0.001).

"The superiority of LCZ696 over enalapril was not accompanied by important safety concerns," added Dr. Packer. The LCZ696 group had more symptomatic hypotension compared to the enalapril group (14% vs 9.2%, p< 0.001) however this rarely required the discontinuation of treatment. In fact, fewer patients in the LCZ696 group stopped their study medication for any adverse event (10.7% vs 12.3%, P=0.03). Importantly, LCZ696 was not associated with an increased risk of serious angioedema, which was the main safety concern observed with a related medication – omapatrilat – in the OVERTURE trial.

Omapatrilat's association with life-threatening angioedema is related to its inhibition of ACE, neprilysin and aminopeptidase P, whereas LCZ696 avoids inhibition of ACE and aminopeptidase P.

"LCZ696 was specifically designed to minimise the risk of serious angioedema by combining the neprilysin inhibitor sacubitril (AHU377) and the ARB valsartan," explained Dr. Packer.

Findings of the PARADIGM-HF trial are particularly striking when considered in the context of the current standard of care in heart failure, concluded Professor McMurray.

> Compared to enalapril, LCZ696 reduced the risk of death from cardiovascular causes by 20% and the risk of hospitalisation for heart failure by 21%

"The superiority of LCZ696 wasn't over placebo – it was over the gold-standard dose of the gold-standard ACE inhibitor, the absolute corner-stone of guideline-recommended, conventional therapy," he said. "On top of that, these incremental benefits were obtained in patients fully treated with the other key pharmacological therapies for this condition such as beta-blockers and mineralocorticoid receptor antagonists. All that you can ask of any new therapy in heart failure (or other chronic diseases) is to make patients live longer, stay out of hospital and feel better – and those are exactly the benefits we demonstrated with LCZ696."

Reference
Angiotensin–Neprilysin Inhibition versus Enalapril in Heart Failure
– John J.V. McMurray, M.D., Milton Packer, M.D., et al
N Engl J Med 2014; 371:993-1004
September 11, 2014
doi: 10.1056/NEJMoa1409077

on the WEB **Youtube:** Cardiologists Mariell Jessup, Keith Fox, and Michel Komajda join study co-chairs John McMurray and Milton Packer to discuss PARADIGM-HF. *https://www.youtube.com/*

Low levels of the DHEA prohormone predict coronary heart disease

Men with low levels of DHEA in the blood run an increased risk of developing coronary heart disease events. The Sahlgrenska Academy study has been published in the *Journal of the American College of Cardiology*.

The term prohormone refers to the precursor of a hormone. DHEA is a prohormone that is produced by the adrenal glands and can be converted to active sex hormones. While the tendency of DHEA levels to fall with age was discovered long ago, the biological role of the prohormone is largely unknown.

Researchers at Sahlgrenska Academy, University of Gothenburg, have now shown that elderly men with low levels of DHEA in the blood run an increased risk of developing coronary heart disease events.

The study – which monitored 2,614 men age 69-80 in Gothenburg, Uppsala and Malmö for five years – assessed DHEA levels. The findings demonstrated that the lower the DHEA level at the study start, the greater the risk of coronary heart disease events during the five-year follow-up.

"Endogenous production of DHEA appears to be a protective factor against coronary heart disease," says Åsa Tivesten, who coordinated the study. "High DHEA levels may also be a biomarker of generally good health in elderly men."

According to Professor Claes Ohlsson: "While the study establishes a clear correlation between DHEA in the blood and coronary heart disease, the discovery does not indicate whether or not treatment with DHEA will reduce the risk in individual patients."

"Dehydroepiandrosterone and its Sulfate Predict the 5-Year Risk of Coronary Heart Disease Events in Elderly Men" was published in the *Journal of the American College of Cardiology* on October 28, 2014. MEH

Medtronic's new Reveal Linq device revolutionises diagnosis

By **Dr Oliver Segal** MBBS, MD, FRCP, FHRS

A Medtronic Reveal Linq device

One of the most exciting technological developments in the world of electrophysiology in 2014 has been the launch of Medtronic's Reveal Linq device. This implantable loop recorder, the size of two matchsticks, replaces the old Reveal XT monitor which was the size of a computer memory stick and which had to be inserted with a small surgical procedure in a cath lab or operating theatre. The new Linq device is simply injected under local anaesthetic in a procedure room and I do not use sedation, intravenous access or even antibiotics.

There is no doubt the tiny size of this new device has lowered the threshold for consideration of implanting a device in patients with infrequent palpitations or loss of consciousness, however, the really revolutionary part of this device is how it communicates the information it detects to doctors and other caregivers. The device comes with a monitor, known as a MyCareLink monitor, which is kept in a patient's bedroom and simply requires a power socket. Each night at about 2am the device and monitor 'talk to each other' using wireless technology. Bradycardias and tachycardias (typically rates <30/min or >180/min) are automatically detected and stored and uploaded via the monitor to the Medtronic remote monitoring portal known as CareLink. This then generates an email to the physician highlighting the arrhythmia.

Case Report

A 67-year-old lady with a history of idiopathic spino-cereballar ataxia and axonal neuropathy presents to a cardiologist in the summer of 2014 having had a sudden collapse whilst at the theatre without prior warning symptoms.

The theatre was hot and it took 20 minutes before she felt back to normal. A systolic murmur is identified on examination but echocardiography gives sub-optimal images and it is difficult to see much more than left ventricular hypertrophy of 1.6cm, good left ventricular systolic function and moderate to severe mitral regurgitation. There was no significant aortic valve gradient but an LV gradient of 255mmHg is detected.

The ECG confirms left ventricular hypertrophy by voltage criteria and sinus rhythm at 63/min. Holter monitoring shows sinus rhythm throughout with only a tiny burden of ventricular ectopy and a further event recorder monitor for 2 weeks detects nothing else. The cardiologist assumes there is hypertensive heart disease but is unsure whether this was a Stokes-Adams attack or a simple faint and after the patient has another episode of syncope, she is referred to me for insertion of a Reveal Linq device.

I implanted a Reveal Linq device on the 15th of October in a procedure room under local anaesthetic alone; the actual procedure itself taking only 2 minutes

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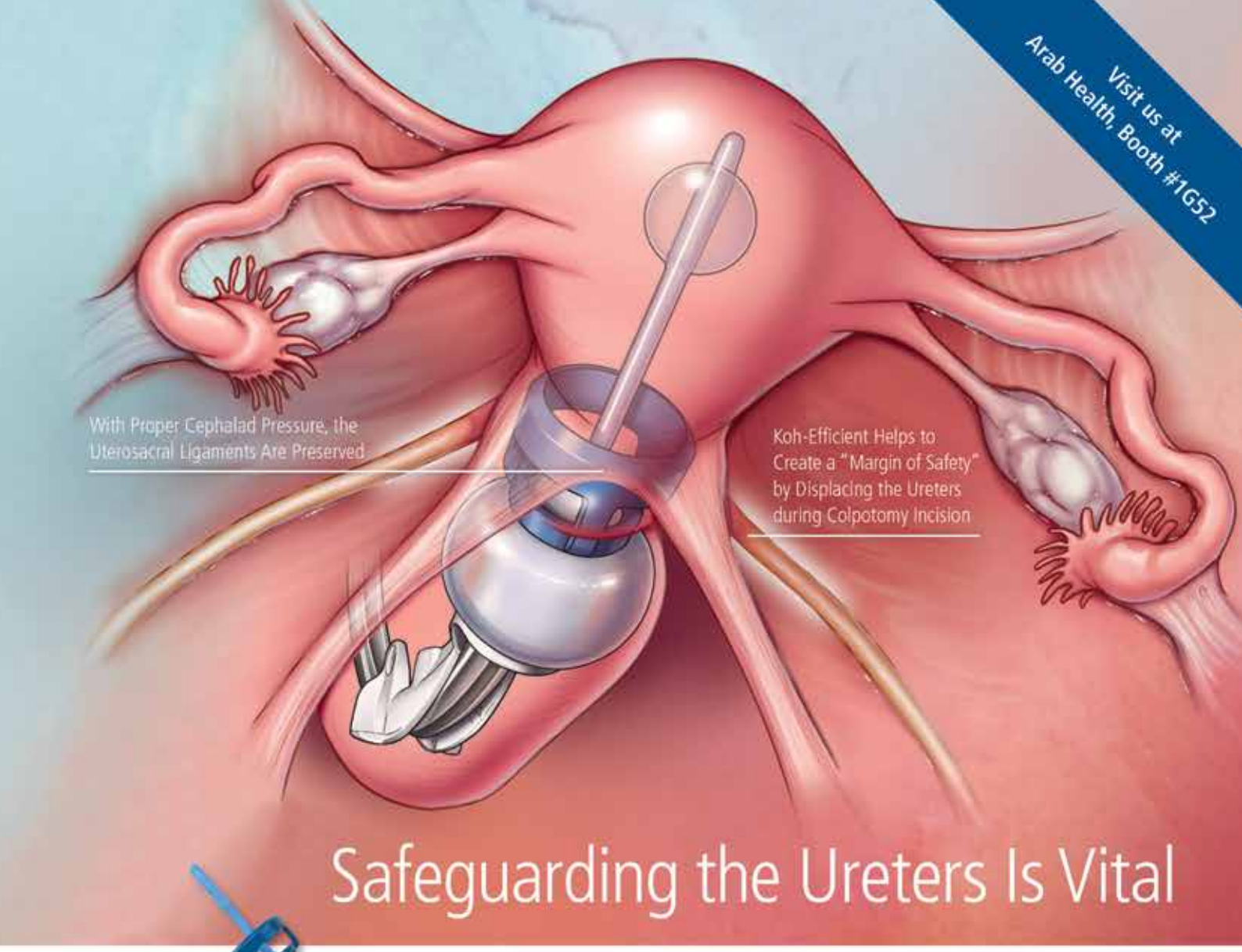

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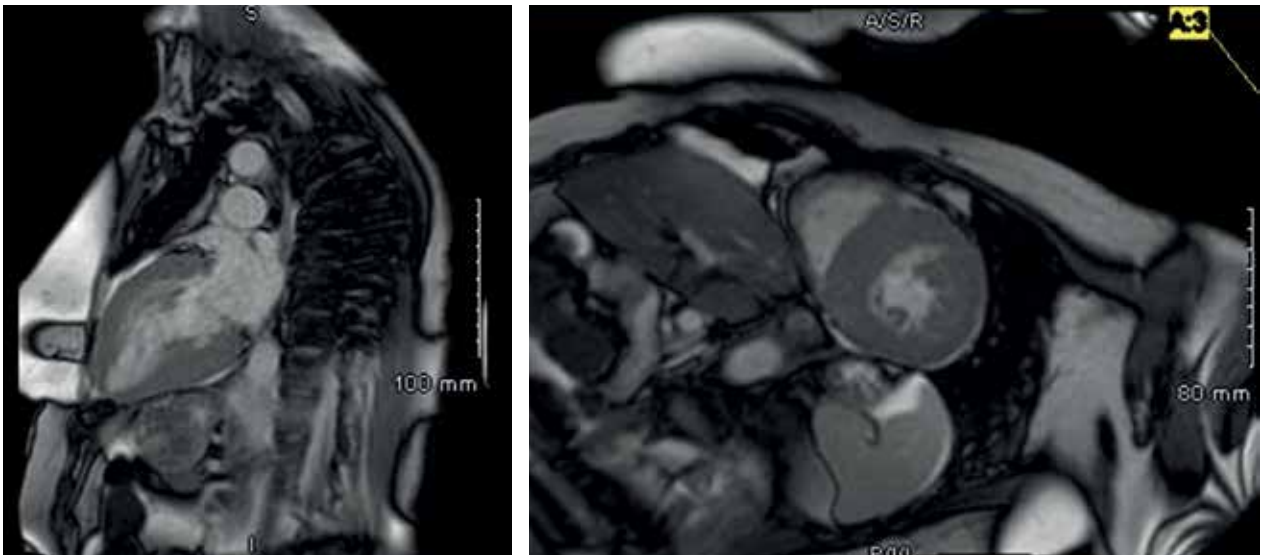


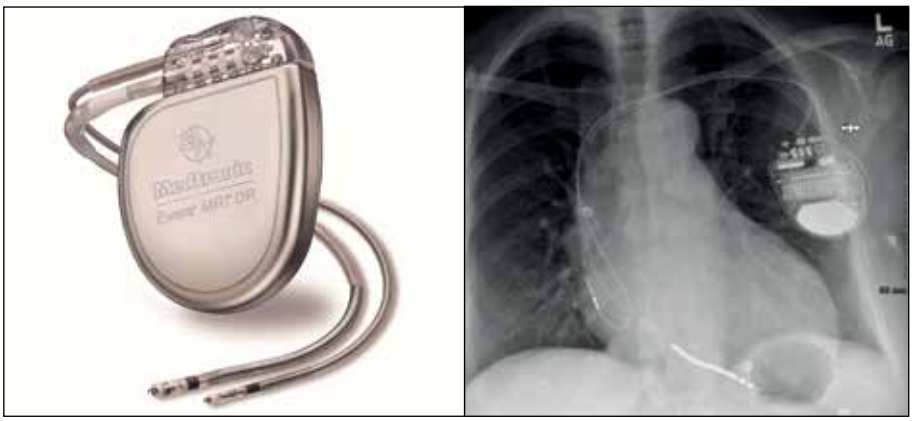
Cardiac MRI scan showing severe left ventricular hypertrophy

and the patient went home shortly afterwards having been instructed on the use of the MyCareLink monitor and device activator.

Nineteen days later I awoke to receive an email from the Medtronic CareLink to let me know the patient had had an automatically detected event triggering an alert. I logged into the CareLink system from my home and downloaded the information.

The 'dot-plot' graph showed the onset of a very rapid tachycardia at 250/min lasting 15 seconds, before abruptly slowing and then a further period of a slower irregular tachycardia between 100-200/min. The ECG showed the onset of a slightly irregular but essentially monomorphic broad complex tachycardia, most likely ventricular tachycardia. The subsequent tachycardia (with ECGs not stored on the device) is most likely atrial fibrillation. I contacted the patient and found she had collapsed earlier that morning at the same time as the event above and I therefore arranged urgent admission to hospital.

A cardiac MRI scan was performed the following day (MRI scans are possible with the Reveal Linq device, although one should normally wait 6 weeks after implant and data should be manually downloaded before the scan and the device checked again immediately afterwards). The scan showed typical features of hypertrophic cardiomyopathy with asymmetric left ventricular hypertrophy of 2.4cm, systolic anterior motion of the anterior mitral valve leaflet, crypts in the myocardium at the LV apex, hypertrophied papillary muscles displaced apically and LVOT obstruction and severe mitral regurgitation. There was minimal late enhancement.



Medtronic Evera ICD and a chest x-ray of the device after insertion

She was reviewed by an expert in cardiomyopathies, who confirmed the diagnosis and also confirmed that Friedrich's ataxia (commonly associated with hypertrophic cardiomyopathy) had previously been excluded with genetic testing. Familial screening was then implemented.

Low dose beta-blockade was started and I then implanted a dual chamber, MRI-conditional, single coil Medtronic Evera ICD without complication and the Reveal Linq device was explanted. This ICD, like the Reveal Linq, is revolutionary in that it is licensed for full body MRI scans after a six-week waiting period (and with appropriate device testing before and afterwards). In this case this means the patient can continue to have MRI scans performed of the brain and spinal cord for her neurological conditions. The patient was discharged home the following day and remains under close review.

This case demonstrates the breakthrough the Reveal Linq device represents in facilitating diagnosis of intermittent, infrequent or alarming arrhythmias or black-outs and immediately alerting their physician of serious heart rhythm problems. In this particular case, this meant admission to hospital and life-saving treatment was implemented without delay and then rapid discharge home.

The Author

Dr Oliver Segal MBBS, MD, FRCP, FHRS is a Consultant Cardiologist & Electrophysiologist at London Medical (*www.londonmedical.co.uk*) and The Heart Hospital, University College London Hospitals, UK. MEH

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Batteryless pacemaker paces the heart using the power of its own motion

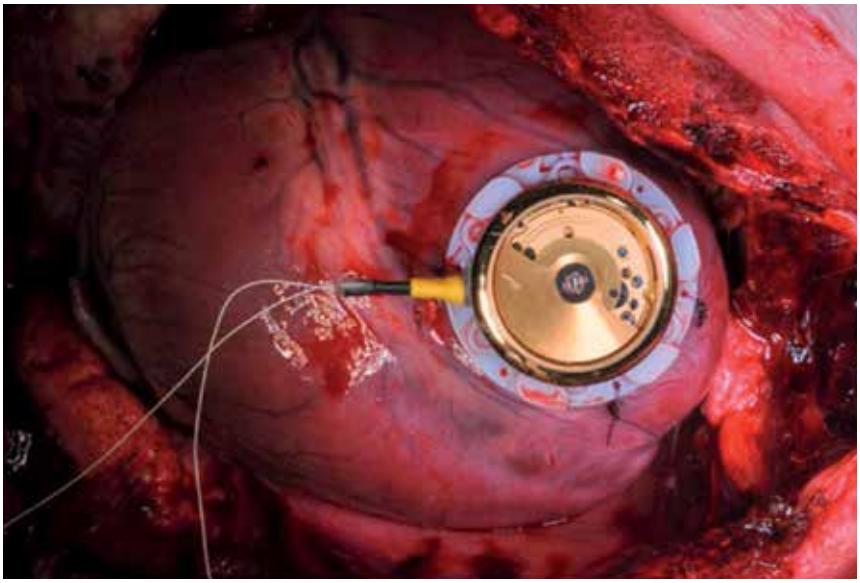
A new batteryless cardiac pacemaker based on an automatic wristwatch and powered by heart motion was presented at ESC Congress 2014 in Barcelona by Adrian Zurbuchen from Switzerland. The prototype device does not require battery replacement.

Commenting on the device, Zurbuchen, a PhD candidate in the Cardiovascular Engineering Group at ARTORG, University of Bern, Switzerland, said: "Batteries are a limiting factor in today's medical implants. Once they reach a critically low energy level, physicians see themselves forced to replace a correctly functioning medical device in a surgical intervention. This is an unpleasant scenario which increases costs and the risk of complications for patients."

Zurbuchen presented a way to power a cardiac pacemaker with an alternative energy source – the heart motion.

Four years ago Professor Rolf Vogel, a cardiologist and engineer at the University of Bern, had the idea of using an automatic wristwatch mechanism to harvest the energy of heart motion. Zurbuchen said: "The heart seems to be a very promising energy source because its contractions are repetitive and present for 24 hours a day, 7 days a week. Furthermore the automatic clockwork, invented in the year 1777, has a good reputation as a reliable technology to scavenge energy from motion."

The researchers' first prototype is based on a commercially available automatic wristwatch. All unnecessary parts were removed to reduce weight and size. In addition, they developed a custom-made housing with eyelets that allows suturing the device directly onto the myocardium.



The energy harvesting device is sutured directly onto the myocardium

The prototype works the same way it would on a person's wrist. When it is exposed to an external acceleration, the eccentric mass of the clockwork starts rotating. This rotation progressively winds a mechanical spring. After the spring is fully charged it unwinds and thereby spins an electrical micro-generator.

To test the prototype, the researchers developed an electronic circuit to transform and store the signal into a small buffer capacity. They then connected the system to a custom-made cardiac pacemaker. The system worked in three steps. First, the harvesting prototype acquired energy from the heart. Second, the energy was temporarily stored in the buffer capacity. And finally, the buffered energy was used by the pacemaker to apply minute stimuli to the heart.

The researchers successfully tested the system in in vivo experiments with domestic pigs. The newly developed system allowed them for the first time to perform batteryless overdrive-pacing at 130 beats per minute.

Zurbuchen explained: "We have shown that it is possible to pace the heart using the power of its own motion. The next step in our prototype is to integrate both the electronic circuit for energy storage and the custom-made pacemaker directly into the harvesting device. This will eliminate the need for leads."

He concluded: "Our new pacemaker tackles the two major disadvantages of today's pacemakers. First, pacemaker leads are prone to fracture and can pose an imminent threat to the patient. And second, the lifetime of a pacemaker battery is limited. Our energy harvesting system is located directly on the heart and has the potential to avoid both disadvantages by providing the world with a batteryless and leadless pacemaker." MEH

Abu Dhabi's Sheikh Khalifa Medical City leads the region for cardiac services

Cardiovascular disease is the world's leading cause of death, claiming about 17.3 million lives a year, according to World Health Organisation data. It accounts for one in four deaths in the UAE, according to the Abu Dhabi Health Authority.

The Institute of Cardiac Sciences at Sheikh Khalifa Medical City (SKMC) is one of the leading programs in the Gulf region with state-of-the-art technology to prevent and treat cardiovascular disease in all age groups.

SKMC achieved Cycle 4 Chest Pain Center Accreditation in 2012 – among only a handful worldwide and the only such institute outside of the US – and maintains an affiliation with the American College of Cardiology.

At the national level, SKMC offers the most comprehensive adult arrhythmia and electrophysiology (EP) service, the first echocardiography service to be accredited by the European Association of Cardiovascular Imaging, the longest running 24/7 Primary PCI program, a unique smoking cessation program, the largest adult cardiac surgery program, the only advanced paediatric interventional cardiology program, the largest paediatric cardiac surgery program, and the most productive collaborative cardiovascular outcomes research portfolio.

The SEHA heart rhythm team at SKMC recently added a unique technology known as cryoablation to its EP service. Recently, the SEHA EP team at SKMC used cryoablation to cure a young Emirati patient from an arrhythmia that has caused his heart to weaken. The young patient had an arrhythmia originating from an area very close to his main heart conduction system, and radiofrequency was too dangerous to use. The availability of cryoablation technology at SKMC offered him an opportunity for cure.

SKMC also has the only dedicated paediatric cardiac surgical program in the country, serving an estimated newborn population of over 80,000. More than 500 newborns per year are born with congenital heart disease (CHD) with nearly 70% requiring surgical intervention, and almost all within the first year of life.

In 2013, SKMC's cardiac surgery program reached over 1800 surgeries conducted since its inception, and currently performs over 400 heart operations per year, offering hope the chance of a happy and fulfilling life for children with congenital heart disorders who would otherwise have faced ill-health or death.

In addition to operating on children with congenital heart disorders, the paediatric cardiac surgery team treat adolescents and adults that were born with cardiac defects and who weren't able to have their problems resolved in their youth. SKMC's Grown Up Congenital Heart or 'GUCH' program is another initiative that is the only one of its kind in the country. The GUCH program treats patients who often fall into a 'grey area', between children and adults, so a multidisciplinary input is required involving both the hospital's adult and paediatric services.

The paediatric cardiac surgery division has the country's only Extracorporeal Membrane Oxygenation (ECMO) program for paediatric patients, which is an advanced form of life support used to treat infants and children in cardiac and/or respiratory failure. It works as a modified form of heart and lung bypass on a temporary basis, and is an alternative to conventional methods of life support.

Recent awards include the Silver Recognition Award by the American Heart Association for its International Training Centre and induction into the American College of Cardiology's International Centres of Excellence Program. MEH

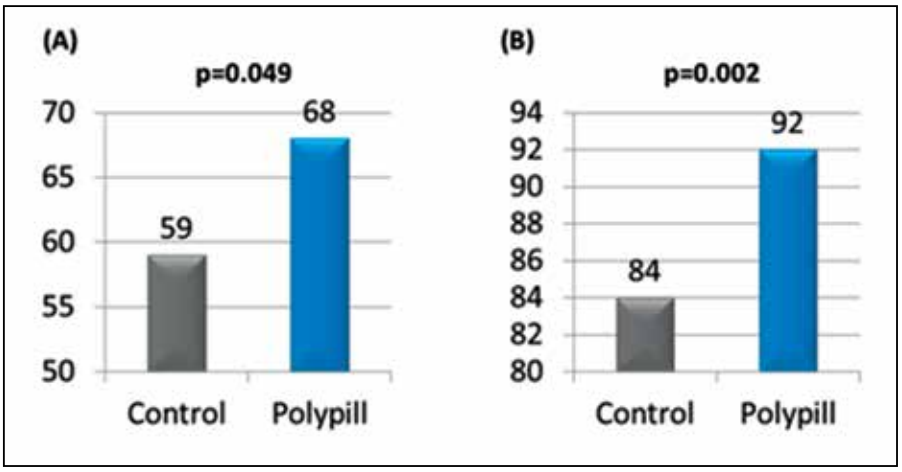
FOCUS study – Polypill increases adherence to post MI treatment

A new polypill increases adherence to treatment following a myocardial infarction (MI), according to results from the FOCUS study presented for the first time at ESC Congress in September 2014. The novel treatment regime has the potential to prevent more patients having a second heart attack.

Presenting the FOCUS study, Dr Valentin Fuster, MD, PhD, is physician-in-chief at The Mount Sinai Hospital and director of Mount Sinai Heart, The Mount Sinai Health System, New York, US, said: "Despite continuous advances in all areas of cardiovascular (CV) medicine, cardiovascular disease (CVD) has steadily increased in prevalence to become the number one cause of death worldwide. It is estimated that half of the overall reduction in CVD mortality observed over the past 20 years in western countries could be attributed to appropriate use of CV medications for secondary prevention. But lack of adherence to treatment impedes adequate secondary prevention and contributes to the CVD pandemic,"

He continued: "The most important factors responsible for a lack of adherence to treatment are the complexity of treatment and the daily number of prescribed pills. The idea of using a polypill for CVD prevention has gained increasing momentum because it could increase adherence and therefore contain the progression of CVD. A polypill could simplify healthcare delivery, improve cost-effectiveness, support the comprehensive prescription of evidence-based cardioprotective drugs, and reach underdeveloped regions of the world."

The Fixed-dose Combination Drug for Secondary Cardiovascular Prevention (FOCUS[2]) study was established to investigate adherence to secondary prevention medication and test a new polypill. The study was conducted in two subsequent phases. FOCUS[1] included post MI patients in a multi-country comprehensive analysis of socioeconomic, comorbidity, and other factors that determine adherence to CV medications. FOCUS[2] was a randomised controlled clinical trial testing the effect of a fixed-dose combination (FDC), the CNIC-FS[3]-FERRER polypill, containing acetylsalicylic acid (ASA) 100 mg, simvastatin 40 mg and ramipril 2.5, 5 or 10 mg, on adherence and control of CV risk factors in post MI patients.



Percentage of post MI patients adhering to treatment with the FDC polypill vs. control (conventional treatment with 3 drugs separately) (A) using Morisky Green Adherence Questionnaire; (B) using pill count.

FOCUS[1] included[2] 118 patients with a history of MI from five different countries (Spain, Italy, Argentina, Brazil and Paraguay). The degree of adherence to prescribed medications was calculated using the Morisky Green Adherence Questionnaire, a self-reported method with four questions on adherence behaviour. The researchers found an average baseline adherence level of 45.5%.

The researchers also conducted a descriptive analysis of variables that impede adequate adherence. They found that patients below 50 years of age, those taking more than 10 pills, following a complex regimen (i.e. those taking medications other than orally), current smokers and those with sedentary lifestyles were significantly more non-adherent.

Dr Fuster said: "Importantly, there was a significant trend towards more non-adherence with a higher score of depression (as measured by the PHQ-9 questionnaire). Of the socio-demographic variables, illiteracy level, lower social support and lower percentage of insurance cover showed significantly lower levels of adherence as well

Left Cardiac Sympathetic denervation (LCSd)

By Dr Simon Jordan, consultant thoracic surgeon at Royal Brompton Hospital

For many years, denervation of the left cardiac sympathetic nerves has been successfully used to decrease the frequency of potentially lethal ventricular arrhythmias in Long QT syndrome; and evidence of this success continues to accumulate.

More recently, LCSD has proved effective in other conditions such as catecholaminergic polymorphic ventricular tachycardia (CPVT) and may also be considered in hypertrophic cardiomyopathy or arrhythmogenic cardiomyopathy (where the patient is experiencing ongoing ventricular arrhythmia resistant to all other therapy).

In 2011, Royal Brompton consultant thoracic surgeon, Simon Jordan, in partnership with Jim Mcguigan, consultant thoracic surgeon at the Royal Victoria, Belfast, started a programme of LCSd tackling the most difficult, unstable cases at Royal Brompton hospital.

The technique has been adapted from the procedure employed for patients with hyperhydrosis and is performed thoracoscopically. The programme, supported by a multidisciplinary team including Royal Brompton consultant electrophysiologists Jan Till and Ferran Roses-Noquer, treats both adults and children with excellent results.

A number of patients have been transformed by this approach in that they have received a greatly reduced number of shocks from their defibrillator and some have decreased the drugs they need to take on a daily basis.

The procedure has its greatest effect in children and adults born with Jervell and Lange-Neilsen syndrome and catecholaminergic polymorphic ventricular tachycardia. Both these syndromes can result in early childhood death and drugs are only partially effective. Defibrillators are inadequate and the patient is often left to live with recurrent shocks which can destroy their quality of life.

Royal Brompton and Harefield Hospitals are some of the few centres in the world that perform Left Cardiac Sympathetic denervation (LCSd), and the only centres in the UK that offer this procedure for arrhythmia patients. The programme accepts patients from across the world, with one third of patients travelling from overseas to have this procedure. MEH

as those patients being treated by general practitioners (as opposed to cardiologists) and being treated in a private centre (as opposed to a public health centre)."

In a stepwise forward regression model, FOCUS 1 found that the risk of being non-adherent was independently associated with younger age (under 50 years old), scoring high on the depression scale, and following a complex (administrations other than oral) treatment. On the other hand, the odds of being adherent increased with higher percentage of health insurance coverage, and with optimal levels of social support.

In FOCUS[2], a total of 695 patients were enrolled from four countries and followed for a period of nine months. Patients were randomised to receive either the polypill or the three drugs separately. Adherence was measured with two methods: self-reported adherence using the Morisky Green Adherence Questionnaire as well as a direct method, the pill count. The results after nine months of follow up are shown in figure 1.

Dr Fuster said: "Patients were more likely to take their medication to prevent a heart attack when it was given as a polypill, rather than as three separate pills. We found this using two methods. With the self-reported questionnaire, 68% of patients in the polypill group took their drugs compared to just 59% of patients in the group assigned to three drugs. With the pill count, we found that 92% of patients in the polypill group were adherent compared to only 84% in the group assigned to separate drugs."

He added: "FOCUS[1] has identified the reasons that impede appropriate adherence to CV medications in a post MI population from five different countries. FOCUS 2 has shown that, compared with the three drugs given separately, the use of a polypill strategy significantly increases self-reported and directly measured medication adherence for secondary prevention following an acute MI. FOCUS[2] is ongoing and will assess whether there are any differences between the two treatment arms in blood pressure, blood cholesterol, safety or costs."

Dr Fuster concluded: "Our results suggest that the polypill has the potential to prevent more patients having a second heart attack. A randomised trial is needed to test whether the improved adherence with the polypill found in FOCUS results in fewer post MI patients having another MI."

References

(1) Dr Valentin Fuster, MD, PhD, is physician-in-chief at The Mount Sinai Hospital and director of Mount Sinai Heart, The Mount Sinai Health System, New York, US. He is also general director of the Centro Nacional de Investigaciones Cardiovasculares Carlos III (CNIC) in Madrid, Spain.

(2) FOCUS was funded by the 7th Framework Programme of the European Commission.

(3) Fuster Sanz

The moral code in Islam and organ donation in Western countries: reinterpreting religious scriptures to meet utilitarian medical objectives

By **Mohamed Y Rady,** Department of Critical Care Medicine, Mayo Clinic Hospital, Mayo Clinic, Phoenix, Arizona, USA and **Joseph L Verheijde** Department of Physical Medicine and Rehabilitation, Mayo Clinic, Phoenix, Arizona, USA

Abstract

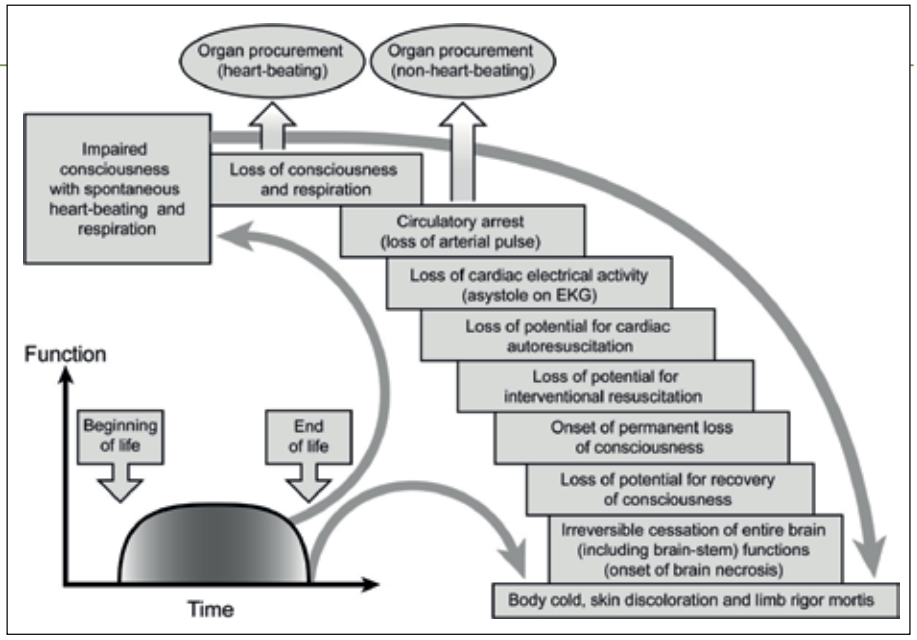
End-of-life organ donation is controversial in Islam. The controversy stems from: (1) scientifically flawed medical criteria of death determination; (2) invasive peri-mortem procedures for preserving transplantable organs; and (3) incomplete disclosure of information to consenting donors and families. Data from a survey of Muslims residing in Western countries have shown that the interpretation of religious scriptures and advice of faith leaders were major barriers to willingness for organ donation. Transplant advocates have proposed corrective interventions: (1) reinterpreting religious scriptures, (2) reeducating faith leaders, and (3) utilizing media campaigns to overcome religious barriers in Muslim communities. This proposal disregards the intensifying scientific, legal, and ethical controversies in Western societies about the medical criteria of death determination in donors. It would also violate the dignity and inviolability of human life which are pertinent values incorporated in the Islamic moral code. Reinterpreting religious scriptures to serve the utilitarian objectives of a controversial end-of-life practice, perceived to be socially desirable, transgresses the Islamic moral code. It may also have deleterious practical consequences, as donors can suffer harm before death. The negative normative consequences of utilitarian secular moral reasoning reset the Islamic moral code upholding the sanctity and dignity of human life.

Introduction

Scientific and scholarly debates about defining death for organ procurement purposes have intensified[1]. The current legal definition requires the irreversible cessation of all functions of the entire brain or the irreversible cessation of circulatory and respiratory functions[1]. All Abrahamic faith traditions (Judaism, Christianity, and Islam) have expressed support for this definition of death, assuming it is supported by scientific evidence[2]. If truly death has occurred, then current timing of organ procurement is appropriate and permissible (ie, organ procurement "*ex cadavere*")[3]. However, the medical literature is unsettled about the brain and circulatory criteria of death determination[1,4-8]. Permanent unconsciousness and cessation of brainstem reflexes (including apnea) constitute the brain criterion of death, while the circulatory criterion is determined by 2 to 5 minutes of absent arterial pulse[1]. Ambiguities in the definition and criteria of death have compelled scholars to re-address the moral permissibility of organ donation in Abrahamic religions[2,9-12].

End-of-life organ donation remains controversial in Islam[2,13]. This controversy emanates from: (1) scientifically ambiguous medical criteria of death determination[4-8,14,15]; (2) invasive perimortem procedures for preserving transplantable organs[13,16,17]; and (3) incomplete disclosure of information to consenting donors and families[4,8,18,19]. We have summarized elsewhere the scientific evidence challenging the validity of the 2 alternative criteria of death and recommended that the medical criteria of death should be restored to reflect the singularity of death as a biological phenomenon[20]. We also outlined examples of utilitarian practices in end-of-life organ donation that conflict with religious values and traditional rituals in dying Muslim patients[13,20]. Here, we limit the term "utilitarianism" to mean "persons are used in the same way as things are used"[21].

Sharif et al. described factors influencing the willingness toward organ donation in an international quantitative survey of Muslims (n = 675) "residing in Western countries (United Kingdom, Europe, North America, and Oceanic geography)": "[t]he main constraints cited by Western Muslims were interpretation of religious scriptures [the Quran and the Hadith] (76.5%) and advice from local mosque (70.2%)"[22].



Human death is a singular phenomenon. "Human death is a singular phenomenon. The dying process occurs in stages over time. There is a gradual loss of capacity for somatic integration of the whole body because of an irreversible cessation of all vital and biological functions including circulation, respiration (controlled by the brainstem), and consciousness. The irreversibility of cessation of circulatory and respiratory functions is interlinked to the onset of whole brain necrosis. The loss of capacity for consciousness is irreversible when the necrosis of the whole brain, including the brainstem, is complete"[37]. Disintegration begins after completion of the dying process. There is no accurate clinical test to ascertain the absence of self and/or environmental awareness in unresponsive patients following severe brain injuries. Arbitrary neurological and circulatory criteria redefining human death enable heart-beating and non–heart-beating procurement of transplantable organs, respectively. Scientifically flawed criteria of death can harm donors because procurement procedures are performed without general anaesthesia. Figure reproduced from source[37], under the terms of the Creative Commons Attribution License (*http://creativecommons.org/licenses/by/3.0/*).

Gauher et al.[23] also commented on the significance of religious and cultural barriers to organ donation among UK Muslims. Transplant advocates [22-29] have proposed corrective interventions: (1) reinterpreting religious scriptures, (2) reeducating faith leaders, and (3) utilizing media campaigns to overcome religious barriers to organ donation in Muslim communities. Several commentators in Western countries have indeed attempted to reinterpret the Islamic moral code[30-33]. In this article, we focus on: (1) the phenomena of life and death within religious scriptures, (2) the utilitarian interpretations of the moral code in end-of-life organ donation, (3) the societal consequences of such challengeable interpretations, and (4) the targeting of faith leaders with reeducation campaigns promoting these interpretations in Muslim communities.

The natural phenomena of life and death within religious scriptures

The Quran and the Sunnah are the 2 primary sources of religious teachings and knowledge in Islam[13,34]. The Quran has described the "natural" phenomena of both life and death 14 centuries ago. However, because of a limited capacity to fully comprehend the Quranic verses on these phenomena, scholars continue to be challenged in understanding these descriptions. For example, the Quran describes human development through the early stages of life[35]. Medical embryology has clarified different embryonal and fetal stages of development. Similarly, the Quran also describes the dying process and transition from life to death. The Quran differentiates between the dying process and death:

"Then why do you not (intervene) when (the soul of a dying person) reaches the throat? (83) And you at the moment are looking on, (84) But We (i.e. Our angels who take the soul) are nearer to him than you, but you see not (85)" (56: 83–85)[36].

Advances in resuscitation science appears to corroborate the Quranic characterization of the dying process. Different stages in the dying process can be discerned before death (Figure 1)[37]. The complete loss of vital organs' capacity to recover their respective functions completes the dying process and death follows as a final, singular and irreversible event[13]. The body begins disintegration at death. The Quran describes the disintegration process: "Who will give life to these bones after they are rotten and have become dust?" (36: 78)[36].

To facilitate organ donation and trans-

Table 1
Primary and secondary sources of the Islamic legal and moral code

- **Primary sources**
- The Quran: revelation from God to man (first source of Islamic law)
- The Sunnah: the tradition of the Prophet Muhammad: what he said, what he did, what he saw and approved during his lifetime (second source of Islamic Law)

- **Secondary sources** (reinterpretation of the primary sources)
- *Ijma*: consensus agreement about the moral and/or legal assessment of an act or practice (third source of Islamic law)
- *Qiyas*: juristic reasoning by analogy (fourth source of Islamic law)
- *Istishab*: the principle of presumption in the laws of evidence that a given state of affairs known to be true in the past still continues to exist until the contrary is proved
- *Maslaha*: the principle of reasoning based on public welfare and interest
- *Istihsan*: the principle of reasoning based on preference, ie, "seeking to do good"
- *Urf*: the principle of reasoning based on customary practice

Table is developed from the source[34]. The primary sources of Islamic law and moral code are the Quran and Sunnah. Secondary sources can be applied to issue legal and moral opinions about acts or practices that are not mentioned explicitly in the primary sources. This process is called *ijtihad*. Sunni and Shiite sects agree on the Quran, Sunnah and Ijma as sources of Islamic law in that order. The Shiite sect considers *Aql* (human intellect) as the fourth source of Islamic law instead of *Qiyas*. Legal and moral opinions or fatwas must uphold the primary objectives or *maqasid* of Islamic law ie, the protection of a person's religion, life, mind, property and progeny. The application of secondary sources (eg, *maslaha, istihsan*) in end-of-life organ donation is preconditioned that death is determined with an absolute certainty or yaqin in accordance with the Quran and Sunnah. – Rady and Verheijde Rady and Verheijde *Philosophy, Ethics, and Humanities in Medicine* 2014 9:11 doi:10.1186/1747-5341-9-11

plantation, contemporary transplantation practices use 2 types of death[1]. Death is now determined by either the brain criterion (ie, brain or neurological death) in heart-beating organ procurement or the circulatory criterion (ie, cardiorespiratory death) in non–heart-beating organ procurement (Figure 1). Scientific evidence has challenged both criteria of death[1,4-8,14]. Either criterion is inconsistent with biological death because: (1) donors determined dead by the neurological criterion can retain normal coordination of bodily physiological functions and/or critical brain functions that are characteristic of living human beings, and (2) donors determined dead by the circulatory criterion can retain viable central brain pathways and neurological responsiveness[1,4,6,7,15,38]. Currently, there is no accurate clinical test that can ascertain the absence of awareness following severe brain injuries. Advances in neurosciences suggest that the capacity for consciousness and self-awareness can be retained despite extensive injury to the human brain[39-42]. Donors retaining viable central neural pathways also may experience nociception during surgical procedures[1,7,43,44]. Living human beings suffer when surgical procedures are performed without general anesthesia. The Quran (as do many scientists and scholars) affirms that death is a singular event, and therefore applying current medical criteria of death can inflict harm onto organ donors[13, 20].

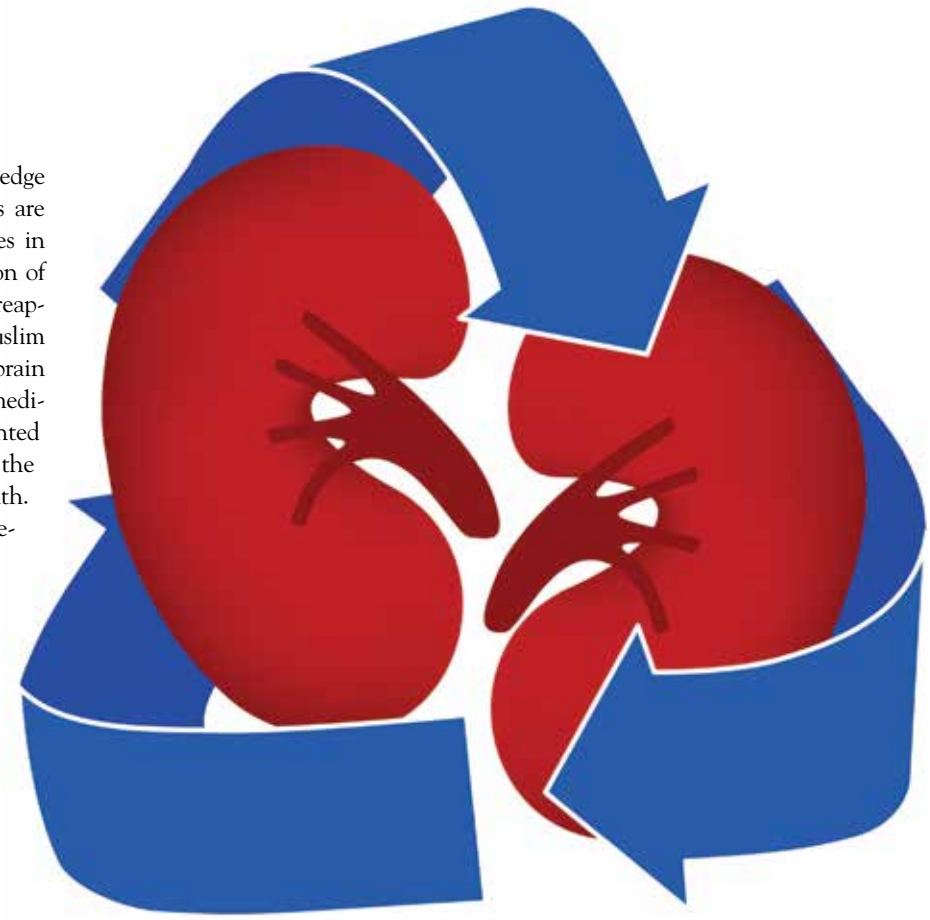
Utilitarian interpretation of the moral code of Islam in end-of-life organ donation

Social contexts may be considered in the interpretation of the Islamic moral code about human acts that are not mentioned in the Quran or Sunnah. To ratify a moral and legal opinion or fatwa about such acts, qualified scholars apply secondary sources or principles in a process called ijtihad (Table 1)[34]. There are 2 preconditions for the validation of an opinion or fatwa: (1) it must not clash with the Quran and the Sunnah, and (2) it must not harm the person's religion, life, mind, property or progeny (ie, the objectives or maqasid of the Islamic law)[34].

The moral code is intended to protect the inviolability and the dignity of human life regardless of time and place. Interpretation of religious scriptures to justify a medical practice perceived to be socially desirable, without the prerequisite observance of the *objectives* of Islamic law, will transgress the moral code. We contend that redefining death in end-of-life organ donation is an example of such misaligned interpretation. For 4 decades, the scientific controversy has continued on death determination in organ donation[1,4]. A social construct of death may well serve utilitarian objectives in society, that is, donors are categorized as dead so that procured organs are transplantable into other living humans. However, such a utilitarian social construct of death can harm donors and pose moral challenges to the transplantation practice[7,38].

The Council of Islamic Jurisprudence accepted brain death as biological and legal death in 1986[45]. Since then, the majority of Islamic institutions and councils in Western countries have issued legal opinions and fatwas permitting end-of-life organ donation[46]. However, these opinions or fatwas are revocable because: "fatwas are generally acknowledged as fallible opinions because of the possibility of human misunderstand-

> The major issue that stems from such debate is who should be deemed the ultimate authority to determine the eventuality of death—physicians or theologians? It is clear from this discussion that opposing views on the subject of brain death criterion can be broadly but not exclusively categorized into physicians versus theologians (supporters of a physical vs. philosophical definition of death, respectively). In Islam, passing of the body may be different from passing of the soul, but we can only rely on physical rather than metaphysical examination to determine the moment of death. I would argue physicians are the true determinants of cessation of (physical) life because the metaphysical is beyond any human assessment.



ing, misinterpretation or lack of knowledge about the phenomenon which fatwas are addressing"[46]. Indeed, recent advances in the clinicopathological characterization of brain death have mandated a critical reappraisal of past fatwas[47]. Various Muslim scholars have rejected past fatwas on brain death because of theological and medical reasons. Sachedina[48] has commented that brain death is incompatible with the Quranic description of life and death. Sarhill et al.[49] have rejected the criterion of brain death because it is imprecise and contradicts the Quran and Sunnah. Bedir and Aksoy[50], after analyzing scholarly Islamic sources, concluded that brain death is not complete death.

Padela and colleagues[51] reaffirmed the clinical ambiguity in brain death determination. In Islam, the criterion of death must be unequivocal and grounded in robust evidence so as to uphold the inviolability of human life. In an address to the Organ Transplantation Congress in Abu-Dhabi on February 1998, the Muslim scholar Al-Qaradawi reemphasized that "the legal Islamic opinion which is in favour of organ donation and organ transplantation, *as long as we are sure that all the moral and religious conditions have been met*" [emphasis added[52]. The Quran describes death as *yaqin* (Arabic word for absolute certainty), ie, a singular event determined with an absolute certainty at a specific time: "And worship your Lord until there comes unto you the certainty (i.e. death)" (15:99[36]. If the medical criterion cannot validate death determination with an *absolute certainty*, then end-of-life organ donation transgresses the moral code. *Al-zann* (ie, doubt, uncertainty, conjecture, or suspicion) is the opposite of *yaqin* and is legally and morally prohibited in death determination. The Quran warns against *al-zann* because it can lead to deviation from the truth: "Certainly, conjecture (al-zann) can be of no avail against the truth" (10:36) [36]. Consequently, acts that are based on al-zann can have negative consequences: "Avoid much suspicion (al-zann), indeed some suspicions (al-zann) are sins" (49:12) [36]. Transplant advocates have accepted *al-zann* instead of *yaqin* in death determination[31-33]. They argue that *al-zann al-ghalib* (ie, the dominant probability) is sufficient to justify contemporary practice of organ procurement in brain death. We think that *al-zann al-ghalib* in death determination is a major departure from the moral code because it is grounded in the faulty assumption that early stages in the dying process (Figure 1) are synonymous with death. Medically, the prognosis of death is mistaken for the *diagnosis* of death[53,54]. Indeed, Western advocates admit that brain death is a social construct based on equating human death with the permanent loss of personhood rather than of biological life[32,33]. Acceptance of this construct of death conflicts with the Quranic characterization of death and emphasis on the sanctity of life. Since *yaqin* (certainty) is a precondition in death determination, leading Muslim scholars have rejected the neurological criterion of death[55].

Advocates have also argued that the principles of *maslaha* and *istihsan* can justify end-of-life organ donation[30,31,45,52]. However, if death cannot be determined with absolute certainty then these principles are not applicable (Table 1). *Maslaha* and *istihsan* can invoke intrinsically subjective and challengeable opinions. In *maslaha*, saving the lives of persons with end-stage organ disease is considered important for societal welfare. However, maslaha cannot justify ending a human life (donors) prematurely to procure transplantable organs since this act transgresses the moral code[20]. In *istihsan*, (Arabic meaning "seeking to do good"), donating an organ is giving another person the "gift of life" and is considered a charitable act. The *istihsan* is based on the good intention and goodness of the act of giving the "gift of life" to another human being. This is also flawed. First, frequently there are alternative medical treatment options available, although less preferred in society, for saving the lives of those with end-organ disease[20]. Second, transplanted organs are not a permanent cure as manifested by the immune system's ultimate rejection in surviving recipients. Surviving recipients are burdened with serious medical complications that can develop because of anti-rejection (immunosuppression) medications which can be life-threatening[56,57]. Third, it can be argued that the gifting of an organ is counterintuitive to the Islamic belief in divine creation and personal entrustment of the body.

Other principles such as *istishab* (presumption of continuity) also prohibit organ donation in brain death. Badawi[58] describes

this principle "…if it is uncertain if a patient is dead (however evolving definition of death is accepted), then continuity of life should be presumed until death otherwise is confirmed". It follows that procuring organs from donors declared dead with a medically ambiguous criterion is the same as procuring organs from a living human being. Based on the preponderance of evidence that brain-dead persons retain most of the living characteristics of human beings, including some brain functions, the principle of *al-zann al-ghalib* equally prohibits equating brain death with death. The moral code mandates *yaqin* in death determination.

In a joint physician-jurist seminar on brain death and organ donation held in Riyadh, Saudi Arabia on 16 April 2012, Kasule[59] reiterated several Islamic legal principles that may be violated. First, the principle of intention is violated because "organ harvesting, ICU [intensive care unit] costs and research have been a driving force behind development of brain death criteria"[59]. Second, the pressure to declare brain death can be "causing potential harm to a donor to benefit a recipient which would violate the principle that prevention of harm has precedence over getting a benefit"[59]. Third, "the principle of certainty: recognition of death [must] be based on clear evidence…brain death criteria do not reach the level of absolute certainty … [in Islamic] Law doubt does not void a certainty: in this case life is a certainty and brain death is a doubt"[59]. Fourth, "the principle of custom [*Urf*]: consensus on criteria of death … [must] be by a preponderant majority of the professionals and not by a minority… [and] also must have stood the test of time… [brain death] criteria have been changing with development of knowledge and technology and have not reached the level of universal consensus having variation by country and by institution"[59]. Fifth, the construct of brain death transgresses the *maqasid* of Islamic Law ie, "protection of life" and that "… death should not be declared in a living person without evidence-based certainty…" because "[m]istaken diagnosis has very severe consequence"[59].

Societal consequences of utilitarian interpretation of the moral code of Islam

Sharif et al.[22] invoked the principle that necessity overrides prohibition to ameliorate the negative implications from ambiguous death determination:

"Although violation of the human body, whether alive or dead, is forbidden in Islam a greater emphasis is placed on altruism and humanitarian need. "If anyone saved a life, it would be as if he saved the life of the whole people"[36] is a shared principle among the Abrahamic religions *and provides theologic justification for enacting the Islamic juristic principle of al-darurat tubih almahzurat or "necessity overrides prohibition"* [Emphasis added].

The implicit argument is that societal needs for organ transplantation should take priority over the prohibition of procuring organs from donors who may not be dead by the biological standard. Khalid and Khalil[60] have commented "[a] dying person may not need his viable organs as much as persons on waiting lists, where an organ transplant could make a difference." The aforementioned comments can be construed as to mean that expediting the demise of a dying person to procure transplantable organs is morally acceptable. This argument may be acceptable to some people under the conditions that: (1) an open public debate has taken place; and (2) a broad agreement has been established on arbitrarily defining death to facilitate organ donation. Neither condition has been met[4,7,38]. Most in society disagree a priori on the permissibility of procuring organs before biological death. The utilitarian objective in redefining death for organ donation and transplantation is grounded in the notion that "the end justifies the means". However, Islam and other Abrahamic faiths[2,3,9-11] forbid terminating life for donating transplantable organs with no exceptions made for "altruism and humanitarian need" as suggested by Sharif et al.[22]. The Quran condemns the intentional termination of human life unjustly: "And whoever commits that through aggression and injustice, We shall cast him into the Fire" (4: 30)[36]. Sharif et al. advocated reinterpreting religious scriptures in favor of donating organs at the end of life[22]. They advanced the utilitarian reinterpretation of religious scriptures by citing the Quranic verse that saving one life is as saving the whole of mankind and, therefore, organ donation and transplantation is permissible[22,25]. However, Sharif et al. cited just a portion of the Quranic verse: "if anyone killed a person – not in retaliation of murder, or (and) to spread mischief in the land – it would be as if he killed all mankind, and if anyone saved a life, it would be as if he saved the life of all mankind" (5:32[36]. Although saving one life is as saving the whole of mankind, the complete verse ranks condemnation of terminating a human life above commendation of saving a life[13]. The ranking of "killing a person" above "saving a life" reaffirms that preventing evil supersedes promoting good[13].

Sharif et al. proposed interventions that are focused on "global Muslim populations", "demographic groups", and "influential parties" encouraging positive attitudes toward donation in Muslim communities. In defense of their effort to increase donation rates, they argued that their approach could contribute to societal welfare by preventing "…Western Muslims developing resentment and temptation into organ trafficking" and "Muslims becoming a growing burden on dialysis programs"[22]. The authors conflated the secular moral theories of consequentialism, utilitarianism, and autonomy with religion-based morality. This utilitarian reasoning and concern with self-serving interests may be discernable in transplantation practice. For instance, Sharif circumvented the controversy about the definition of death by reasserting the authority of the medical profession in settling this matter and ignoring (scientific and/or theological) concerns:

"[t]he major issue that stems from such debate is who should be deemed the ultimate authority to determine the eventuality of death – physicians or theologians? It is clear from this discussion that opposing views on the subject of brain death criterion can be broadly but not exclusively categorized into physicians versus theologians (supporters of a physical vs. philosophical definition of death, respectively). In Islam, passing of the body may be different from passing of the soul, but we can only rely on physical rather than metaphysical examination to determine the moment of death. I would argue physicians are the true determinants of cessation of (physical) life because the metaphysical is beyond any human assessment"[25].

Sharif disregarded contemporary scien-

tific objections to the medical criteria of death. He depicted the Quranic characterization of death as a singular phenomenon as merely philosophical (metaphysical) and, therefore, physicians should be the decisive authority in defining death criteria. The assertion that physicians (more precisely, the transplantation community) should be customizing the death criteria, for the goals of the organ transplantation practice, highlights the creep of moral reasoning toward the duty-to-die and utilitarian medical homicide[61,62]. Engelhardt[63] has described the rise of secular moral reasoning in medicine and concluded that it "results from the death of God and the abandonment of a God's eye perspective" in "posttraditional Western societies". Engelhardt[63] pointed out that controversial end-of-life medical practices have thrived through "secularizing" morality and dismantling traditional moral boundaries of Abrahamic faiths. Indeed, the new field of "Islamic bioethics" appears to be emerging with a focus on reinterpretation of religious text to accommodate utilitarian-based objectives in medicine[64]. History has shown the disastrous consequences of dismantling traditional moral boundaries under the premise that the medical profession knows what is best[65,66]. Utilitarian medical objectives culminated in extermination of "vulnerable populations" under the premise of compassionate care, relief of human suffering, and societal welfare[66]. The "moral vulnerabilities" and utilitarian pressures that previously justified prematurely ending "life unworthy of life", are still thriving in "contemporary medical culture"[67]. Hamdy[68] has cautioned against the slippery slope in utilitarian transplantation practice by describing an example from Germany: "…many books were published in Germany voicing fears and criticism of organ harvesting from brain-dead patients" because of "haunted memories of state violence and its link to biomedical practice." Therefore, it is surprising that Islamic councils continue to rely on the premise that "the medical profession is the proper authority to define the signs of death"[46] without critically evaluating the scientific validity or the utilitarian objectives underlying the death criteria.

We have cautioned of the sociocultural consequences of reinterpreting the moral code to conform to the utilitarian ideology of increasing end-of-life organ donation[13,20]. Critics of this utilitarian ideology are generally disdained:

"when people in other societies voice antipathy toward medical procedures like organ procurement, they explain their own stance in terms of "culture", such that similar feelings of antipathy from within the US dominant culture are rendered imperceptible"[68].

The dominance of utilitarian ideology in Western countries is evident when Randhawa[69], a member of the UK Organ Donation Taskforce, rejects the relevance of religious scriptures because its moral code is dictated by values that are ancient and irrelevant in modern day practice of organ transplantation:

"We need to acknowledge that most religious scriptures *were written* hundreds, if not thousands of years ago, before any consideration of organ transplantation. Consequently, any religious position on organ donation is subject to a religious scholar's interpretation of the scriptures and the *values espoused by the faith*." [Emphasis added].

Theologians would disagree with Randhawa because of the theological view that religious values of the Abrahamic faiths are held to originate from one divine source and apply regardless of time. Along the same line of reasoning, Moosa has counterargued theological dissent: "theologians and pseudo-theologians use science… in order to prove the validity and the wisdom of their scriptures only to put on display the 'truth' of their respective faiths.…these pseudo-theologies are embarrassing for both serious scientists and theologians"[32]. However, it can be argued that the so-called "serious scientists and theologians", who are rejecting the truth and wisdom of the religious scriptures, are imposing their societal ideological preferences and values over those of others. Padela and Zaganjor have blamed negative attitudes towards organ donation on "negative religious coping" as well as an "insecure relationship with God and an ominous view of the world"[70]. Advocates appear to overlook that the Quran is held to be the ultimate reference in Islam to settle disputes on the moral boundaries of human behavior: "He sent the Scripture in truth to judge between people in matters wherein they differed" (2:213)[36].

In spite of valid scientific and theological objections, many Sunni and Shiite scholars continue to espouse the permissibility of end-of-life organ donation[71,72]. One implication of reinterpreting religious text for the benefit of a utilitarian transplantation practice is that religion's primary value, ie, the sanctity of life and human dignity is being violated. Incorrect reinterpretation of the moral code by special interest groups transgresses the religious rights of Muslim communities and constitutes intellectual violence against religious scholarship. The Quran cautions against deviant interpretation of the moral code to appease special interests: "And if the truth had been in accordance with their desires, verily, the heavens and the earth, and whosoever is therein would have been corrupted!" (23:71)[36].

Media campaigns and reeducation of Muslim faith leaders

Sharif et al.[22] conveyed conflicting messages about Islam. They stated "…poor donation consent among Western Muslims centered primarily around theologic pressures, from interpretation of religious scriptures or advice from Imam or Mosque" to then attribute this unfavorable interpretation or advice to "the lack of education and/or awareness"[22]. Sharif et al. suggested 2 related strategies: reeducating religious leaders and utilizing media campaigns. For example, Sharif et al. disapproved of 2 religious beliefs prevalent in Muslim communities: (1) the forbiddance of physically violating the living or deceased human body, and (2) the "fatalist attitudes of predetermination" prohibiting "human interference to alter a preordained course of medical events"[22]. They connoted these 2 religious beliefs that are barriers to willingness to organ donation as *lack of education*. Others would argue these religious beliefs are founded on: (1) the sanctity of God's creation of life and human body, and (2) the divine predetermination, Will and Decree (*Al-Qadaa wa Al-Qadar*). The Quran is the source of these beliefs: "Verily, We have created all things with Qadar (Divine Preordainments of all things before their creation, as written in the Book of Decrees)" (54:49)[36].

We have addressed elsewhere how mass media can be an effective tool of communication to remove religious barriers toward organ donation[18,73]. For example, selective

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Giving Shape to Ideas

disclosure of information in media and educational campaigns promoting organ donation in Muslim communities is not novel. Scholarly and scientific debates that are critical about organ donation are generally excluded from educational and media campaigns. Yilmaz applied similar strategies to improve willingness to organ donation among Turkish Muslims[24]. He found that religious interpretation of death was the main reason for refusing organ donation[24]. Yilmaz applied 2 consecutive interventions in a pilot study of 132 Muslim men so that "…wrong beliefs about organ donation disappeared": (1) a one-hour teaching session on favorable reinterpretation of religious scripture about death and organ donation; and then (2) a continuous exposure to favorable public messages about organ donation in multimedia campaigns (eg, educational brochures and posters) for a period of 2 months[24]. The refusal rate of organ donation decreased from 54% at the beginning of the study to 17% after the completion of the study[24]. Yilmaz proved that controlling the information in media campaigns could influence willingness to organ donation. Yilmaz selectively disclosed information on "opinion of Supreme Board of Religious Affairs" that was favorable on brain death and organ donation in his study. He did not inform the study subjects that Turkish Muslim scholars[50] have rejected brain death as the Islamic definition of death. In another Turkish survey in the province of Kayseri, Guden et al.[29] considered overcoming the unfavorable attitudes among religious officials (Imams, muezzins, preachers, and Quran educators) toward organ donation by mischaracterizing scientific and medical concerns as "social reflex of skeptics":

"As known, officials of religion preach people and answer questions from the Islamic point of view and provide interpretations. People pay attention to these interpretations from the officials according to their religious vulnerability and behave accordingly. It is of utmost importance that officials of religion explain that their *religious reasons opposing organ donation are not valid, especially to those who are skeptical about organ donation and show an opposing attitude as a social reflex but ground it on religious beliefs*" [Emphasis added].

Turkyilmaz et al.[28] proposed a similar strategy of targeting Muslim religious officials in the Eastern Black Sea region of Turkey with "appropriate education" to improve willingness to organ donation. In a subsequent survey of religious officials, Tarhan et al. reported 92% had favorable views to organ donation[74]. Nondisclosure of the medical, legal, and religious controversies about the death criteria and organ donation was a common theme in public surveys[27-29,71,72,74,75]. Surveyors did not discern willingness to organ donation if the death criteria were inconsistent with the Islamic moral code. Dissemination of incomplete information violates the ethical principles of transparency and truthfulness in medicine and denies individuals the right to informed decision making. It is not surprising that almost 24% of US physicians object to donation because of concerns about the quality of end-of-life care and the invasiveness of perimortem procedures associated with organ procurement[76]. We recommend that medical information about how death is determined and the surgical procedures that are performed for organ procurement should be communicated clearly and explicitly to the general public in media campaigns and opinion surveys. Attempting to influence behavior and attitudes through disclosing incomplete information or communicating incorrect interpretations contradicts the Islamic moral virtues of truthfulness and honesty.

Conclusions

Proposals by organ transplantation advocates to promote organ donation in Muslim communities disregard the appropriate application of Islamic jurisprudence and the growing scientific and theological controversies in Western societies about death determination. Utilitarian reinterpretation of the religious scriptures for the purpose of embracing a controversial end-of-life practice, perceived to be socially desirable, has deleterious practical consequences: (1) donors can suffer harm; and (2) utilitarian secular moral reasoning resets the Islamic moral code that uphold the sanctity and dignity of human life.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

MYR and JLV attest that they have made substantial contributions in drafting the manuscript and revising it critically for important intellectual content, that they have given final approval of the version to be published, and that they have participated sufficiently in the work to take public responsibility for appropriate portions of the content. Both MYR and JLV have read and approved the final manuscript.

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Mubadala Healthcare launched Abu Dhabi Telemedicine Centre in 2014, with Swiss telemedicine leader, Medgate. The Centre offers 24/7 phone-based medical consultations to eligible patients. Pictured from left to right: Andy Fischer, M.D. – Board Member, Abu Dhabi Telemedicine Centre and Founder and Chief Executive Officer, Medgate; Hasan AlAttas – General Manager, Abu Dhabi Telemedicine Centre; Suhail Mahmood Al Ansari – Executive Director, Mubadala Healthcare.

Abu Dhabi Telemedicine Centre consults by phone to increase access to healthcare

As healthcare knowledge and expertise becomes more innovative with time, consumers' demand for that same medical guidance has increased across the world. Despite this innovation, millions of patients across the globe don't have easy access to healthcare, and are in need of efficient and high quality medical guidance for even the most common health conditions, including the flu, skin rashes or a chronic cough. Telemedicine, or the remote delivery of medical information between locations by means of electronic communication, has emerged as a reliable solution, both improving the dissemination of medical knowledge and helping to bridge the all-too-common gap between patients and healthcare providers. *Middle East Health* reports.

Originating over forty years ago, telemedicine began as a method for hospitals to extend care, beyond the boundaries of their walls, to patients living in areas without direct access to healthcare facilities or providers. Telemedicine has since spread – today enabled by advances in technology, it is successfully used in over 85 countries worldwide.

Broad in meaning and scope, the practice of telemedicine encompasses an array of methods of exchanging medical information. For example, electronic medical records, remote medical device management, vital sign monitoring, and video conferencing, among others are considered forms of telemedicine. Many agree that telemedicine may be one of the most effective and efficient forms of healthcare delivery in operation, as consumer-facing call centres and applications have helped manage costs for consumers, insurers, and healthcare providers alike, when compared to the costs associated with traditional methods of healthcare delivery.

Global success

The use of telemedicine as a safe and effective form of healthcare delivery has seen great success in the United States, United Kingdom and Europe. Within the US, there are nearly 200 telemedicine networks, with more than 3,500 service sites. In fact, more than half of all US hospitals use some form of telemedicine.

The University of Pittsburgh Medical Center Children's Hospitals, a top ranking children's hospital in the US, is among the hospitals utilizing telemedicine. The hospital began using electronic medical record keeping and teleconsultations to help combat the shortage of paediatric dermatologists in the region. Recognizing the need for a formal telemedicine program, digital cameras were kept in secure locations throughout the hospital. As cases presented, medical staff uploaded images to the patient's electronic medical record, along with detailed notes about the patient's symptoms and medical history, and shared the record remotely with a paediatric dermatologist.

St. Vincent Healthcare, a hospital based in rural Billings, Montana, has utilized telemedicine in a similar manner. Located a substantial distance from any of the larger, more well equipped metro-area hospitals, St. Vincent was regularly transporting paediatric patients with head injuries to Denver, Colorado for 24-hour observation by a paediatric neurologist, as mandated by the American Academy of Pediatrics. However, the transport cost per patient averaged US$15,000, a substantial cost for both the patient and hospital. Through the use of telemedicine, the hospital began sending a patient's scans and medical records for evaluation, rather than the patient, saving valuable time, money and resources.

These cases are not unique to the US. In fact, the European telemedicine market is worth an estimated €5 billion (about $6.2 billion). Amongst the most successful telemedicine endeavours in Europe is Medgate AG, a Swiss company founded by Dr Andy Fischer in 1999. Medgate is not only the leading telemedicine provider in Switzerland, but also the largest telemedicine centre operated by physicians in Europe. On average, the centre provides nearly 4,500 teleconsultations per day, and has consulted on over 4 million cases since its founding.

Telemedicine in the Middle East

Telemedicine and e-health is expanding, and becoming more prevalent in the Middle East. Recently, Mubadala Development Company, an investment and development company owned and operated by the Government of Abu Dhabi, UAE, partnered with Medgate to open Abu Dhabi Telemedicine Centre, based at Al Maryah Island, Abu Dhabi. Mubadala's healthcare unit acts under a mandate to address the region's most pressing healthcare needs through the creation of world-class healthcare facilities and the long-term development of locally based, sustainable capabilities. The 24/7 centre is the first of its kind in the UAE – fully staffed by medical professionals who are specially trained and qualified to practice telemedicine. As a fully digital and paperless facility, the centre applies modern technology to improve patient outcomes.

"Abu Dhabi Telemedicine Centre provides eligible patients located across the country direct access to high quality medical advice, increasing access to healthcare particularly for patients living in areas of the Emirates which may not have providers nearby," said Hasan AlAttas, General Manager of Abu Dhabi Telemedicine Centre.

"Our team of experienced General Practitioners are fully qualified to diagnose a patient's condition over the phone, recommend easy-to-understand treatment plans, provide second opinions on previous diagnoses and provide guidance on medications which the patient may already have. Patients can call us for any non-emergency medical condition; however, we do realize that some cases will require in-person consultations. In these instances, we recommend specialized healthcare providers who are nearby and covered by the patient's insurance plan to complete the assessment," continued AlAttas. "Our doctors conveniently follow up with patients – whether they received a teleconsultation or were recommended to a clinic – to ensure that they've received the care they needed.

Our team of experienced General Practitioners are fully qualified to diagnose a patient's condition over the phone, recommend easy-to-understand treatment plans, provide second opinions on previous diagnoses and provide guidance on medications which the patient may already have. Patients can call us for any non-emergency medical condition.

"We aim to treat the majority of patients who call us over the phone via a teleconsultation; in fact, we're currently treating 60% of all medical inquiries received by the Centre over the phone," AlAttas added.

Diagnosing medical conditions

Dr Fischer, who sits on the Abu Dhabi Telemedicine Centre board, describes how med-

ical staff are specially trained to diagnose a variety of conditions over the phone.

"Our physicians in Abu Dhabi, like their counterparts in Switzerland, employ the same medical methodology of elimination as in a hospital or clinic setting. This means doctors begin each teleconsultation by eliminating signs and symptoms of conditions that require emergency treatment. Patients are guided through simple self-examination techniques, and asked a series of questions to help our team in the diagnosis process. For example, the doctor may instruct the patient on how to look for anomalies on their skin or eyes, or how to apply pressure or move certain body parts to trigger pain responses. Similarly, physicians may guide patients on taking vital signs using common home health equipment such as thermometers, blood pressure cuffs, or glucometers, used by many diabetes patients," said Dr Fischer. "Our professionals are also trained to listen for key signs over the phone, such as breathing patterns or coughs, which can tell us a great deal about the patient's condition."

Often, a visual can also help in diagnosing a medical condition. For example, photos can capture if a patient has a skin condition such as a rash that has not gone away or that has changed in appearance after several days. Abu Dhabi Telemedicine Centre has developed a free mobile application, Telemed, to address such needs. Available for both Android and iPhone, the application enables patients to take up to three pictures of the affected area, mark the affected area on a body map visual, and securely share the photos with the centre for further analysis by a doctor. Patients can also use Telemed to send photos of their medical reports for a doctor's review in the diagnosis process, or even of medication labels should they need guidance on the usage or possible side-effects of the medication.

Benefits of telemedicine

In the Middle East, clinics and hospitals are often inundated with non-emergency cases that don't necessitate an in-person consultation. According to Dr Fischer, approximately 50% of conditions can be diagnosed over the phone. The benefits of telemedicine are wide-ranging.

Cost Efficient

Telemedicine can help streamline the diagnosis and treatment process in some cases, and as such relieve the healthcare system by decreasing costs for both patients and providers.

Time Efficient

Those with busy schedules can receive a teleconsultation without deviating from their schedule. For example, mothers who have a sick child in the middle of the night can receive medical guidance without having to bring the entire family to a hospital or clinic. Or working professionals can get advice on their way into the office.

Convenient

Telemedicine allows for immediate access to medical care, from anywhere in the region. Furthermore, patients can now seek timely guidance over the phone for the following, rather than visiting a clinic, and allow them to make an informed decision on their health:

- A second opinion;
- A question on a previous diagnosis;
- Clarification on a prescription label; or
- Details surrounding over-the-counter products.

Future of telemedicine

Over time, as the population continues to grow, access to high quality medical care will remain important. It's an issue that will continue to be faced by many throughout the Middle East, especially those living in areas without direct access to healthcare facilities or providers.

As such, experts agree there is opportunity for the practice of telemedicine and e-health to expand even beyond what it is today. With time, more patients will become aware that they can receive the reassurance and guidance needed to accurately manage their health, over the phone, and begin utilizing telemedicine as their initial medium of healthcare delivery.

National developments, such as this year's 1st Middle East Conference on Telemedicine & eHealth event, and the 2015 World Telemedicine & eHealth Forum which will take place in Abu Dhabi in March, showcase the growing use of these successful healthcare delivery models. Bearing further testament to the emphasis being placed on telemedicine, mHealth and eHealth in the region, is Etisalat's recent signing of a strategic Memorandum of Understanding (MoU) with the Ministry of Health (MoH) in support of eHealth, mHealth and the Digital Hospital, an initiative aiming to improve healthcare delivery in the country.

- To learn more about Abu Dhabi Telemedicine Centre and its innovative medical teleconsultation service, visit: www.telemed.ae MEH

Zero Mothers Die – a global initiative to reduce maternal mortality

The global partnership Zero Mothers Die was officially launched at a high-level side event during the United Nations General Assembly in New York in October. The initiative aims to save the lives of pregnant women, new mothers and their babies.

The plan behind Zero Mothers Die is to reduce maternal mortality by putting mobile technologies in the hands of these women to increase their access to healthcare information and assist them in having a healthy pregnancy and childbirth.

The world still faces high maternal and child mortality with 300,000 women and 6 million children under the age of five dying every year from preventable or treatable causes.

Flagship of the campaign is the Mum's Phone, a unique mobile phone giving pregnant women access to health messaging services, delivering health information to pregnant women via voice messages in their local languages.

However, the project includes more than just the phone and messaging service. It is also about providing:

- free airtime packages for pregnant women to enable calls with local health workers and facilities, especially in emergencies;
- capacity-building and education of local health workers using ICT's and localized digital content;
- mobile money savings scheme to help finance and increase access to skilled care during childbirth;
- solar power chargers to provide green energy to charge the mobile phones and bring financial empowerment to pregnant women.

The Zero Mothers Die consortium is composed of Advanced Development for Africa Foundation, Millennia2025 Women and Innovation Foundation and the Universal Doctor Project, in partnership with UNAIDS, The People's Vision, Airtel and ZMQ.

on the WEB Zero Mothers Die
www.zeromothersdie.org

Just the Tonic

Giuseppe Catania, Healthcare Industry Manager, Infor, looks at why the Middle East is leading the charge when it comes to embracing new initiatives in healthcare IT.

With growing, aging populations; a desire to continually improve patient care, combined with a relentless focus on efficiency, means that the Middle East healthcare industry is experiencing a revolution when it comes to supporting technology. In its quest to achieve better, measured outcomes for patient and financial health alike, healthcare organisations are capitalising on a wealth of new initiatives – from improved internet speeds to cloud, social media and business intelligence (BI). Here are five which are starting to make a big difference to the Middle East industry.

1. The rise and rise of the internet

Rapidly improving internet speed, bandwidth, availability and reliability in the Middle East together are driving substantial progress. For example, in telemedicine remote diagnosis using processes such as digital pathology reduces costs in remote regions. Improved internet scope can also minimise patient interactions with the hospital, allowing appointments to be made online. The idea of central patient health records becomes a reality; and software maintenance costs can be reduced through using URL type software interfaces rather than hard coded interfaces that need to be changed every time one software component is upgraded.

2. Embracing the cloud

These improved internet capabilities combined with a reduced cost in mass storage make the delivery of hospital software applications very cost effective, reliable, standardised, scalable and maintenance free. This delivers clear benefits to hospitals, particularly as it they can be delivered through secure servers to ensure rigorous data protection legislation is adhered to.

3. Mobilising information

The use of mobile devices for clinicians and administrative staff is increasing year on year. Clinicians often use such devices to access health record data, and submit new data at the patient's bedside, while administrative staff might use devices to map and locate medical and surgical equipment, selecting the most optimum device by availability and location.

Speed, accessibility, costs and security are all improving, and as the benefits of using mobile devices expand (the MERS outbreak saw clinicians use them to huge advantage), therefore we believe it is fundamental that hospitals select IT systems that can, in the future, be moved to a mobile platform when required.

4. Social media: enjoying the moment

Many hospitals experience departmental siloes – both clinically and in the back office. If a 'social media' type environment is set up within the hospital and mapped on to clinical and business departments there is a great opportunity for increased collaboration, speed, and improved care. This sort of environment is also far more user friendly, and quite frankly, way more enjoyable to engage with than many older transaction based interfaces. Adoption rates are better and the value extrapolated from the system is greater.

5. Applying business intelligence (BI)

By using common integration platforms for clinical and business data, collecting ever bigger volumes of data, and exploiting cheaper and increased processing power, hospitals can more easily combine data and drill into information which informs strategy and future planning such as cost per patient or procedure. In addition they can identify and trend KPIs that might be needed for statutory reporting to government, or insurance provider, as well as aligning these with their strategic plan. Increasingly clinicians are also looking to analyse 'big data', for example, through combining clinical episodes across numerous hospitals with extensive research results, relationship and patterns can be identified in order to improve future care.

First Mover Advantage

The Middle East isn't really any different to any other developed region in its adoption of new technologies. However large levels of investment in the region on new structures and hospitals mean that there is a big opportunity for early, fast introduction of new technologies – and in many cases adoption levels are leapfrogging those in the US.

Other drivers for this revolution include regional demographic demands on healthcare (an aging population with chronic disease increases in cardio-vascular, obesity, diabetes, cancer), which if anything, are more pronounced in many Middle East countries. And there are also additional regional drivers for increased technology use such as genetic disorders specific to the Middle East population.

A lack of qualified clinicians and nurses means that it is imperative to optimise their deployment by acuity and specialty across shifts, as well as to ensure the right resources are channelled to their development and recruitment.

Finally there are a number of centres planning to capitalise on medical tourism, and their ability to attract patients will in some part depend on their use of IT technology that supports global best practice.

The next five years are set to witness major adoption of new technologies and associated best practice in the healthcare market. If its potential is reached then the Middle East will set an example to other regions around the globe. MEH

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Eucarbon – the essence of bowel history

2500 years of experience dedicated to your bowel health

By **Dr Johannes Gottfried Mayer**

Whenever the topic "Traditional Medicine" comes up, it makes people think of the traditional Chinese medicine. Yet, people tend to forget, that also the European medicine is steeped in tradition. For hundreds and thousands of years, it has been strongly influenced by various healing arts, which are primarily based in Asia Minor and the Arab regions. Groundbreaking findings in research and science are the reason that European-based traditional medical methods fell into oblivion. Lately, it is, amongst other things, the findings gathered from the herbalism in the medieval cloister gardens, which is putting the topic back into focus.

Eucarbon is a preparation made up of four agents, which are used in the traditional European art of healing. It was developed by the pharmacists F. Trenk and Prof. Wolfgang Pauli in 1909. It is applied as mild bowel regulator, helps to relieve constipation, slight diarrhea, and flatulence – and binds toxic metabolic products. One tablet contains:

- Senna leaves (Folium Sennae) 105 mg
- Rhubarb extract (Extractum Rhei) 25 mg
- Natural coal (Carbo ligni) 180 mg
- Purified sulfur (Sulfur depuratum) 50 mg

Rhubarb from the land of the Barbarians

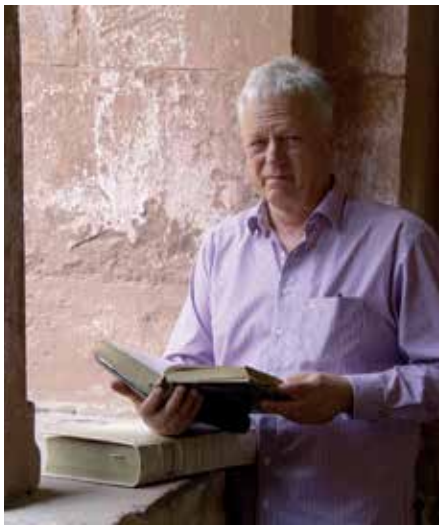
Rhubarb has its name from the river Wolga, which the Greeks used to call Rha. Hence, from the Greeks' point of view, it originated beyond the Black Sea – the home of the Barbarians; that's how the plant Rhubarb got its name. Its healing effects were discovered by Greek physicians back in ancient times (≈ 2000 BC – 500 AD). It turned out that the spectrum of its healing effects was very wide. We'd like to focus on those related to the stomach and bowel. The Greek physician Dioskurides was convinced of the relieving effect of rhubarb when applied against eructation, flatulence, digestive problems, and colics. The Roman civil servant Pliny the Elder held the same view. It was in the 9th century AD, when the medicinal rhubarb contained in Eucarbon was discovered by the Arabs in the course of their journeys to China. They brought their knowledge about the plant and its increased effects to Europe. Besides, its significance is higher than assumed.

"If there is anything that can contribute to avoiding death, it is Senna"

Prophet Mohammed, 1. Hadith, based on the book "Sunanihi" written by Tarmidi and Ibn Maja.

The Arab physician Ibn Sina (Avicenna, 980-1037)

Rheum palmatum - medicinal Rhubarb



Dr Johannes Gottfried Mayer

The name Senna or Cassia derives from the Arab term "sanâ" or "sannâ". The physicians of the ancient Europe didn't know anything about this medicinal plant until the famous healers of Arab's cultural spheres conveyed their knowledge to them in the 9th and 10th century. The plant conquered the field of European medicine thanks to the findings of the Arabs, and was firstly applied in Italy. Back in the 16th century, the city physician Adam Lonitzer from Frankfurt (Germany) described the correlation of rhubarb and senna; according to him, the formula can be used to get rid of undesired "liquids" as it was referred to by people, then – and purify the blood. The combination rhubarb and senna was also mentioned by other researchers and authors of works on that topic, which were published later on.

Sulfur – The yellow healing powder

The use of sulfur in the art of healing goes back to early times, too. Sulfur was considered to be a remedy by both the Egyptians and the Greeks. The Arab physician Ibn Sina (Avicenna, 980-1037) describes the use of sulfur as a remedy against skin diseases, ulcers, respiratory infections, liver and spleen diseases, painful womb conditions, and temperature. Also the renowned physician Paracelsus (about 1493-1541) recognized the astonishing effects of sulfur and regarded it as one of the most important active pharmaceutical ingredients. In the late 19th century, the oral application of sulfur added to combined preparations, which also supported the bowel movements owing to its mild laxative effect, found its way into the European Pharmacopoeia and was used with different names (e.g. *Pulvis Liquiritae Compositum* Laxatives, Kurella´s powder…)

Charcoal - Carbo ligni

Other than the medicinal plants known to exist since ancient times, evidences for the use of charcoal for medical purposes showed up quite late. The German alternative physician Johann Rudolf Osiander (1717-1801) used charcoal as a treatment against "acid regurgitation, gastric acid, foul-smelling wind… The same means can be applied to get rid of bad breath and stimulates the bowel movement." The use of charcoal has been constantly increasing; apart from that, it is known and appreciated to bind toxic agents.

Forschergruppe Klostermedizin

Eucarbon – the best preparation for an ideal bowel movement based on 2000 years of medical experience

The four most important ingredients of Eucarbon are known to be significant means of traditional medicine in Europe and the Middle East. In 1909, they were combined for the very first time in Eucarbon. Since then, Eucarbon, which is produced in Austria, is regarded as an indispensable preparation to treat bowel irritation in a smooth way.
www.eucarbon.com

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Breaking the chain of cross infection with the first Medical Pulp Disposables manufactured in Saudi Arabia

Al Kifah is a large, privately owned group headquartered in Saudi Arabia that currently employs more than 8,000 people.

The Paper Products Division has been a market leader, supplying the region's leading dairy, medical and food companies for almost 30 years. The Division is accredited with ISO 9001, ISO 22000 and was the first non-food producing company to achieve BRC certification in the Kingdom.

In 2014, Al Kifah assembled a team with close to 30 years' experience in pulp moulding technology and completed the commissioning of a new multi-million dollar, advanced paper pulp moulding facility. This investment was made to address a growing demand in the region for locally manufactured products to minimize the increasing problem of supply chain interruptions.

The company's discussions with hospitals throughout the region identified a growing demand for disposable medical products to help combat the risk of cross infection. During the discussions it became clear, that Hospitals wanted a local manufacturer as a result of the issues normally associated with imported products.

A full range of Medical Pulp Disposables

Al Kifah recognized the need to supply a complete medical disposables system to the hospitals, developing a full range of medical pulp disposables that includes, Bed Pans, Urinal Bottles and Kidney Trays, etc… In addition, after completing an analysis of the leading macerator suppliers, Al Kifah identified DDC Dolphin Limited as the market leading manufacturer, based upon their ongoing investment in R&D and their commitment to innovation. DDC was the first company to introduce a completely "Hands Free" Macerator solution.

Last year, Al Kifah partnered with DDC Dolphin Limited to become the exclusive distributor in the Saudi Arabian market for the complete range of DDC products which include, Pulp Macerators, Incontinence Macerators and Washer Disinfectors.

Al Kifah maintains an inventory of DDC Macerators at their facility in Al Ahsa in the Eastern Region of Saudi Arabia. They have also assembled a team of factory trained technicians, who are able to maintain and service all DDC manufactured equipment, ensuring that hospitals receive a fast and efficient service. The technicians provide ongoing training to nursing staff and guarantee the long and productive life of the DDC machines.

Al Kifah will be supplying their Disposable Medical Pulp Products throughout Saudi Arabia and the GCC, to support the growing medical sector. Successful trials of Al Kifah's new medical disposables system have already taken place at a number of locations in Saudi Arabia and the company is expecting several large Hospital Group installations during the First Quarter of 2015.

- **Please visit the DDC Dolphin Stand at Arab Health 2015. Stand Number Z1B50 in the UK Pavilion**, where Al Kifah representatives will be pleased to discuss your specific needs.
- For additional information regarding Al Kifah's Paper Products Division, please visit *www.kifahpaper.com*
- For additional information regarding DDC Dolphin Limited, please visit *www.ddcdolphin.co.uk*

The Paradigm Shift in Healthcare Information Technology is Accelerating the Realization of Smart Hospitals

Hospitals today are being transformed into sophisticated medical facilities with computer-based medical equipment and intelligent, connected medical devices. According to a 2014 Statista report, the value of the mobile healthcare industry is expected to quadruple over the next 6 years. The increasing deployment of technology in hospitals, enables healthcare providers to optimize not only staff workflows, but also the services provided to patients. Thus, trusted and experienced hospital information technology (IT) solution providers are crucial to the delivery of effective, safe, and quality healthcare. Advantech is committed to assisting hospitals with implementing technical solutions that improve outpatient services, nursing care, and critical care.

Hospitals of the future

An illustration of a smart hospital is provided on page 19 of this month's issue. Imagine walking into a hospital and not experiencing long queues because of the self-check in system installed at the service desk and connected to the Hospital Information System (HIS). Next, you are not only guided to the appropriate department, but the doctor already knows the reason for your visit. As you pass by the nursing station, you observe nurses and other healthcare staff using either mobile clinical pads or medication carts with vital sign measurements for updating patient records while on the move. Clinical mobility solutions prevent interruptions to internal hospital workflows. Furthermore, with the use of medical-grade IP-certified, fanless POC-W series equipment in operating rooms and intensive care units, doctors and nurses no longer have to worry about bacterial control. What about the patients residing in hospital wards? In smart hospitals, patients feel less isolated with the implementation of patient infotainment systems. These systems enable patients to easily access their medical records, watch television, order food, and even communicate with their family and friends over the Internet, without using their personal devices. Regarding emergency admission registration from ambulances, by synchronizing patient data and conducting initial diagnostics prior to hospital arrival, precious treatment time and patient lives can be saved. Additional time can be saved by using Advantech's TREK fleet management series to guide ambulance drivers and provide them with real-time route information. Every one of Advantech's high-tech solutions contributes to digitalization and the realization of smart hospitals. At Advantech, we believe that saving time equate to saving lives.

Worldwide applications

Advantech has successfully delivered smart hospital IT solutions to many world-renowned hospitals and organizations such as Hamad Medical Corporation (Qatar), TATA Hospital (India), Han Yang University Hospital (Korea), Richard Wolf GmbH (Germany), Netherland Cancer Institute (Netherland), King Khalid University Hospital (Saudi), and Cleveland Clinic (UAE). For a complete list of installations worldwide, please visit our website or contact our local specialists for more information.

About Advantech Digital Healthcare

Founded in 1983, Advantech is a leading provider of information technology solutions for the digital healthcare market. Our years of trusted experience combined with comprehensive medical, ISO, and IP certifications attest to the quality of our uniquely designed products. Advantech has a full range of medical products for satisfying all demands, medical technology and implementation research and development teams, extensive customization capabilities, as well as global sales and service teams that guarantee a rapid time-to-market and local support. The future hospital applications and innovations made possible by using Advantech products are unlimited. For more information, please visit *www.advantech.com/digital-healthcare*

The demonstrator for a suture anchor made of iron-tricalcium phosphate (FE-TCP) is only slightly larger than a match head.

Fewer surgeries with degradable implants

Until now, in cases of bone fracture, doctors have used implants made of steel and titanium, which have to be removed after healing. To spare patients burdensome interventions, researchers are working on a bone substitute that completely degrades in the body. Towards this end, material combinations of metal and ceramic are being used.

No other joint in the human body is as highly mobile as is the shoulder. However, it is also very sensitive and prone to injury, with athletes being particularly affected. The most common complaints include tendon rupture, which have to be treated surgically. The surgeon fastens the cracks using suture anchors. Such implants used to be made of titanium or non-degradable polymers – with the disadvantages that either they remain in the body even after healing has occurred or doctors have to remove them in a second procedure. To avoid this, researchers at the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM in Bremen, Germany, have developed load bearing, biodegradable implants that are completely degraded in the body. In the first step, they have used powder injection moulding to manufacture a suture anchor, which is available as a demonstrator. The research was presented at the COMPAMED trade fair in Düsseldorf in November 2014.

Calcium phosphate stimulates healing of the bone

"With the implant, severed tendons can be anchored to the bone until they have grown again. Since the function of the fixing element is satisfied after the healing process, it is no longer needed in the body. If implants or prostheses that are as wear resistant as possible are required – such as in an artificial hip joint – metallic alloys such as titanium will certainly continue to be used. However, for plates, screws, pins and nails which should not remain in the body, there are other requirements," says Dr Philipp Imgrund, manager of the Medical Technology and Life Sciences business field at IFAM.

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In the project "DegraLast", IFAM has worked jointly with the Fraunhofer Institutes for Laser Technology ILT, for Biomedical Engineering IBMT and for Interfacial Engineering and Biotechnology IGB in establishing a materials and technology platform to produce degradable bone implants for use in trauma surgery and orthopaedics. These materials are to be gradually absorbed by the body while, at the same time, new bone tissue is formed. Ideally, the degree of degradation is adapted to the bone growth so that the degradation of the implant meshes with the bone formation. For this reason, the scientists are developing materials with specifically adjustable degradation. The challenge: The implants have to be mechanically stable enough during the entire healing process so that they are able to fix the bone in place. At the same time, they cannot have any allergenic effects or cause inflammation. The researchers at IFAM are relying on metal-ceramic composites. A metal component based on an iron alloy is being combined with beta-tricalcium phosphate (TCP) as the ceramic component. "Iron alloys corrode slowly and ensure high mechanical strength, while ceramic decomposes quickly, stimulates bone growth and aids the ingrowth of the implant," Dr Imgrund says to explain the advantages of this material combination.

In order to be able to manufacture the material composite, the researchers have turned to the powder injection moulding process. It offers the ability to produce complex structures cost-effectively and in large numbers. Properties such as density and porosity can be controlled selectively – an important factor, since high density and low porosity result in high mechanical strengths. Another advantage: The materials are available as powders and can be mixed in any proportion prior to processing. But what proportion is the right one? In laboratory experiments, the researchers have found the optimum composition of the materials for the suture anchor. The demonstrator consists of 60% iron and 40% ceramic.

"It is important to determine the right amount of ceramics as a function of the powder amount. If the proportion is too high, the material will be brittle. On the other hand, the tricalcium phosphate accelerates the degradation of the implant," says Dr Imgrund. The researchers have succeeded in doubling the degradation rate from 120 to 240 micrometres per year in the laboratory model. The shoulder anchor would be absorbed by the body within one to two years.

While shaping processes such as powder injection moulding are especially suited in large quantities as fixation elements for standard implants, additive manufacturing methods are used to produce individual implants – such as for bone replacement in the skull area – or implants with defined pore structure. The researchers from ILT who are also involved in the project are producing implants made of magnesium alloys through the use of Selective Laser Melting (SLM). To ensure the safety of the novel composite materials from the outset, colleagues from IGB in the "DegraLast" project are establishing cell-based in-vitro test systems for analysis of the ingrowth behaviour in the bone. The scientists at IBMT are in turn working on an in-vivo monitoring system that can monitor and document the degradation behaviour of the implants in the human body. MEH

Iron alloys corrode slowly and ensure high mechanical strength, while ceramic decomposes quickly, stimulates bone growth and aids the ingrowth of the implant.

The *International Journal of Surgery* opens access to journal issues after 24 months

The *International Journal of Surgery* (IJS) will open open up its archive of previously published content: after 24 months published journal issues become available for all to read. A key aim of the IJS is to improve surgical knowledge and patient care and it is hoped that by making these articles available to all it will improve efforts to achieve this.

As a general surgical journal, covering all specialties, the *International Journal of Surgery* is dedicated to publishing original research, review articles, and more – all offering significant contributions to knowledge in clinical surgery, experimental surgery, surgical education and history. The Journal had an impact factor of 1.650 for 2013 and is Indexed and Abstracted in: EMBASE, Scopus and Medline/PubMed.

Professor David Rosin, Editor-in-Chief of IJS said: "The journal has always been a great place for authors to publish and disseminate their research, but we believe that this new publication policy will give authors an even wider distribution of their research."

The Managing and Executive Editor of the Journal, Riaz Agha, said: "Opening up our archive means we will release a decade of content – over 1,000 articles – immediately to the world. This is a fantastic opportunity to boost exposure globally for our authors, to spread peer-reviewed knowledge and enhance patient care."

- The IJS articles are available through ScienceDirect: *www.sciencedirect.com/science/journal/17439191* MEH

Internalized weight bias affects obesity surgery outcome

Negative feelings about one's own weight, known as internalized weight bias, influence the success people have after undergoing weight loss surgery, according to research appearing in the journal *Obesity Surgery*, published by Springer. The study, from the Geisinger Health System in the US, is considered the first and only study to examine internalized weight bias in relation to post-surgical weight loss success in adults.

Internalized weight bias adversely affects many overweight people. Studies have shown that weight bias stems from personal perception or societal views that overweight people are personally accountable and at fault for their body weight. These overweight individuals feel – or think others feel – they lack the willpower, discipline and treatment needed to lose weight. In addition, people who are highly vulnerable to negative feelings about their own weight are more likely to experience low self-esteem and depression.

In this study, the researchers measured the degree to which participants internalized weight bias by developing negative self-attributions as a result of these biases. They leveraged Geisinger's electronic health record and its existing bariatric surgery database along with psychological surveys. The result: As ratings of internalized weight bias before surgery increased, weight loss success twelve months after surgery decreased.

The researchers found no differences in ratings of bias between participants' race or geographic location (urban or rural) but identified high levels of internal negative thoughts and feelings in about 40% of preoperative participants. In addition, greater weight bias was associated with greater depression. On average, most participants were white females with a preoperative mean BMI of 47.8 kg/m^2 and a postoperative BMI of 32.5±6.1 kg/m^2 12 months after surgery.

Clinically, the study suggests a potential benefit to pre-operative weight bias screening. Identifying an opportunity to provide coping strategies, including counselling and peer support group participation, may help to foster long-term weight loss surgery success.

"How an individual internalizes weight bias relates to depression before surgery as well as overall weight loss success 12 months following bariatric surgery," says Michelle R. Lent, Ph.D., Investigator and Clinical Psychologist at Geisinger's Obesity Institute. "Future studies should assess the impact of early weight bias screening and intervention to promote better psychological health and weight loss results."

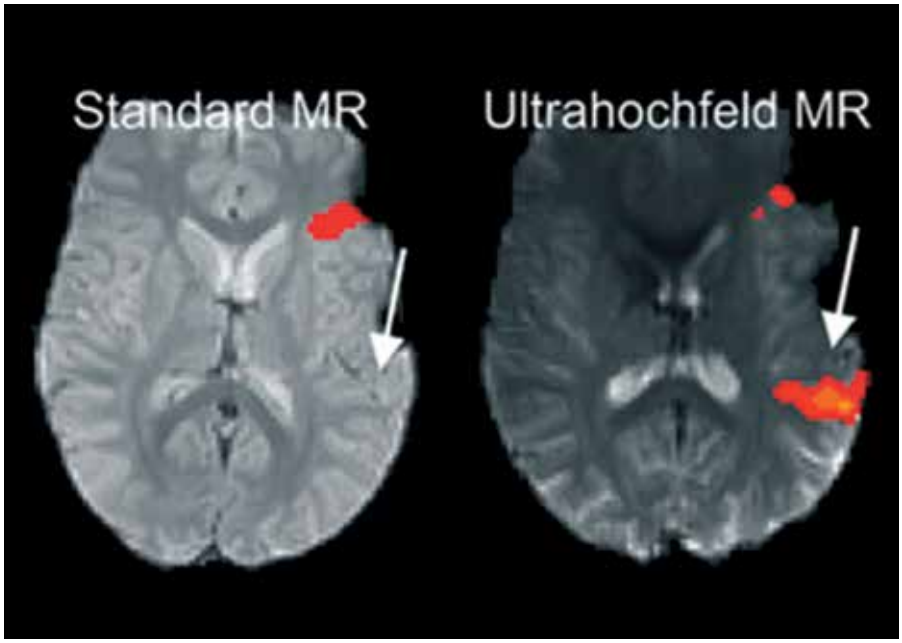
doi: 10.1007/s11695-014-1455-z

Ultra-high-field MRI reveals language centres in the brain in detail for preventative action prior to brain surgery

In a new investigation by the University Department of Neurology at the Medical University of Vienna, it has been possible for the first time to demonstrate that the areas of the brain that are important for understanding language can be pinpointed much more accurately using 7-Tesla ultra-high-field MRI than with conventional clinical MRI scanners. This helps to protect these areas more effectively during brain surgery and avoid accidentally damaging it.

Before brain surgery, it is important to precisely understand the areas of the brain required for language in order to avoid injuring them during the procedure. Their position can shift considerably, especially in patients with tumours or brain injuries. The brain's flexibility also means that language centres can shift to other regions. If the areas responsible for language control and processing are injured during a brain operation, the patient can be left unable to communicate. In order to create a "map" of the language control centres prior to the operation, functional magnetic resonance imaging (fMRI) is used these days.

A multi-centre study from 2013 demonstrated the advantages of fMRI-assisted localisation of the motor centres in the brain. In a new investigation by the working group led by Roland Beisteiner (University Department of Neurology), it has been possible for the first time to demonstrate that the areas of the brain that are important for understanding language can be pinpointed even more accurately using ultra-high-field MRI than with conventional clinical MRI scanners. The focus lies on the two most important language centres in the brain known as Wernicke's area (which controls the understanding of language) and Broca's area (which controls the motor functions involved with speech).



Ultra-high-field MR offers much greater sensitivity than classic MRI scanners, allowing even very weak [brain] signals to be recorded in areas that would otherwise have been missed.

The brain is scanned for activity while the patient is carrying out speech exercises. This allows the areas required for speech to be localised much more accurately than previously. "Ultra-high-field MR offers much greater sensitivity than classic MRI scanners," explains Roland Beisteiner, "allowing even very weak signals to be recorded in areas that would otherwise have been missed."

The work was carried out in cooperation between the University Department of Radiology and Nuclear Medicine and other university departments as well as with support from one of the research clusters at Vienna's universities (Roland Beisteiner, Tecumseh Fitch) and was published in the respected journal *Neuroimage*.

In Austria, fMRI methods were first set up and established for clinical use by the University Department of Neurology back in 1992. They are funded exclusively through third-party finance and have been constantly developed in cooperation with other university organisations. As a result, the working group has published numerous pioneering papers on the improvement of neurological diagnostics using fMRI and carried out the world's first study into improving the diagnosis of brain function using ultra-high-field MRI. fMRI is the most important non-invasive technique in Austria for the research and clinical exploration of brain functions.

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Brain surgery through the nose

Advances in medical technology allow Wake Forest Baptist surgeons to perform endoscopic brain surgery through the nose. *Middle East Health* reports.

Imagine a tiny pea at the bottom of a bowl of Jell-O. Now, imagine trying to remove that pea without disturbing the Jell-O around it. That's how Rashid Janjua, M.D., assistant professor of neurosurgery, and Drew Plonk, M.D., assistant professor of otolaryngology, at Wake Forest Baptist Medical Center describe the precision required to remove pituitary tumours at the base of the brain.

Now, new tools and technology are allowing Janjua, Plonk and other surgeons at Wake Forest Baptist to remove these and other skull base tumours even more precisely without having to make an incision on the head. They are able to perform brain surgery through the nose.

The team of surgeons from two specialties takes a multidisciplinary approach in the technique offered at Wake Forest Baptist. Plonk is joined by assistant professor of otolaryngology, John Clinger, M.D., on the otolaryngology side, and Janjua is joined by John Wilson, M.D., professor of neurosurgery, on the neurosurgery side. Together all four make up the endoscopic skull base surgery team.

In the operating room, Plonk and Clinger guide an endoscopic camera through one nostril to the floor of the skull. Once this exposure is established inside the nasal cavity, Janjua or Wilson will open the bony floor of the skull and begin removing the pituitary tumour through instruments working from the other nostril. In the same fashion, other tumours arising from the base of the skull or defects in the bone that result in the brain protruding into the nose or sinuses, can be treated in this minimally invasive fashion.

"With the conventional methods, the neurosurgeon relied on a microscope to guide the removal of the tumour," said Plonk. "This technique allows an endoscopic camera to be right at the tumour which gives a complete view of the tumour allowing the surgeon to ensure removal of all of it."

The endoscopic skull base surgery team started using this technique in 2012 and has continued to improve upon it as the only medical centre in the Triad offering this surgery technique.

A recent case, Donna Crigger, developed a pituitary tumour that was discovered after a routine eye exam. Crigger noticed large blind spots in her vision during the exam and an MRI was ordered. The test results showed she had a large pituitary tumour. Although the tumour was benign, it was pushing on her optic nerve causing the tunnel vision.

Janjua and Plonk performed the surgery and removed her tumour by going through her nose to the tumour instead of opening up her skull.

"It was just a blessing in disguise," said Crigger about catching the tumour early during an eye exam. "I no longer have the vision problems thanks to the removal of the tumour, and I don't have any side effects from the surgery."

The surgery technique offered a quicker recovery time compared to the conventional methods that involve cutting into the skull.

> This technique allows an endoscopic camera to be right at the tumour which gives a complete view of the tumour allowing the surgeon to ensure removal of all of it."

"This allows us to be more thorough in tumour removal," said Janjua. "Plus, the patients usually are sitting up and having dinner that same night. With these techniques, we are able to discharge them from the hospital sooner, and they are back at home with their loved ones and at work earlier than they would've been before." MEH

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Strict blood sugar control after heart surgery may not be necessary

Patients undergoing coronary artery bypass grafting (CABG) surgery may not have to follow a strict blood sugar management strategy after surgery, according to a study in the October 2014 issue of *The Annals of Thoracic Surgery*.

The study found that liberal management of a patient's blood sugar levels following CABG surgery leads to similar survival and long-term quality of life as achieved through stricter blood sugar management. The findings applied to all patients, regardless of diabetes status.

Previous research has shown that hyperglycemia (high blood sugar) after CABG and other cardiac surgery is associated with increased morbidity and mortality; however, more recent studies have shown that liberal maintenance of blood glucose levels (<180 mg/dL) after CABG surgery can be safer and more advantageous in both diabetic and non-diabetic patients.

A. Thomas Pezzella, MD, Niv Ad, MD, and colleagues from Inova Heart and Vascular Institute in Falls Church, Virginia, United States, used data from patients enrolled in one of their previously published studies to assess long-term survival and health-related quality of life based on glucose control following first-time isolated CABG surgery.

"The study randomly assigned heart bypass surgery patients, with and without diabetes, to two types of blood sugar control. In one group, blood sugar control was tightly controlled, which was the standard procedure at our hospital. The second group had blood sugar controlled more loosely," said Dr Ad. "The original study only focused on how blood sugar control affected complications in the hospital, so we were interested in following those same patients over time to see if blood sugar control had any impact after discharge from the hospital."

The new study found that survival after heart bypass surgery was not affected by the level of blood sugar control in the hospital while recovering from surgery, as long as blood sugar was kept below 180 mg/dL. The new study also found that health-related quality of life significantly improved in all patients from baseline to 6 months, whether or not they had strict blood sugar control.

"We hope that these results will encourage more hospitals to consider a less strict control of blood sugar in all patients after heart bypass surgery, which could reduce the chances for hypoglycemic events in the hospital, as well as secondary complications from drops in blood sugar," said Dr Ad.

We hope that these results will encourage more hospitals to consider a less strict control of blood sugar in all patients after heart bypass surgery, which could reduce the chances for hypoglycemic events in the hospital, as well as secondary complications from drops in blood sugar.

Reassurance for patients

In an invited commentary in the same issue of *The Annals*, Harold L. Lazar, MD, from Boston Medical Center, said that the study provides some assurance to heart surgery patients. "Since most groups are moving away from aggressive blood sugar control because of a higher incidence of hypoglycemia low blood sugar, this study's results will provide some affirmation that, at least for overall survival, there is no difference between the two techniques," said Dr Lazar.

"One limitation of the current study is that Pezzella and colleagues report only on survival. We don't know if there were differences in cardiac-related issues, such as heart attacks, recurrent angina, need for repeat coronary revascularization procedures, or long-term readmissions for acute coronary syndromes," said Dr Lazar. ""This is important for future research since many of these patients have other comorbid diseases that are not related to their heart."

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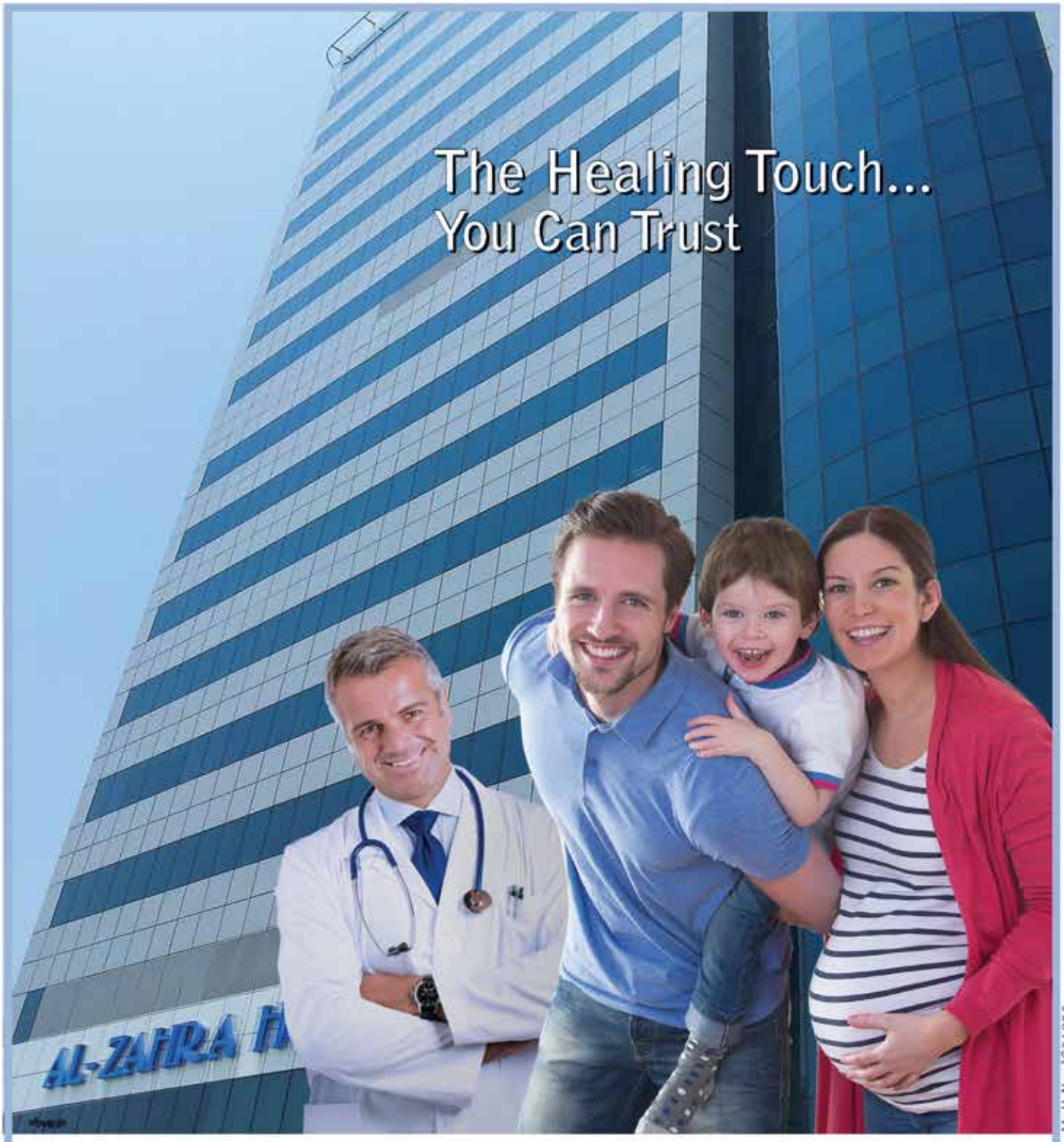

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Dr Mohammad Ahmad Al Jarallah, former Minister of Health in Kuwait and former Chief of the Military Medical Services Authority in the Kuwait Ministry of Defense

Professor Fahim Bassiouny, Professor of General Surgery at Cairo University, Egypt

The role of bariatric surgery in tackling obesity

The scale of the Middle East's obesity threat has reached such a point that only one thing is certain: without new thinking and definitive action, it will only get worse. *Middle East Health* reports.

A global issue of pandemic proportions

The need to tackle obesity – both in healthcare and society in general – is the message from experts across the region who are discussing ways to effectively address a health emergency that will not be solved by continuing to focus on prevention alone.

Obesity is a healthcare challenge of global reach, with recent evidence highlighted in the McKinsey Global Institute report "How the world could better fight obesity", showing that 2.1 billion people (approximately 30% of the world's population) are overweight or obese; however the statistics for the Middle Eastern region alone, are equally as staggering. According to one study[i], 51 million people in the Middle East are classed as obese, crystallizing the scale of the issue. In the same study, Qatar is reported to have the highest incidence of obese men (44%) in the Middle East and North Africa region, followed by Kuwait (43%) and Bahrain (31%), while the prevalence of obesity among women exceeded 50% in three Middle Eastern countries; Kuwait (59%), Libya (57%) and Qatar (55%).

Solutions to this growing epidemic were top of the agenda at a recent obesity roundtable meeting held by Johnson & Johnson at its offices in Dubai Healthcare City. Sabine Dandiguian, Company Group Chairman for the Global Surgery Group of Johnson & Johnson Medical across Europe, the Middle East and Africa, was joined by professors and medical experts from across the region to discuss the role of bariatric surgery in easing the increasing burden of obesity on the region's patient's and healthcare systems.

A growing economic and societal burden in the Middle East and North Africa

Not only does obesity carry serious consequences for people's health, it carries a global cost of $2 trillion, consuming 2.8% of global Gross Domestic Product and demanding approximately 15% from the healthcare budgets of developed countries, according to the authors of the McKinsey report.

Sabine Dandiguian, Company Group Chairman for the Global Surgery Group of Johnson & Johnson Medical across Europe, the Middle East and Africa

> Ten years ago, we were fighting to prove that obesity is a disease. Nowadays, we are reaching that point where people realize obesity is one of the biggest health problems in society. It is recognized in the medical community, still, we need to raise awareness of its status as a true disease state among clinicians, and that it can really impact a patient's health and well-being.

Researchers have produced the startling forecast that if current obesity rates continue, almost half of the world's adult population will be overweight or obese by 2030.

The roundtable discussion highlighted how the demand for bariatric surgery is increasing by 20% annually in Gulf countries, however in many cases it is out of necessity rather than choice. Bariatric surgery is proven to reduce the risk of serious health complications associated with obesity such as cardiovascular disease, sleep apnea, certain cancers and perhaps most pressing for the region, type 2 diabetes.

According to experts, it is pivotal to dispel the notion held by many, that obesity is self-inflicted or a lifestyle choice, rather than a critical health issue.

It is these damaging perceptions which have led to widespread criticism of bariatric surgery, which can cost between $8,000 and $15,000, as many claim that the procedure is becoming a substitute for a lifestyle overhaul. It is from this viewpoint that a serious stigma has emerged.

The alternative perspective, shared by the thought leaders in attendance at the roundtable discussion, is that surgical intervention for obesity can have health benefits for patients, many of whom suffer from two or more associated diseases by the time they are eligible for surgery.

An increase in bariatric procedures could also realize financial savings for governments and healthcare systems alike, as patients who have undergone surgery, are more likely to avoid life-threatening and costly conditions such as heart disease and diabetes, which currently affects approximately one in ten adults in the Middle East and North Africa region, according to the International Diabetes Federation.

The shift from lifestyle disorder to disease state

In 2013, the American Medical Association voted for obesity to be recognized as a chronic disease and the World Health Organization has said obesity is one of today's most blatantly visible – yet most neglected – public health problems. However, the idea that obesity is a lifestyle disorder lingers in the public consciousness.

"As a company operating within the Middle East and North Africa region, we are seeing the stigma associated with obesity first-hand," said Dandiguian. "It is a belief that obesity is purely cosmetic and those patients are just lazy; there is a perception they should just go out and exercise. Our message is that this is a life-threatening issue. As a company, it is our responsibility to change the way obesity is viewed and treated. We are dedicated to collaborating with pioneering experts to help bring obesity under control before it is too late."

Dr Mohammad Ahmad Al Jarallah, the former Minister of Health in Kuwait and former Chief of the Military Medical Services Authority in the Kuwait Ministry of Defense, agrees.

"There are these views that if you are obese, go and get a bike. There is no doubt, that we need to start by encouraging patients to control their diet and address their lifestyles, but we also need an endpoint."

Professor Fahim Bassiouny, Professor of General Surgery in Cairo University, Egypt believes that, "obesity by itself is a disease", and evidence shows investing in surgical intervention for obesity saves not just costs, but lives.

There has definitely been some success over the last decade in shifting the long-held perception of obesity as being related simply to poor lifestyle choices and lack of exercise, in the opinion of Dr Haitham Al Falah, Hospital Director for King Saud Medical City in Riyadh, the largest Ministry

of Health (MOH) hospital in Saudi Arabia.

However, he feels more education is needed if its true severity is to strike a public chord.

"Ten years ago, we were fighting to prove that obesity is a disease," he said. "Nowadays, we are reaching that point where people realize obesity is one of the biggest health problems in society. It is recognized in the medical community, still, we need to raise awareness of its status as a true disease state among clinicians, and that it can really impact a patient's health and well-being."

The importance of providing access to treatment

An increase in awareness however, can also create its own challenges as the rise in obesity means demand for multidisciplinary services and bariatric surgery is already outstripping supply in the public sector.

"The number of people treated versus the number of people who deserve to get access to treatment is very low – not only here in the region, but all over the world," said Dandiguian. "We need to know what we can do to increase access to the right type of care."

Saudi Arabia provides an example of the variance between what is required and what is available in terms of bariatric surgery.

The number of eligible candidates in the Kingdom far outnumbers the number of procedures performed annually, according to Dr Al Falah, and eligible candidates often go without surgery – with waiting lists stretching into years, as opposed to months.

"The main issue is manpower," he explains. To address this, he believes future efforts in fighting obesity should focus on closing these gaps in care, and increasing the number of skilled surgeons and accredited centers.

Understanding the necessary guidelines

If you are eligible for bariatric surgery, sleeve gastrectomy and gastric bypass procedures are considered safe and effective options which can have a positive impact not just on weight loss, but also on diabetes and other serious conditions caused by obesity.

To undergo a sleeve gastrectomy or gastric bypass procedure, international guidelines state a patient must have a Body Mass Index (BMI) of at least 40, or if they are suffering from a weight-related illness such as diabetes, at least 35.

In rare cases, patients with a BMI between 30 and 35 can also be considered if they are at risk of serious illness, but Dr Abdelrahman A. Nimeri, Head of the Division of General, Thoracic, and Vascular Surgery at Sheikh Khalifa Medical Center – Cleveland Clinic in Abu Dhabi, believes cosmetic reasons often drive obese patients to seek surgery.

"Patients come to us for cosmetic reasons," he said. "I think there are milestones that need to be reached for us to be able to actually make patients understand we are not doing this so they can just look better; we are doing this to help them become healthier."

The message from Dr Al Nimeri is that a patient whose BMI falls below the agreed criteria will not be operated on, due to the risk of potential complications outweighing the benefit.

Whatever the intention for a patient seeking surgery, the most important factor, says Dr Al Falah, is simply to get them through the door of their doctor's consulting room in the first place. "Even if they are initially seeking intervention for a cosmetic purpose, it is a good thing because we know operating on eligible patients will positively impact their health. Nevertheless, it is our continued responsibility to ensure awareness is raised around obesity as a disease state and surgical intervention as a viable treatment option for the right patients."

While bariatric surgery is a safe and cost-effective treatment for obese patients, as with any major operation, it does not come without potential risk to short- and long-term health. Procedures are performed under general anesthesia and can lead to complications such as infection and blood clots.

"Patients must be completely informed when opting for bariatric surgery," said Dr Al Nimeri. "They must know it works, but also that there is the potential for complications."

According to Dr Al Nimeri, patients must also be aware that surgery is not a quick fix, and that aftercare is a vital part of treatment. To ensure adequate post-surgical care and monitoring, Dandiguian also believes further guidelines should be applied. "It is not only about surgery, you have to have a comprehensive approach to patient follow-up. The question for the future is how can we collaborate to secure the clinical outcome?"

One of the key aspects of any advancement in bariatric surgery is the framework in which it operates. More guidelines are required to standardize the procedure, according to Professor Bassiouny, including which patients are eligible for surgery, which surgeons should perform the operation and to which centres patients should be referred.

This will act as a safety net for post-operative patients, with Dr Al Jarallah saying: "In our society, although the government has budget, the administration needed to manage such major health problems still needs to be defined.

"The plan and the strategy are there, the program is there, and implementation is vital. You need the manpower and the education. In our community, we are currently focusing on prophylactic; treatment first, then education.

A long, yet achievable, road ahead

Even if the journey involved in tackling obesity may seem long, significant steps have already been taken.

"About 20 years ago, we had this discussion and discovered there was nowhere to physically walk in Riyadh," said Dr Al Falah. "Now there are places to walk everywhere. At the beginning, the idea of simply walking was rejected by society. It is much more accepted now and common to see people walking. There is a social awareness about the problem of obesity, and that it is not healthy to be an obese person."

Enhanced awareness has been mirrored by increasing recognition regarding the safety of bariatric surgery. In the past, negative media scrutiny following unsuccessful bariatric surgery deterred eligible patients. "The media can magnify things, and so there have been opinions that bad things can happen in surgery and people have had bad experiences. Now it is considered by the public as a safe method of treatment for obesity," said Dr Al Falah.

Despite the definite sense of optimism around the table at Johnson & Johnson's offices in Dubai, there is also the realization that a challenge as great as obesity will not be solved by one society alone.

Progress can be made, says Dr Al Nimeri, but this will only be through collaborative action between government, industry and society and that means the Middle East must act in partnership and unison.

"One opportunity we have in the region is to increase connectivity between surgical teams," he said. "We have a lot of talent in different regions, in different countries, but we do not always share that talent. We do not share our successes and failures together. I think if we were able to do that, we would benefit tremendously.

"We need an annual meeting across the Middle East, North Africa, the Gulf; a singular bariatric surgery meeting once a year. This is the ultimate goal."

Professor Bassiouny likens the current structure of the Middle East's approach to addressing obesity to "operating like islands". The scale and complexity of the issue means countries cannot hope to succeed if they work in isolation; teamwork, and the sharing of expertise and knowledge is vital to preventing the region's health systems becoming overwhelmed by obesity and the serious related conditions.

One step towards creating unity within the field is the establishment of the Gulf Obesity Surgery Society's (GOSS) annual meeting, which aims to become the region's premiere educational platform in the field of bariatric surgery, and a platform for experts across the region to share their learnings.

The need for collaboration chimes with the need for ongoing, transparent, peer-to-peer discussion on how to tackle the obesity pandemic. The roundtable discussion was one forum for achieving this aim, and Dandiguian feels such think tanks can open the door to further progress, building the foundations for tangible action on major health issues and setting an example for the rest of the world to be guided and inspired by. "With attention on this region, and by collaborating with experts and strong leaders, we can show the world what is best for obese patients."

on the WEB McKinsey Global Institute report: How the world could better fight obesity *http://tinyurl.com/p7fdgwe*

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Enabling people to have better control over their health

By **Ravendra Singh**
Vice President - Business Development, KMG Infotech

We see businesses around us working year round to understand consumer behaviour, build loyalty and deliver satisfaction to thrive in the race. Focusing on the core area is essential, while engaging consumers adds value to your business. Till now, the Healthcare sector has been comfortably absorbed in merely providing medical care. Since healthcare is a necessity, the industry has taken only few steps to engage with patients.

Through patient engagement, people can have better control over their health which in turn enables physicians to make timely interventions and prevent/manage chronic conditions.

Everywhere, except healthcare, consumers are empowered with tools to make choices in what they need. Studies suggest that majority of the patients use web and mobile devices to access healthcare information and support, yet the industry has lagged behind in keeping pace with the trend. Not only patient engagement tools help improve services, it can bring substantial improvement in performance and cost efficiency.

Market snapshot

The Gulf Cooperation Council (GCC) is characterized by a very dynamic healthcare market registering high growth primarily due to an aging population and heightened per capital healthcare expenditure. With an increase in the region's population, which is anticipated to rise by 5% YoY mainly due to an influx of expatriates, we might witness a further boost in their healthcare sector. Other factors, such as state initiatives in lifestyle programs, health awareness and technological advancements, focus on medical tourism, and new regulations are expected to bolster the sector.

Over the years, transformation in the population's lifestyle and nutritional habits due to socio-economic development has led to couple of medical disorders such as diabetes, obesity and hypertension. These disorders combined with increased expectations for better quality medical care are driving the demand for medical technology and investment in medical facilities.

The Public Sector, which is majorly responsible for healthcare delivery in the region, is leaping forward to involve the Private Sector, develop infrastructure and leverage information technology to provide better services. Driven by all the above factors, healthcare expenditure witnessed a steep rise to US$41.6 billion in 2011. The number is anticipated to rise further owing to factors such as higher penetration of insurance and prevalence of lifestyle disorders.

Evolution

The healthcare market in GCC is expected to surge at a rate of 11% annually by the year 2015, with UAE and Saudi Arabia poised for fastest growth. By 2015, the region is anticipated to need 93,992 hospital beds, a rise of more than 10% from 2010. Witnessing the growth and its consequent impact on state budgets, GCC

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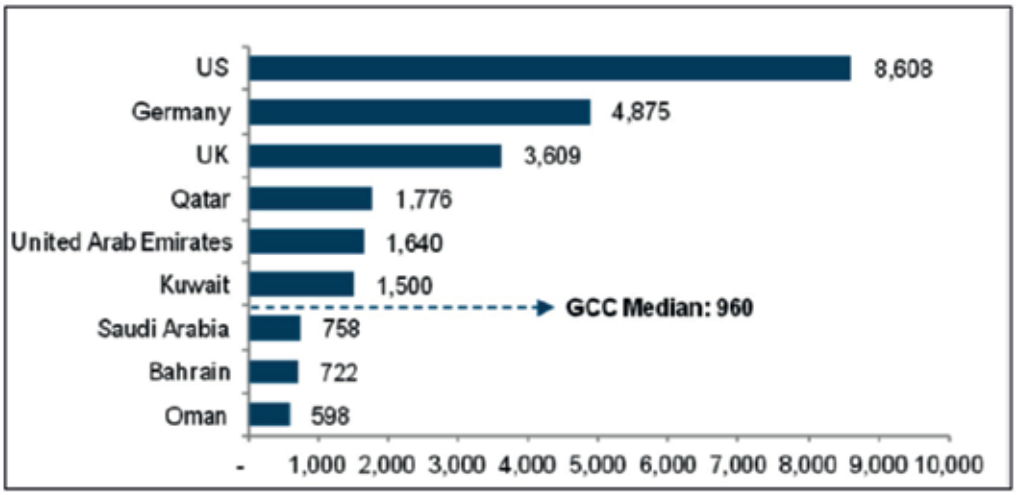

Per Capita Healthcare Expenditure - GCC Vs Developed Countries (US$) – Source: WHO 2011

governments are devising policy changes and reforms to spur investments by the private sector.

An important trend that has impacted the market positively is increased focus on technology with the adoption of e-health services. Expenditure on information technology was approximately $444.2 million in 2011, and is expected to reach $550 million by the year 2015. With proactive state initiatives like WAREED (Health Information System Project by MOH, Dubai) and national e-health policy, IT investments would surely rise in the future. Such advancements not only automate processes but also help in improving services and in turn lead to cost efficiency.

Challenges

- Consumers are not satisfied with the services and infrastructure provided by the public sector hospitals
- Lack of skilled manpower for Information Technology as well as physician profiles
- High dependence on Public Sector - Public Sector investment constitutes 70% of the total healthcare expenditure
- Per capita healthcare expenditure is not commensurate with the standards of developed economies
- Underdeveloped Hospital Infrastructure – there are only 1.5 physicians per 1000 people and 21 beds per 10,000 people

The IT landscape

The intersection of healthcare and information technology has laid the foundation for patient-centric service delivery. Today, IT has become vitally crucial in healthcare, from helping physicians in their day-to-day business, enabling patients to track their health vitals, analyzing information to take better and informed treatment decisions, to preventing/managing chronic conditions. However, in the GCC, public healthcare institutions lack the necessary skill set and experience to utilize digital technology and thus are way behind their counterparts in healthcare delivery.

An interesting point to note here is the extent to which digital technology has influenced the Arab Digital Generation (ADG). The ADG includes everyone born from 1977 to 1997 and accounts for 40% of the population in MENA. Stats suggest that 83% of the ADG population uses internet daily whereas 53% use the internet to research about products, while 51% write about their experiences with companies online. Apart from web, mobile health applications also have widespread acceptance as well as usage that can bring a radical shift in the sector.

Saudi Arabia and the UAE record one of the highest rates of smart phone penetration across the globe. Yet, the sector has undermined the potential of web and mobile tools to empower patients and physicians alike. With recent initiatives of Dubai Healthcare Authority and Ministry of Health, UAE in IT, the region may soon start exploring and utilizing digital tools and systems in a big way to better serve the consumers.

Digital solution

Digital technology might prove to be an impetus to the healthcare sector in GCC which would help overcome some of the problems as the market has substantial potential and below-average implementation of Healthcare IT. By making the care process proactive rather than reactive, healthcare providers in the region may witness significant improvement. To embark on this endeavor, the sector needs to understand the intricacies of healthcare service delivery along with the specific requirement of patients.

Recent studies have established that the UAE experiences high rate of lifestyle disorders such as diabetes, hypertension and obesity. The MENA region has reported one of the highest occurrences of diabetes in the world. Sedentary lifestyle, work stress, wrong food habits are some of the reasons behind these disorders. Such disorders eventually lead to life-threatening problems or chronic conditions without timely preventive measures.

With the help of digital technology, we can encourage healthier lifestyles amongst people. The proliferation of mobile health apps in the region also suggest the willingness of masses to work towards a healthy lifestyle. From the patient's perspective, mobile apps can be utilized to track vitals, receive regular reminders for medications, re-

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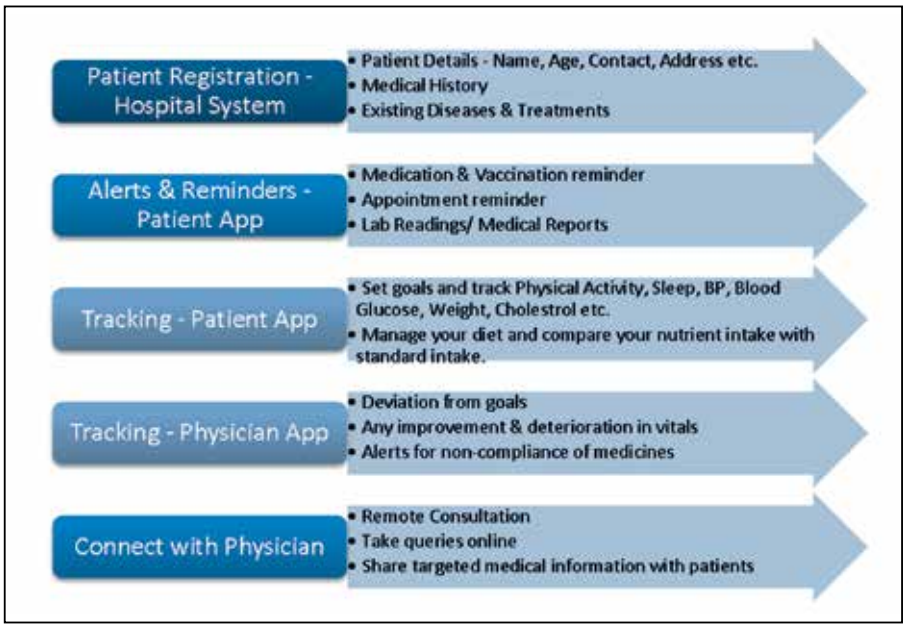

The graphic showcases how technology can play a role to transform healthcare

ports, lab orders etc. This would help them to have a better control over their health as well as push them to maintain a balanced diet and lifestyle.

On the other end, physicians would be empowered and better informed if they receive regular updates about their patient's condition and have access to the complete medical history while their patient sits in front of them. Such integration and intelligent use of technology would not only save time and resources but also engage patients throughout their treatment.

These features are just a drop from the vast ocean of functionalities and capabilities that can be offered to the healthcare sector. The influx of data can be utilized for population health management as well by filtering the same based on multiple parameters. Healthcare providers across different regions can also share and analyze the data to identify and prevent outbreak of communicable diseases in a particular population. Moreover, physicians would be able to regularly monitor their patient's health which may prompt them to intervene at the right time and prevent chronic conditions.

The above modules can exist in isolation and serve the needs of its audience; however we can reap much larger benefits if all the systems are integrated seamlessly. For instance, patients would be able to track their vitals and take medications on time, however only a trained physician would be able to identify any abnormal changes or potential risk. Hence, we need to build an integrated system wherein each user can interact with the other and contribute towards preventing life-threatening diseases/eradicating lifestyle disorders.

A survey was conducted to understand the market of mobile apps in healthcare with response from 2,291 health professionals in the US. Please refer to the infographic which reveals interesting stats and bolsters the importance of digital technology in healthcare. The results clearly state the top three issues as diabetes, preventative care and medication adherence that can be resolved if we link Electronic Health Records (EHR) with mobile applications.

State initiatives

Governments across GCC have taken several initiatives to improve service delivery with the help of cloud-based technology. Some of those are highlighted below:

- Dubai Health Authority has distributed 3,000 tablets across its health centers for the waiting areas which would be used by patients to browse their services. They have also launched many applications which provide prescription details, vaccination reminders, healthcare packages etc.
- Ministry of Health, UAE unveiled a mobile application that would help physicians to remotely monitor & diagnose patients. The solution uses audio, video and teleconferencing for access to medical care anytime, anywhere.
- Saudi Ministry of Health implemented a system that connects all the public health professionals with others across the globe. The technology enables them to share and analyze health information to prevent disease outbreaks.

In a nutshell

By 2015, 33% users are expected to use some kind of mobile health app in the Middle East. With such positive vibes in the market, the healthcare sector seems well prepared to weather the challenges ahead. Patient engagement tools would allow physicians to focus on chronic patients, rather than spending a lot of time on patients who can be managed through remote self-monitoring. Eventually, this would bring operational & cost efficiency as the number of patient visits would reduce. Hospitals would then be able to highlight their service quality and efficiency to boost medical tourism.

In the end, these initiatives would empower patients and allow them to make choices through continuous engagement in the care process & beyond. Over a period of time, consumers would be more inclined to follow a healthy lifestyle as well as be more aware about their medical condition & treatment. MEH

KMG Infotech is a global software development company providing IT solutions mainly to the Healthcare sector across the globe. Along with a proven track-record of over 20 years and strong fundamentals in the IT industry, KMG is also amongst the top 100 software companies in India. The company has developed patient-engagement solutions to help prevent chronic conditions and is in the process of adding more features and functionalities to improve delivery.

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Brain abnormality found in group of SIDS cases

More than 40% of infants in a group who died of sudden infant death syndrome (SIDS) were found to have an abnormality in a key part of the brain, researchers report. The abnormality affects the hippocampus, a brain area that influences such functions as breathing, heart rate, and body temperature, via its neurological connections to the brainstem. According to the researchers, supported by the US National Institutes of Health, the abnormality was present more often in infants who died of SIDS than in infants whose deaths could be attributed to known causes.

The researchers believe the abnormality may destabilize the brain's control of breathing and heart rate patterns during sleep, or during the periodic brief arousals from sleep that occur throughout the night.

"The new finding adds to a growing body of evidence that brain abnormalities may underlie many cases of sudden infant death syndrome," said Marian Willinger, Ph.D, special assistant for SIDS at NIH's Eunice Kennedy Shriver National Institute of Child Health and Human Development, which funded the study. "The hope is that research efforts in this area eventually will provide the means to identify vulnerable infants so that we'll be able to reduce their risk for SIDS."

SIDS is the sudden death of an infant younger than 1 year of age that is still unexplained after a complete post mortem investigation by a coroner or medical examiner. This investigation includes an autopsy, a review of the death scene, and review of family and medical histories. In the United States, SIDS is the leading cause of death between one month and one year of age. The deaths are associated with an infant's sleep period.

The study was published online in *Acta Neuropathologica* and conducted by Hannah C. Kinney, M.D., and colleagues at Boston Children's Hospital and Harvard Medical School in Boston, and colleagues from the San Diego County Medical Examiner's office in San Diego, and Baylor College of Medicine in Houston.

The hippocampus is involved in memory, learning, spatial orientation, and, through its connections to the brainstem, some aspects of breathing and cardiac function. Specifically, the researchers traced the abnormality to a structure within the hippocampus known as the dentate gyrus.

In the SIDS cases, the researchers found that the dentate gyrus, at certain intervals along its length, contained a double layer of nerve cells instead of the usual single layer. This abnormality is called focal granule cell bilamination.

"The pattern of abnormal changes in the dentate gyrus suggests to us there was a problem in its development at some point in late foetal life or in the months right after birth," Dr Kinney said. "We didn't see any signs of injury to the brain by low oxygen levels in the tissue we examined, such as scarring and loss of nerve cells."

Dr Kinney and her colleagues believe that the dentate gyrus abnormality in the SIDS cases may lead to instability in the brain areas directly responsible for breathing and heart function. The researchers found the abnormality in SIDS cases that were discovered in unsafe sleep environments such as face down, as well as in safe sleep environments such as with infants found on their backs.

Dr Kinney said the findings suggest that in infants with the hippocampal abnormality, an unsafe sleep environment may trigger an underlying instability in heart or breathing function. However, because many of the SIDS deaths also occurred in safe sleep environments, Dr Kinney said that more research is needed to determine what might have triggered the underlying instability in these cases as well. Dr Kinney noted that additional research is needed to find ways to detect the hippocampal abnormality in a live infant.

In their article, the researchers noted that the hippocampal abnormality they found in the SIDS cases is similar to a hippocampal abnormality found at autopsy in some cases of temporal lobe epilepsy.

The researchers do not know why they didn't find the hippocampal abnormality in all of the SIDS cases they examined, but only in about 43%. Dr Kinney explained, however, that SIDS is a syndrome that likely results from a number of different causes and not the result of only a single abnormality or underlying disorder. Similarly, the researchers don't know whether or not the hippocampal abnormality played a role in the death of the very small number of control cases in the study who also had this abnormality.

The NICHD led Safe to Sleep Campaign advises that infants should be placed on their backs for sleep, in their own sleep area, on a firm sleep surface, such as a mattress in a safety-approved crib. These practices reduce the risk of SIDS and SIDS rates have declined by half since more babies have been placed to sleep on their backs.

"The story of SIDS research is far from complete," Dr Kinney said. "Until it is, the best ways to reduce the risk for SIDS is by following the recommendations for safe sleep and other infant care practices of the Safe to Sleep campaign."

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Mobility leads the way in Middle East healthcare

By Jyoti Lalchandani

With a recent IDC Health Insights survey of hospitals across the Middle East and Africa region (MEA) identifying a strong correlation between IT infrastructure investment plans and a desire among hospitals to increase patient satisfaction, healthcare providers across the Middle East are increasingly switching their attention to the so-called 3rd Platform technologies of mobility, cloud, and big data and the benefits they can bring. So what does the future hold for eHealth in the Middle East?

Given the wide array of emerging information and communication technology (ICT) tools that now reside at their finger tips, the focus of eHealth stakeholders across the region is increasingly on enabling the remote management of diseases, improving data exchange and collaboration across healthcare agencies, increasing workforce efficiency, and ultimately expanding the coverage of adequate healthcare services to a wider population.

We are already seeing this in the digitization of patient information (including medical records and diagnostic images), the deployment of picture archiving and communication systems (PACS), the implementation of healthcare information systems (HIS), and the emergence of telemedicine initiatives aimed at mitigating disparities in healthcare access, which is proving particularly relevant for large countries and those with strict workforce constraints.

But with more and more importance being given to the management of chronic diseases, mobility is becoming an increasingly valuable add-on to telemedicine services, although the lines between telemedicine and mobile health are rapidly disappearing. Indeed, IDC expects mobile health solutions to gain traction both within and beyond telemedicine, with telemedicine services based on mobile platforms becoming increasingly common. There will also be an increase in demand for telemonitoring services, which may combine mHealth and telemedicine systems to enable mobile monitoring of patients with various chronic diseases.

However, the opportunities for mHealth go beyond its use in mobile-enabled telemedicine. In addition to the application of mHealth solutions in the process of care delivery, mobile technologies are being further leveraged to support various other functions and objectives of healthcare systems, including the provision of medical education and training, the enablement of clinical decision making, the facilitation of administrative processes, and the provision of support for public health activities.

mHealth solutions have promising prospects in many areas, and solutions like mAwareness, mTraining, mSurveillance, and mScreening are emerging fast. The use of mobile technologies will grow further in the areas of data collection support, patient tracking and disease surveillance systems, and the organization of emergency responses to public health disasters. Further opportunities lie in utilizing mobile technologies to address health workers' education, skills enhancement, and medical information needs; for example, via mobile clinical decision support systems. Mobile solutions that provide education and clinical decision support for health workers (including physicians, nurses, and community health workers) will see particularly high uptake where the healthcare workforce shortage is most profound.

While mobile technologies are already gaining considerable traction in healthcare, the other elements of the 3rd Platform will take longer to permeate the region's healthcare markets. The adoption of big data analytics may still be at a nascent stage within the healthcare sector, but providers are increasingly recognizing its value, particularly in terms of its potential for managing data volume and velocity. Given the enormous role that big data analytics can play in addressing healthcare challenges in terms of improving quality of care, increasing the efficiency of scarce health workers, and managing the population's overall health, IDC expects big data to permeate the Middle East markets over the coming years, although widespread adoption will take some time.

Cloud computing

As for cloud computing technologies, end-user attitudes are somewhat mixed. Providers are exploring the possibilities of cloud models, with many readily acknowledging the benefits. However, they are also considering the challenges and costs associated with its implementation, and subsequently delaying their cloud-related IT initiatives. Factors contributing to this hesitation include a general lack of awareness around cloud technologies, as well as legislative uncertainty, with the conditions and criteria required for the successful implementation, uptake, and expansion of cloud computing technologies yet to be well defined.

Despite this, IDC Health Insights' survey revealed that the overwhelming majority of hospital IT executives in urban settings plan to adopt cloud and big data analytics in the future. In the long term, GCC healthcare organizations will proceed with cloud deployments, most likely starting with private cloud models.

Of the emerging 3rd Platform technologies, it is clear that mobility is already an indispensible asset within the Middle East healthcare sector. And while there is also undoubted enthusiasm for cloud and big data analytics, IDC maintains that provider concerns around compliance and security issues will prevent this enthusiasm from transforming into actual implementations during the course of 2015. Patience, it seems, will have to remain a virtue for a while longer.

The author

Jyoti Lalchandani is group vice president and regional managing director for the Middle East, Africa, and Turkey at global ICT market intelligence and advisory firm International Data Corporation (IDC). MEH

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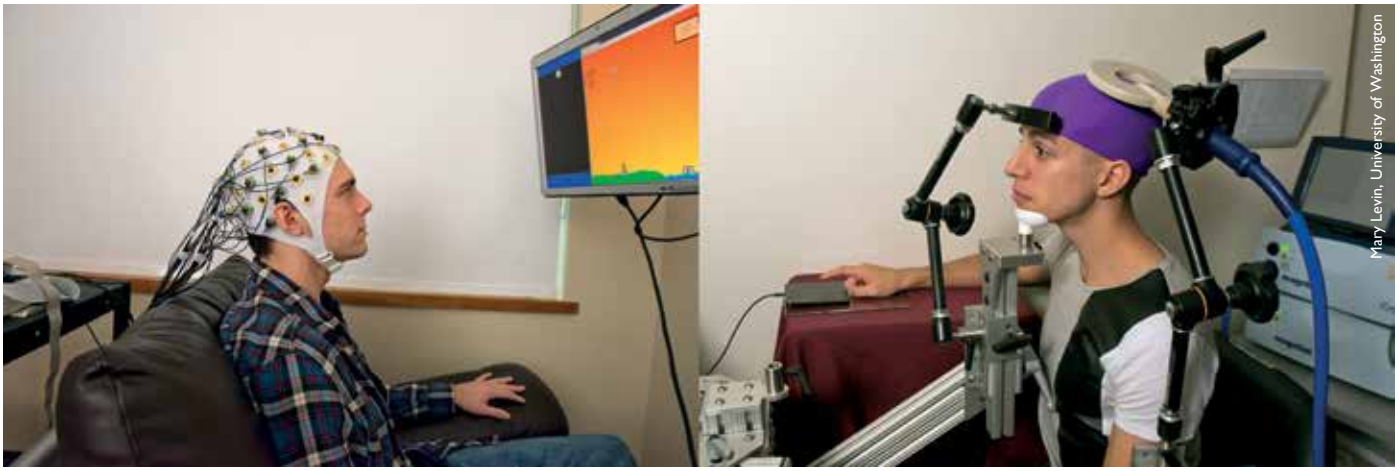
Study shows direct brain interface between humans



University of Washington students Darby Losey, left, and Jose Ceballos are positioned in two different buildings on campus as they would be during a brain-to-brain interface demonstration. The sender, left, thinks about firing a cannon at various points throughout a computer game. That signal is sent over the Web directly to the brain of the receiver, right, whose hand hits a touchpad to fire the cannon.

Sometimes, words just complicate things. What if our brains could communicate directly with each other, bypassing the need for language?

University of Washington researchers have successfully replicated a direct brain-to-brain connection between pairs of people as part of a scientific study following the team's initial demonstration a year ago. In the newly published study, which involved six people, researchers were able to transmit the signals from one person's brain over the Internet and use these signals to control the hand motions of another person within a split second of sending that signal.

At the time of the first experiment in August 2013, the UW team was the first to demonstrate two human brains communicating in this way. The researchers then tested their brain-to-brain interface in a more comprehensive study, published November 5 in the journal *PLOS ONE*.

"The new study brings our brain-to-brain interfacing paradigm from an initial demonstration to something that is closer to a deliverable technology," said co-author Andrea Stocco, a research assistant professor of psychology and a researcher at UW's Institute for Learning & Brain Sciences. "Now we have replicated our methods and know that they can work reliably with walk-in participants."

Collaborator Rajesh Rao, a UW professor of computer science and engineering, is the lead author on this work.

The research team combined two kinds of noninvasive instruments and fine-tuned software to connect two human brains in real time. The process is fairly straightforward. One participant is hooked to an electroencephalography machine that reads brain activity and sends electrical pulses via the Web to the second participant, who is wearing a swim cap with a transcranial magnetic stimulation coil placed near the part of the brain that controls hand movements.

Using this setup, one person can send a command to move the hand of the other by simply thinking about that hand movement.

The UW study involved three pairs of participants. Each pair included a sender and a receiver with different roles and constraints. They sat in separate buildings on campus about a half mile apart and were unable to interact with each other in any way – except for the link between their brains.

Each sender was in front of a computer game in which he or she had to defend a city by firing a cannon and intercepting rockets launched by a pirate ship. But because the senders could not physically interact with the game, the only way they could defend the city was by thinking about moving their hand to fire the cannon.

Across campus, each receiver sat wearing headphones in a dark room – with no ability to see the computer game – with the right hand positioned over the only touchpad that could actually fire the cannon. If the brain-to-brain interface was successful, the receiver's hand would twitch, pressing the touchpad and firing the cannon that was displayed on the sender's computer screen across campus.

Researchers found that accuracy varied among the pairs, ranging from 25% to 83%. Misses mostly were due to a sender failing to accurately execute the thought to send the "fire" command. The researchers also were able to quantify the exact amount of information that was transferred between the two brains.

Another research team from the company Starlab in Barcelona, Spain, recently published results in the same journal showing direct communication between two human brains, but that study only tested one sender brain instead of different pairs of study participants and was conducted offline instead of in real time over the Web.

Now, with a new $1 million grant from the W.M. Keck Foundation, the UW research team is taking the work a step further in an attempt to decode and transmit more complex brain processes.

With the new funding, the research team will expand the types of information that can be transferred from brain to brain, including more complex visual and psychological phenomena such as concepts, thoughts and rules.

The project could also eventually lead to "brain tutoring," in which knowledge is transferred directly from the brain of a teacher to a student.

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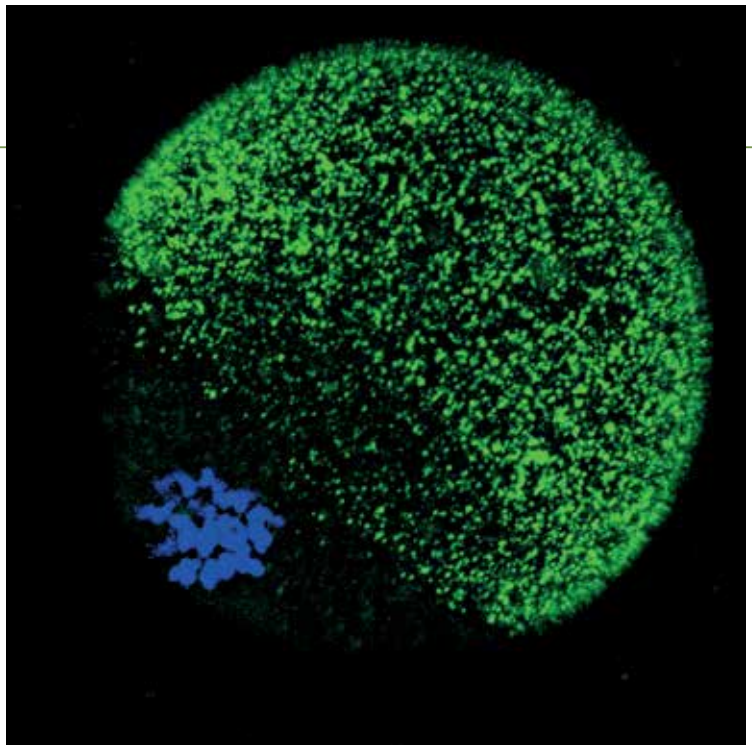

In a study published in *Nature Chemistry*, researchers have discovered that in the mammalian egg, zinc is stored in tiny packages just below the cell surface. These packages are released in waves following fertilization in events called 'zinc sparks.'

Stunning fireworks when egg meets sperm

Sparks literally fly when a sperm and an egg hit it off. The fertilized mammalian egg releases from its surface billions of zinc atoms in "zinc sparks", one wave after another, found a Northwestern University-led interdisciplinary research team that includes experts from the US Department of Energy's Advanced Photon Source at Argonne National Laboratory.

Using cutting-edge technology they developed, including new high-energy X-ray imaging techniques, the team is the first to capture images of these molecular fireworks and pinpoint the origin of the zinc sparks: tiny zinc-rich packages just below the egg's surface.

Zinc flux plays a central role in regulating the biochemical processes that ensure a healthy egg-to-embryo transition, and this new unprecedented quantitative information should be useful in improving in vitro fertilization methods.

"The amount of zinc released by an egg could be a great marker for identifying a high-quality fertilized egg, something we can't do now," said Teresa K. Woodruff, an expert in ovarian biology and one of two corresponding authors of the study. "If we can identify the best eggs, fewer embryos would need to be transferred during fertility treatments. Our findings will help move us toward this goal."

Woodruff is the Thomas J. Watkins Professor of Obstetrics and Gynecology and director of the Women's Health Research Institute at Northwestern University Feinberg School of Medicine.

The study, published December 15 by the journal *Nature Chemistry*, provides the first quantitative physical measurements of zinc localization in single cells in a mammal, using mouse eggs. The research team developed a suite of four physical methods to determine how much zinc there is in an egg and where it is located at the time of fertilization and in the two hours just after. Sensitive imaging methods allowed the researchers to see and count individual zinc atoms in egg cells and visualize zinc spark waves in three dimensions.

After inventing a novel vital fluorescent sensor for live-cell zinc tracking, scientists discovered close to 8,000 compartments in the egg, each containing approximately one million zinc atoms. These packages release their zinc cargo simultaneously in a concerted process, akin to neurotransmitter release in the brain or insulin release in the pancreas.

These findings were further confirmed with chemical methods that trap cellular zinc stores and enable zinc mapping on the nanometer scale in a custom-designed electron microscope developed for this project with funding from the W.M. Keck Foundation. Additional experiments at the Advanced Photon Source synchrotron at Argonne enabled the scientists to precisely map the location of zinc atoms in two and three dimensions.

"On cue, at the time of fertilization, we see the egg release thousands of packages, each dumping a million zinc atoms, and then it's quiet," said Thomas V. O'Halloran, the other corresponding author. "Then there is another burst of zinc release. Each egg has four or five of these periodic sparks. It is beautiful to see, orchestrated much like a symphony. We knew zinc was released by the egg in huge amounts, but we had no idea how the egg did this."

O'Halloran is the Charles E. and Emma H. Morrison Professor of Chemistry in the Weinberg College of Arts and Sciences and director of Northwestern's Chemistry of Life Processes Institute.

The study establishes how eggs compartmentalize and distribute zinc to control the developmental processes that allow the egg to become a healthy embryo. Zinc is part of a master switch that controls the decision to grow and change into a completely new genetic organism.

The studies reported in *Nature Chemistry* are the culmination of six years of work and build on prior discoveries in the Woodruff and O'Halloran labs, and work they conducted at the APS.

doi:10.1038/nchem.2133 MEH

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The Cardiovascular Program at the University of Nebraska Medical Center

By **John R. Windle,** M.D.
Professor and Chief, Internal Medicine
Division of Cardiology, UNMC

A hidden gem exists in the middle of the United States, the Cardiovascular Program at the University of Nebraska Medical Center/Nebraska Medicine. In the past decade this program has grown into a comprehensive cardiovascular program worthy of international recognition. The Division is composed of six Sections:

- Interventional and Structural Heart Disease
- Advanced Heart Failure and Transplantation
- Consultative Cardiology
- Electrophysiology
- Imaging
- Adult Congenital Heart Disease

The Interventional and Structural Heart Disease program is led by Dr Gregory Pavlides. Before moving to Nebraska, Dr Pavlides was the Director of the Onassis Heart Hospital in Athens and one of Europe's leading interventional cardiologists. He brings extensive experience in transaortic valve replacement and decades of experience in valvuloplasty.

Dr Brian Lowes leads the Advanced Heart Failure and Transplant program. Over the past decade the program has grown to be one of the largest advanced heart failure programs in the United States. This year we will perform 40 transplants and 75 LVADs. Dr Lowe's research interest is coupling next generation DNA sequencing with clinical research and personalized medicine.

The Consultative Cardiology program brings over 100 years of clinical experience with a broad international exposure. Dr Ward Chambers, the Executive Director of International Health and Medical Education for UNMC, has set-up programs and partnerships in the Middle East and Asia. Additionally, the consultative program has launched an innovative prevention and telemedicine program to better engage patients in their care. The electrophysiology program provides comprehensive advanced ablation therapies for all types of SVT and VT including epicardial mapping and ablation.

The Cardiovascular Imaging program is led by Dr Tom Porter. Dr Porter is an international leader in perfusion imaging, therapeutic imaging and cardiac magnetic resonance imaging. He is joined by Drs Samer Sayyed, Shikar Saxena and Haree Vongooru to provide world-class multi-modality imaging.

A recent but important addition to this program has been the Adult Congenital Heart Disease program. Over 50% of all patients with congenital heart deformities are now adults and their management requires special expertise. The program is led by Dr Shane Tsai, who is board certified in Pediatrics, Medicine, Pediatric Cardiology, Adult Cardiology as well as Cardiac Electrophysiology. He is joined by Dr Angela Yetman, a noted researcher in connective tissue disorders and Dr Jonathan Cramer who holds joint imaging appointments in Medicine, Pediatrics and Radiology.

The Cardiology program is complemented by a superb cardiovascular surgery team lead by Dr Mike Moulton. Their outcomes are among the best in the country and their expertise ranges for surgery for adults with congenital heart disease, to heart and lung transplantation (launching in 2015) to advanced valve surgery. Joining Dr Moulton are Drs Kim Duncan, John Um and Aleem Siddique.

Equally important to UNMC's clinical care is research and education. The cardiology fellowship consists of four fellows per year for general cardiology as well as advanced programs in interventional cardiology, advanced imaging, electrophysiology and heart failure/transplantation. Their research expertise spans genetics, inflammation, imaging and informatics. The Cardiovascular Biobank contains blood and tissue samples that are linked to the program's Cardiovascular Quality, Outcomes and Research database that allows them to perform research from protein function to population-based therapeutics.

In summary, the Cardiovascular program at UNMC provides a world-class patient experience in the heartlands of the United States.

Nizar Mamdani, executive director of Nebraska Medicine's International Healthcare says: "Our healthcare professionals and researchers are great examples of the caliber of specialists and researchers working tirelessly to help provide the best cardiovascular treatment options. Through strategic collaborations with 123 institutions in 44 countries, Nebraska provides innovative treatment options for cardiovascular, cancer care and transplantation to patients around the world."

Nebraska also provides customized training and educational programs for specialists, nurses and allied healthcare professionals.

- Contact: *nmamdani@nebraskamed.com; www.unmc.edu/international*

Living Donor program speeds evolution of transplant science

In the heart of Chicago, Northwestern Medicine is expanding possibilities for transplant patients. Leading the efforts is Michael M. Abecassis, MD, MBA, founding director of the comprehensive transplant center at Northwestern Medicine and chief of the division of transplantation within Northwestern Memorial Hospital's department of surgery. Under his direction, the center has performed more than 3,000 living donor transplants.

"Because we have been such a force in living donor transplants, we are able to aggressively advance the field through translational and clinical research," says Abecassis, who is also past president of the American Society of Transplant Surgeons.

Northwestern Medicine has one of the largest living donor programs in the U.S. and is ranked in the top five U.S. transplant organizations. Surgeons work with patients who need liver, kidney, pancreas, intestinal, adult, pediatric, heart and lung transplants, as well as islet cell transplants to treat diabetes. Northwestern also participates in A2ALL, the Adult to Adult Living Liver Transplantation Consortium.

Experts in immunosuppression

"Careful innovation is our focus," says Abecassis. "We believe that good is simply not good enough, and that's what drives us to push the science further." This pursuit made possible what Abecassis calls "The Holy Grail" of transplantation: Immune tolerance through induced full chimerism following kidney transplantation.

"We transfer engineered stem cells from the living donor into the recipient and we perform the kidney transplant from the same donor," Abecassis explains. "In doing so, we fool the immune system of the recipient into believing the donated kidney is not foreign; in effect, we create two immune systems that coexist within the recipient's body, known as chimerism."

The recipient achieves immune tolerance with an incredible benefit: ability to forego a lifetime of anti-rejection medication without suffering rejection, reducing costs and eliminating side effects. This Phase II research is led by Joseph R. Leventhal, MD, a transplant surgeon on the medical staff at Northwestern Memorial Hospital and associate professor of Surgery and director of the Living Donor Renal Transplant Program at Northwestern University Feinberg School of Medicine.

Minimally invasive procedures

Northwestern Medicine pioneered minimally invasive donor techniques. The center was one of the first in the U.S. to perform living donor laparoscopic nephrectomy (kidney transplantation), reducing risks and morbidity of surgery for kidney donors. Northwestern Medicine was the first in the world to perform laparoscopy-assisted donor right lobe hepatectomy for liver transplantation.

By championing minimally invasive donor procedures, the center improves living donation rates.

Big picture: Ethics and morals

Abecassis says his organization focuses on the bigger picture: "Performing living donor transplants is not just about technique. We employ an independent living donor advocate who helps us navigate complicated moral and ethical questions."

Potential donors go through a thorough intake process, and donor candidates work with the advocate to protect them from coercion, while protecting their ability to opt out through a "blameless excuse".

"There are those who would approach the transplant process without regards to the illegality of payment for donation. We have mechanisms in place to make sure that living donors are altruistic volunteers," says Abecassis. "Our organization does not advocate transplant tourism that includes payment for organs." The International Health program ensures patients follow U.S. laws and regulations.

Advancing transplant science

Research thrives at Northwestern Medicine. One protocol that induces a different, non-chimeric type of tolerance recently received FDA approval. Leventhal just launched a Phase I study of this "T-reg approach" in kidney transplant recipients: "We take the recipient's regulatory T (T-reg) cells and expand them to enhance tolerance to the donor by down-regulating the recipient's immune response that might otherwise turn into rejection," says Abecassis. He anticipates employing the technique in living liver transplants soon.

Additional research examines biomarker signatures in the peripheral blood that could allow practitioners to monitor an organ recipient non-invasivally for rejection – and personalize immunosuppression medication in the moment, without waiting for laboratory or clinical evidence of graft rejection and injury. Abecassis joined two other co-founders to create Transplant Genomics Inc., which will offer this "precision medicine" test commercially.

Experts at Northwestern Medicine are seeking an answer to the world's organ shortage. Jason Albert Wertheim, MD, PhD, a transplant surgeon at Northwestern Medicine, is leading efforts to be able to build tissue-engineered organs, which would be made from what normally would be discarded tissue or tissue from other species infused with cells from the recipient to create a "just-in-time" organ that doesn't necessitate anti-rejection medicine.

"We are defining the science," says Abecassis. "We are opening up a whole new world, and in the next five to 10 years, we are going to see incredible advances." MEH

International Health at Northwestern Medicine

Northwestern Medicine's International Health program assists patients with travel, lodging, translation services, medical record transfer and more. By focusing on collaboration, the International Health program assures that referring physicians can coordinate care with its staff in Chicago. Learn more: *internationalhealth.nm.org*.

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Treating breast cancer while keeping the woman beautiful with nipple sparing mastectomy and breast reconstruction

By **Dr Rache M Simmons** and **Dr David M Otterburn**

Breast cancer is a curable disease when it is diagnosed early and treated appropriately. There are hurdles to accomplishing this and the first and largest hurdle is delay in diagnosis. Why do patients wait, or avoid tests that could potentially save their lives? Because of fear and hope. Fear of the treatment, of procedures, of the need for chemotherapy and radiation therapy and of the possible deformity to their bodies. Hope that the small lump found is not really there, that it will go away tomorrow, or the next day…

Most women diagnosed with breast cancer can be treated with a lumpectomy, which is simply the removal of the cancer in an outpatient setting, but some women may require or desire to have a mastectomy (removal of the breast) to treat their breast cancer. Also, some women who are at a very high risk of developing breast cancer due to their family history or who carry a genetic risk of the BRCA gene, elect to undergo mastectomies to prevent developing breast cancer in the future.

If a woman does need a mastectomy, they often think it will be the same surgery their mother or grandmother had years ago and that is simply not true. The way we perform a mastectomy today is a different world from how it was done even a decade ago.

Today, if a woman has a mastectomy, often all the skin of the breast and the nipple can be preserved. This is called a nipple sparing mastectomy. The incision is usually in the natural crease under the breast so that the scar is well hidden and not even seen after the surgery. Following the mastectomy, during the same operation, the plastic surgeon performs reconstruction of the breast. So with the woman's own skin and nipple remaining and a beautiful reconstruction, it is difficult to even tell she has had a surgery afterwards. Women can dress in their usual clothes and even wear a bathing suit on the beach, and no one would know she had a mastectomy.

Although nipple sparing mastectomy with reconstructive surgery cannot alleviate the fear of a breast cancer diagnosis, it can be a powerful tool in helping breast cancer patients get through their treatment. Having a woman feel beautiful and feminine after her mastectomy is very important to her well-being and the healing process. Breast reconstruction accomplishes this, and has been shown to increase the quality of life post surgery, helping physically, socially and psychologically.

The goal of the plastic surgeon performing breast reconstruction is to provide the most natural and aesthetic breast possible, following the complete resection of the tumor by the breast surgeon. The ultimate compliment is when the patient is happier with her body after the reconstruction than before her mastectomy. When she looks at herself we do not want her to be reminded of her cancer.

To achieve this goal, the breast surgeon and plastic surgeon must work well together. Reconstructive options for our patients are tailor-made, as the location, type of cancer, size of cancer; breast shape, breast size and previous surgeries all change the options for the patient.

The two main types of breast reconstruction are using breast implants and using the body's own fatty tissue. The types of implants used today include two different types of silicone breast implants and saline implants. The two types of silicone implants include anatomic, or shaped implants and traditional round implants. Each of these is used for different patients, depending on the natural shape of her breast and the preferred cosmetic outcome of her reconstruction.

Using your body's own fatty tissue allows patients to not only get the most natural breast reconstruction, but also a chance to improve upon other areas of the body. The most common area used is the abdomen, were tissue is removed in a tummy tuck, and sculpted into a breast. During this procedure nerves from the abdomen can be reattached to increase sensation in the reconstructed breasts. Although this is experimental, initial results are promising. Other areas that can be used are the buttocks, the area just below the buttocks and the lateral thigh/flank area. As the reconstructed breast is made of fatty tissue, it feels like a natural breast.

For patients who have already had breast reconstruction and who are unhappy with their results there are several reconstructive options to correct deformities. These include transferring fat from one part of the body to fill in the defects, or changing from a breast implant to your body's own fatty tissue. Radiation can affect the skin, harden the breast reconstruction and deform the underlying breast implant. There are techniques that can be used to correct these defects.

Lymphedema, or swelling of the arm after lymph nodes have been removed can be a devastating condition, leading to the inability to use the arm. Transferring lymph nodes from one area of the body to the affected armpit can decrease the severity of this ailment.

Nipple sparing mastectomy and breast reconstruction are an effective and important part of treating patients with breast cancer. These modern techniques are an important way to alleviate patients' fears that they will be deformed by their cancer treatment. By combining nipple-sparing mastectomy, with state of the art breast reconstruction techniques, our patients are surviving their breast cancer and living normal lives with a beautiful look as a whole woman.

Weill Cornell Medical College
Department of Surgery

The Authors

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- **Dr David M Otterburn** is and Assistant Professor of Surgery in the Division of Plastic and Reconstructive Surgery in the Department of Surgery at Weill Cornell Medical College

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Surgical innovations at Children's Mercy benefit patients across the globe

By **George W. Holcomb III,** MD, MBA
Surgeon-in-Chief and **Katherine Berry Richardson,** Professor of Pediatric Surgery, Director Center for Minimally Invasive Surgery, Children's Mercy Kansas City

Children's Mercy Kansas City serves half a million patients each year not only from the United States, but around the world. Children's Mercy, an independent 354-bed health system, has been consistently ranked among the leading children's hospitals in the United States (USA) by U.S. News & World Report and the hospital has received Magnet recognition three consecutive times for excellence in nursing care.

In affiliation with the University of Missouri-Kansas City, a faculty of nearly 600 pediatric subspecialists and researchers are actively involved in clinical care, pediatric research, and educating the next generation of pediatric subspecialists. Advances in a wide range of disciplines, including spine surgery, cleft palate/lip surgery, and clinical trials are transforming pediatric care worldwide.

Center for Prospective Clinical Trials advances pediatric surgical care

The Children's Mercy Center for Prospective Clinical Trials is dedicated to identifying which cutting-edge approaches to medical and surgical care are advantageous to infants and children.

More than 13 studies have been published in leading medical journals by the center and presented at prestigious surgical associations. Current and upcoming trials allow the center to continue its goal of bringing patients the best and most innovative surgical care available.

For more information, visit the *www.centerforprospectiveclinicaltrials.com*.

MAGEC® spinal deformity treatment eliminates need for multiple surgeries

Children's Mercy Kansas City is one of only 20 children's hospitals in the USA selected to participate in the alpha group for the MAGEC System. This ground-breaking growing rod system is comprised of an implantable rod, an external remote controller, and other accessories. The system has Food and Drug Administration 510K clearance.

These implantable growing rods are used to brace the spine to minimize the progression of spinal curvature. The rods are implanted during a one-time surgery and are fixed to the spine at the top and the bottom using laminar hooks and/or pedicle screws. However, unlike traditional growing rods, the center of these rods includes a magnetic component. The magnetism between the rods and the remote control device allows for lengthening at the push of a button during a non-invasive outpatient visit. Early studies indicate these rods are eliminating the need for multiple surgeries and reducing the risk for complications.

The hospital's three dedicated, board-certified spine surgeons characterize the MAGEC System as a significant advancement for children with scoliosis, as well as those with neuromuscular conditions that cause curvature of the spine, such as cerebral palsy.

Ideal candidates for the MAGEC rods are skeletally immature patients, typically ages 6 to 7 but under age 10, with severe progressive spinal deformities associated with, or at risk for Thoracic Insufficiency Syndrome (TIS).

Cleft palate/lip program incorporates multidisciplinary care

Children's Mercy Kansas City has one of the largest pediatric plastic surgery groups in the USA. These fellowship-trained surgeons commonly treat complex cleft palate/lip cases. Treatment depends on the type and severity of cleft palate/lip deformity. Typically, cleft lip is repaired between 4 to 6 months of age and cleft palate is repaired between 12 to 18 months.

These children benefit from an innovative blood conservation program (which greatly reduces the need for blood transfusions) and also from a minimally invasive operative approach. A pediatric anesthesiologist experienced in administering anesthesia precisely for the child's age, size and condition is critical for a successful outcome.

Prior to surgery, a multidisciplinary team evaluates the child in the Cleft and Craniofacial Clinic. The team includes nursing, lactation, nutrition, occupational therapy, social work, speech and hearing, dental, otolaryngology, plastic surgery, and if needed, developmental medicine and genetics. Families can even preview the postoperative outcome through advanced 3-D rendering technology.

Comprehensive surgical services

Children's Mercy Kansas City is a leader in minimally invasive surgery and offers extensive pediatric surgical expertise in:

- Cardiovascular Surgery
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- Neurosurgery
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- Plastic and Reconstructive Surgery
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For more information about surgical care and other international services at Children's Mercy Kansas City, call +1 (816) 701-4524 or visit us at *www.childrensmercy.org* MEH

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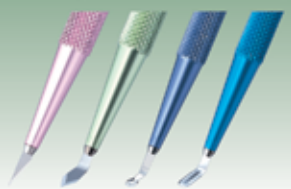

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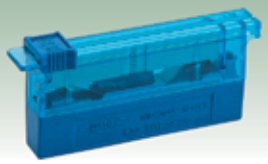

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Burning seizures away: Laser ablation gives a teen his life back

By **Nancy Fliesler**

When high school sophomore Justin Griffin was about four months old, he began having lapses in his breathing. He was having seizures that were discovered to be caused by a brain tumour. Boston Children's Hospital neurosurgeon Joseph Madsen, MD, removed the tumour. All seemed to be well.

But in middle school, Justin's seizures started up again. They were caused by a small lesion – a pocket of abnormal tissue – that had developed near the location of the original tumour. His neurologist prescribed a series of anti-epileptic medications.

"He would be on a medicine for a while and it would seem to be working, and then he would start having seizures again," says his mother, Keren. "The neurologist said that usually after three or four medicines when you fail, that's when they start talking about other options, and one of them would be surgery. I said, 'I don't want to open up his head again. Isn't there anything else we can do?'"

New treatment

It turned out there was: Madsen, director of Epilepsy Surgery at Boston Children's, had recently begun offering a new, minimally invasive laser operation and took Justin on as one of his early cases. Because Justin's seizures were originating from a discrete, identifiable spot in his brain, he was a good candidate for the procedure, known as laser ablation.

The neurosurgical team first placed a frame on Justin's head, containing a set of markers that acted like a GPS system. These coordinates would help Madsen navigate a safe path to the lesion, bypassing healthy parts of the brain.

Next, an applicator tube about the width of a strand of spaghetti – tipped by the laser – was inserted through a small hole drilled in Justin's scalp and advanced to the site of the lesion, guided by magnetic resonance imaging (MRI).

Then Madsen turned the laser on. He used the MRI signal to keep close tabs on the temperature, allowing him to safely dial up the heat and ensure that only the lesion was being heated, not the surrounding tissue.

The team then reviewed the MRI images again: The heat of the laser had successfully killed – ablated – the abnormal tissue.

Justin left Boston Children's the next day. "By the time we got home, Justin wanted to be out and doing things," says Keren. "The hardest part of the recovery for me was holding him back a little bit." Four days later, Justin was back in school.

Justin has now been seizure-free for more than eight months and completed his first year of high school this spring. Read about his laser procedure in detail on Boston Children's Neurosurgery website at *www.bostonchildrens.org/laserablation*. MEH

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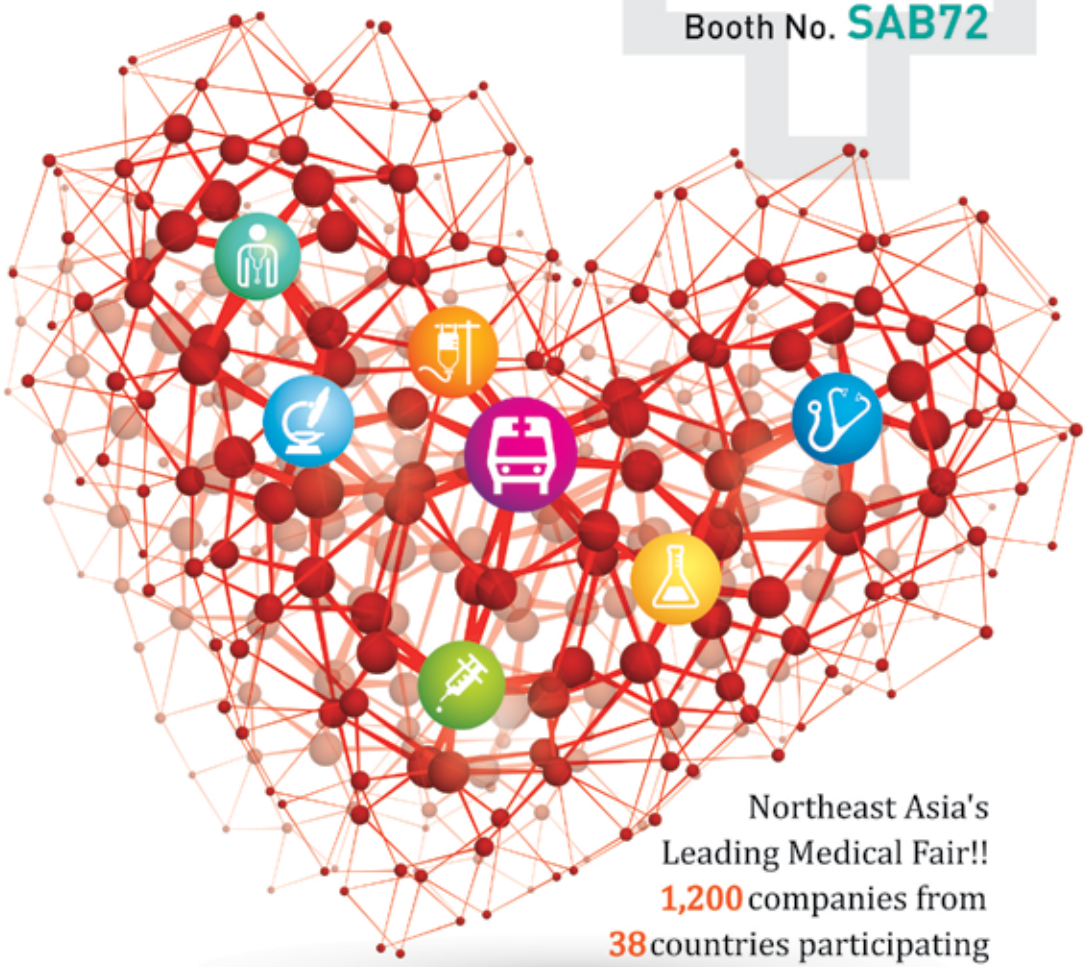

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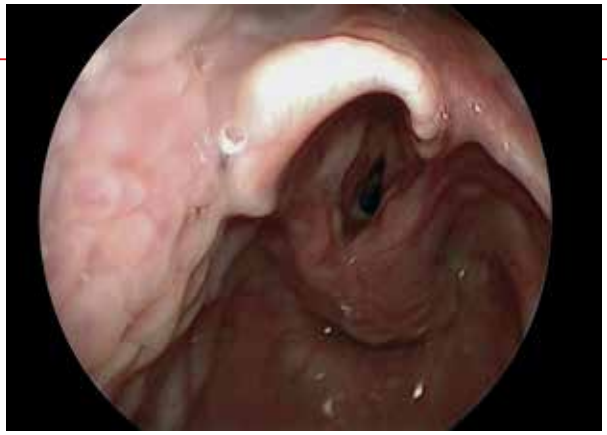
Case study: Airway reconstruction



View of glottic scarring during microlaryngoscopy and bronchoscopy

This case study illustrates the multidisciplinary assessment and management approach used by otolaryngology and the Aerodigestive Center at Cincinnati Children's Hospital Medical Center in the care of children with complex aerodigestive conditions. The collaboration between the services of otolaryngology, gastroenterology and pulmonary medicine is illustrated in the following case study of a tracheostomy-dependent patient seeking airway reconstruction and decannulation.

Clinical history

The male patient was born full term from an unremarkable pregnancy. Severe difficulty with breathing was noted at the time of delivery. He was unable to be intubated and an immediate tracheotomy was performed. He underwent unsuccessful airway reconstruction surgeries at age one and again at age three in Europe. At age four, he remained tracheostomy dependent and the family travelled to Cincinnati to seek an opinion from Michael Rutter, MD, and the Cincinnati Children's Otolaryngology/Aerodigestive Center about further surgical options for airway reconstruction.

Our approach

We have found that pre-operative evaluation and optimization is critical to good outcomes, especially in children requiring revision airway surgery. An airway intake is used by the otolaryngology nurse practitioner to review past and present medical history and issues. In this case, conditions that span the scope of several disciplines were identified including mild dyspnoea on exertion, frequent coughing and respiratory infections, aspiration issues and gastroesophageal reflux. We have found that careful evaluation and management of associated problems results in best airway reconstruction outcomes. The patient's history was presented at a weekly Aerodigestive Center rounds meeting and it was determined that a collaborative assessment by the Aerodigestive Center was appropriate. The collaborative evaluation plan was determined with input from all services represented in the Aerodigestive Center.

Diagnosis of anomalies

The initial Aerodigestive assessment plan included multiple tests and procedures including high resolution CT of the chest to evaluate the lungs and possibility of bronchiectasis, flexible bronchoscopy, rigid microlaryngoscopy and bronchoscopy (MLB), esophagogastroduodenoscopy (EGD), and videofluoroscopic and fiberoptic endoscopic evaluations of swallowing (VFSS/FEES). Only one anaesthesia episode is used during a "triple scope" procedure whereby the otolaryngologist, gastroenterologist and pulmonary medicine physician are present, increasing efficiency of the assessment and facilitating communication and collaboration regarding results and future intervention.

Results of the overall evaluation revealed severe grade III subglottic stenosis barely accommodating the 1.9 mm telescope, extensive glottis scarring, tracheomalacia, tracheal bronchus, mild bilateral bronchiectasis and bronchial wall thickening, diffuse purulent bronchitis and mildly increased reflux into the distal oesophagus. Swallowing parameters appeared to be within normal limits with good ability to achieve and maintain airway protection during swallowing.

Surgical course

The findings of the Aerodigestive assessment were reviewed by the physicians and it was decided that the patient would be a good candidate for a revision double stage laryngotracheoplasty procedure with anterior, posterior and lateral costal cartilage grafts. The family was counselled about the assessment results and about the recommended type of airway reconstruction surgery. The need for the grafts to widen the airway and the necessary post-operative stenting period to stabilize the reconstructed area during the postoperative healing process was described in detail. The potential for swallowing difficulties during the stenting period was explained. The patient subsequently underwent airway reconstruction surgery performed by Dr Rutter and a stent was placed for approximately six weeks. He recovered nicely during the post-operative period and was successfully decannulated four months later. He required interval procedures for lysis of scar bands and balloon dilations of his airway. He recovered well and returned home to Kuwait. He remains successfully decannulated and will return to Cincinnati Children's in one year to undergo a repeat microlaryngoscopy and bronchoscopy, lysis of scar band and dilation. He currently has no tracheotomy, no symptoms of airway obstruction and a reasonably good voice.

Summary

This case demonstrates the value of collaborative, multidisciplinary assessment and management of patients seeking airway reconstruction and decannulation. Careful review of this patient's medical history and current status guided the plan for a comprehensive pre-operative evaluation. Consideration of results and treatment of underlying conditions such as gastroesophageal reflux prior to surgical intervention is key to generating best patient outcomes. In this case, the patient had undergone two prior unsuccessful airway reconstruction procedures and presented with severe subglottic and glottic stenosis. The multidisciplinary Aerodigestive Center assessment provided an opportunity to efficiently address the issues that potentially impact surgical success, providing this patient with an opportunity to achieve the best possible outcome. MEH

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CHI St. Luke's Health Baylor St. Luke's Medical Center, home of the Texas Heart Institute, implants 1,000th Ventricular Heart-Assist Device

CHI St. Luke's Health Baylor St. Luke's Medical Center and the Texas Heart Institute (THI) announced in early 2014 that a historic and unmatched medical milestone had been reached – implantation of the 1,000th left Ventricular Assist Device (LVAD) – a mechanical pump that assists patients with congestive heart failure.

"It's a significant milestone for a significant medical problem, which is why we've made it a key focus of our work for so long," said O.H. Frazier, MD, Director of Cardiovascular Surgery Research, THI and Chief of Transplant Service, Baylor St. Luke's Medical Center.

More than 6 million people in the United States suffer from heart failure – the inability of the heart to pump enough blood to other organs in the body. Almost 600,000 die annually from end-stage heart failure. When medications and pacemakers no longer help the heart, patients are in need of a heart transplant or a mechanical pump. However, due to a shortage of donor hearts, only about 2,200 heart transplants are performed each year in the U.S.

Because of this unmet clinical need, THI and Baylor St. Luke's researchers have spent decades developing ventricular assist devices or VADS that are smaller, more durable mechanical pumps, which assist the heart by helping the ventricles pump blood, thus easing the workload of the heart.

VADs are used both as a "bridge-to-transplant" for patients awaiting a heart transplant and as "destination therapy" to support circulation in the body over a period of years. The LVADs used worldwide today were primarily developed by Dr Frazier and his THI team in the 1970s and 80s.

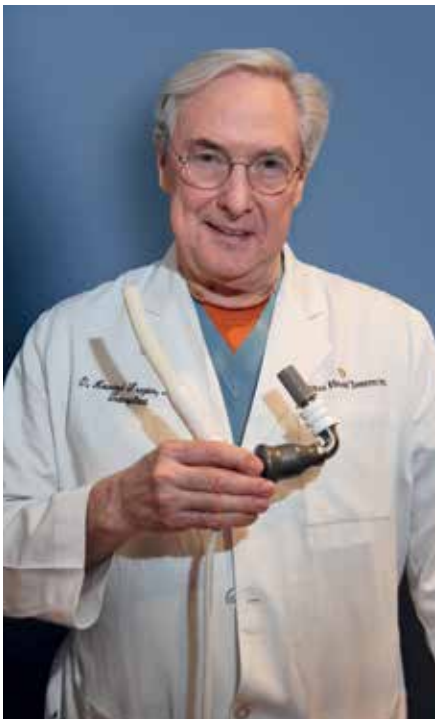
An LVAD is the first acceptable solution for long-term support of heart failure patients, because it allows them to leave the hospital and return to active, productive lives. LVAD, known as a left ventricular assist device, helps the left ventricle – the heart's main pumping chamber – circulate blood throughout the body. The device consists of a pump that is implanted, which has an electrical cable that connects to external battery packs. The packs are worn on the shoulders and electronic controls are worn on the belt.

The 1,000th LVAD implantation was performed in December 2013, and the patient made a full recovery. No other hospital in the U.S. has performed the surgery more than the Baylor St. Luke's Medical and THI.

"Patients have come from all over the country and the world to have this surgery performed in Houston," said Dr Frazier. "When we began performing this procedure some 30 years ago, being able to help save the lives of 1,000 people was just a dream. Now, it's a reality, and we couldn't be more proud."

THI at Baylor St. Luke's Medical Center is the nation's first cardiovascular centre to offer the Thoratec HeartMate® XVE and the HeartMate® II LVAD as a permanent implant – known as destination therapy – for end-stage congestive heart failure patients who do not qualify for heart transplantation due to age or other health circumstances.

- For more information contact St Luke's International Services, at *stlukesinternational@stlukeshealth.org* or call +1- 832-355-3350 or visit *StLukesInternational.org* Texas Medical Center, Houston, Texas - USA MEH



Dr O.H. "Bud" Frazier, Director of Cardiovascular Surgery Research, THI and Chief of Transplant Service, Baylor St. Luke's Medical Center. holds the world record for performing more heart transplants than any other surgeon in the world, and has pioneered the development of heart pumps and total artificial hearts that have saved thousands of lives.

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MEDICA provides boost for export business

"The high number of international visitors has provided medical device technology providers as well as their suppliers at MEDICA and COMPAMED with tailwinds for propping up their export business," says Joachim Schäfer, Managing Director at Messe Düsseldorf, summing up events in the halls of the world's biggest medical trade fair. The 4,831 exhibitors at MEDICA (12 – 15 November 2014) as well as the 724 exhibitors at COMPAMED gave the almost 130,000 visitors impressive proof of the benefit of their product innovations and wealth of ideas for high-quality and affordable health care. Approx. 84,000 visitors came from abroad travelling from some 120 countries to Düsseldorf. The average length of stay rose to 2.2 days. Just as important for exhibitors is the visitors' decision-making authority. MEDICA also boasts top scores here. Over 70% of visitors have a say or are decisively involved in purchasing decisions; add to these another 10% who are involved in a consulting capacity.

The latest reports from industry associations underscore just how important MEDICA and COMPAMED are as drivers for suppliers' international business. 85% of the medical device technology companies in the German Medical Technology Association BVMed polled expect sales to rise over the previous year, driven especially by dynamic export business. Explaining trends Marcus Kuhlmann, Head of the Medical Technology Association in SPECTARIS, the German High-tech Industry Association, says: "This year we expect turnover at the 1,200 German medical technology manufacturers to exceed EUR 25 billion for the first time, with growth abroad developing more strongly than it is on the domestic market. Exports account for 68%". In view of the trade fair business Kuhlmann emphasises: "MEDICA continues to be an outstanding possibility for companies to present themselves and their products and is therefore a "must"."

Re-launch of conference program

To also meet the needs of international visitors in future, MEDICA's accompanying conference program has been fundamentally restructured over the past two years.

The MEDICA EDUCATION CONFERENCE, which was organised by the German Society for Internal Medicine (DGIM) for the first time, offered an impressive multi-disciplinary program: 280 events with 350 speakers on four days placed the link between science and medical technology centre stage. Highlights of the programme included events on sonography, latest insights into the treatment of hepatitis C, the introduction of the MiroSurge surgical robotic system as well as lectures on "Medical and Social Freezing".

"Participant feedback on the quality of topics and speakers was very positive," says Prof. Dr. Hendrik Lehnert, the President of the MEDICA EDUCATION CONFERENCE.

DiMiMED, the International Conference on Disaster and Military Medicine, registered a further increase in participants with high-ranking representatives from the armed forces of over 20 nations. "Military medical services render outstanding performance worldwide under often very difficult conditions. The opportunity to exchange experiences amongst participants and know-how with medical technology manufacturers was boosted significantly at DiMiMED," said Dr. Christoph Büttner, the Scientific Head of the Conference (Beta Group), summing up.

The MEDICA MEDICINE + SPORTS CONFERENCE for sports and preventive medicine also enjoyed growing attendance. Here renowned experts like Prof. Dr. Tim Meyer, physician to Germany's national football team, or Prof. Jonathan Clark, medical director of the Red Bull-Stratos project, provided visitors with exciting insights into the latest methods used in performance diagnostics and sports medicine. Aspects that doctors regularly face as routine were not neglected in the English lectures either. Generating great interest was the session on preventing lack of exercise in children. Speaker Dr. Birgit Böhm (Faculty for Sport and Health Sciences / TU Munich) surprised the audience with the insight that specific sports programmes of gaming consoles (when played energetically via controller) can by all means be considered as useful exercise.

Newly incorporated into the programme, the MEDICA PHYSIO CONFERENCE addressed not only pain treatment aspects in physiotherapy but also preventive approaches. Among other things, participants learnt about the positive effect of weight training on older people and how medical fitness training schemes can improve patient loyalty and extend the service portfolio of doctors' surgeries.

The next MEDICA in Düsseldorf will be held from 16-19 November 2015. MEH

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7-9 May 2015

Officials and medical practitioners from the public and private sectors, institutions and foundations from scores of countries will meet at the "2nd Istanbul Medical, Health, Geriatrics, Thermal, Spa & Wellness Tourism Fair and Congress" in Istanbul May 7-9, 2015.

The trade fair and congress will gather at Istanbul Congress Center (ICC) and serve as a key international platform for medical and health tourism professionals and suppliers. Important organizations as 'Europe Business Assembly', 'European Union of Private Hospitals', and breast care institute 'Senatürk' will be taking part. Dr. Bahadır Güllüo, a professor and specialist in breast cancer surgery at Marmara University Medical School, and Dr. Yaman Tokat, a professor of organ transplant and general surgery and program director at Florence Nightingale and Gayrettepe Hospitals in Istanbul, together with other leaders in their fields, will be at the trade fair and congress.

Conferences and seminars will be held simultaneously at the fair, providing direct negotiations and communication opportunities with new and potential clients and suppliers in the field of health tourism, and interviews with industry professionals.

The health tourism sector is growing 6% to 12% annually worldwide. Turkey, one of the most important countries in this sector, has hospitals using state-of-the-art technologies and well-trained doctors and health professionals. The costs of medical treatment in Turkey are reasonable compared to western European countries, the U.S. and other developed countries, providing price advantages to patients and medical insurers.

In particular, organ transplantation, bone marrow transplant and cancer treatment, plastic and aesthetic surgery, hair transplant, eye surgery, test tube fertilization, open heart surgery stand out in Turkey. The nation is also strong and cost effective in the treatment for skin diseases, medical check-ups, nose, mouth and throat surgery, dialysis, cardiovascular surgery, gynecologic treatment, neurosurgery, orthopedic surgery and treatment, dental treatment and surgery, spa, physical therapy and rehabilitation services

The same development and progress has taken place in Turkey in the fields of thermal spas, offering the foreign elderly and disabled opportunities for treatment The country offers the elderly and the disabled highly developed thermal baths with modern infrastructure and facilities with healing powers.

● For further information and application, visit: *www.imtfuari.com* MEH

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RSNA celebrates 100 years' of prestigious scientific assembly

The 2014 annual RSNA (Radiological Society of North America) – the world's leading radiology exhibition and conference – took place from Sunday, November 30 – Friday, December 5, 2014, in Chicago, USA. The 2014 event marked 100 years since the inception of the Scientific Assembly and Annual Meeting of the Radiological Society of North America.

Highlights from the event include:

3D printing helps face transplant surgeons

According to a study presented at RNSA, researchers are using computed tomography (CT) and 3D printing technology to recreate life-size models of patients' heads to assist in face transplantation surgery.

Physicians at Brigham and Women's Hospital in Boston performed the USA's first full-face transplantation in 2011 and have subsequently completed four additional face transplants. The procedure is performed on patients who have lost some or all of their face as a result of injury or disease.

A 3D printed facial model

In the study, a research team led by Frank J. Rybicki, M.D., radiologist and director of the hospital's Applied Imaging Science Laboratory, Bohdan Pomahac, M.D., lead face transplantation surgeon, and Amir Imanzadeh, M.D., research fellow, assessed the clinical impact of using 3-D printed models of the recipient's head in the planning of face transplantation surgery.

"This is a complex surgery and its success is dependent on surgical planning," Dr. Rybicki said. "Our study demonstrated that if you use this model and hold the skull in your hand, there is no better way to plan the procedure."

Each of the transplant recipients underwent preoperative CT with 3-D visualization. To build each life-size skull model, the CT images of the transplant recipient's head were segmented and processed using customized software, creating specialized data files that were input into a 3-D printer.

"In some patients, we need to modify the recipient's facial bones prior to transplantation," Dr Imanzadeh said. "The 3-D printed model helps us to prepare the facial structures so when the actual transplantation occurs, the surgery goes more smoothly."

"You can spin, rotate and scroll through as many CT images as you want but there's no substitute for having the real thing in your hand," Dr Rybicki said. "The ability to work with the model gives you an unprecedented level of reassurance and confidence in the procedure."

The Expo

The exhibition floor at RSNA is hive of activity with many companies using the show to launch new medical equipment and devices.

Siemens shows new MAGNETOM Amira

Siemens Healthcare launched their MAGNETOM Amira 1.5 Tesla system. Siemens says the scanner is designed with the same technologies that are available on Siemens' flagship MRI systems, MAGNETOM Amira is also designed to be distinguished by its low operating costs. One reason is the new "Eco-Power" technology, which enables significant power savings in standby mode. MAGNETOM Amira is intended to meet the requirements of radiology practices, small and medium-sized hospitals, and larger facilities that are interested in a scanner to complement their existing systems.

MAGNETOM Amira is equipped with Siemens' latest applications and syngo MR E11 software architecture.

Carestream launches Touch Ultrasound System

Carestream unveiled their Touch Ultrasound System, which has a unique all-touch control panel, integrated GPU processing power and smart transducer technology coupled with a single-board system design. This creates a highly reliable product with advanced imaging capabilities, a compact footprint and a modern user interface. The sleek, all-touch control panel blends the best of both worlds by combining the speed and flexibility of a soft user interface with the tactile feedback of traditional keys. Etched marking for primary controls assists the user with easily locating key functions without looking away from the image display monitor.

Philips launches DoseWise Portal

Philips Healthcare introduced the DoseWise Portal, a comprehensive radiation dose management software solution aimed at managing radiation exposure risk to patients and their caregivers. The Philips DoseWise Portal enables health care providers to proactively record, analyse and monitor imaging radiation dose for patients and clinicians across multiple diagnostic settings.

Gene Saragnese, executive vice president and CEO of Philips Imaging Systems, explained: "Dose management is a critical issue, and the reality is that sometimes the higher radiation dose of a CT is necessary for a particular patient to in order reach a definitive diagnosis, in the shortest time, and at the lowest cost. Philips DoseWise Solutions return a measure of control to patient care, arming clinicians and informing patients with the tools, training and insights they need in order to ask the right questions regarding radiation dose." MEH

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Salome Karwah, ebola survivor turned MSF carer

I survived Ebola for a reason – to help others fight the disease

By **Salome Karwah** – Ebola survivor turned carer at MSF's Elwa 3 treatment centre, Monrovia

It all started with a severe headache and a fever. Then, later, I began to vomit and I got diarrhoea. My father was sick and my mother too. My niece, my fiancé and my sister had all fallen sick. We all felt helpless.

It was my uncle who first got the virus in our family. He contracted it from a woman he helped bring to hospital. He got sick and called our father for help, and our father went to him to bring him to a hospital for treatment. A few days after our father came back, he too got sick. We all cared for him and got infected too.

On 21 August, I and my whole family made our way to MSF's Ebola treatment centre in Monrovia. When we arrived at the treatment unit, the nurses took my mother and me to the same tent. My fiancé, my sister, my father and my niece were taken to separate tents. My sister was pregnant and had a miscarriage.

They took our blood and we waited for them to announce the results. After the lab test, I was confirmed positive. I thought that was the end of my world. I was afraid, because we had heard people say that if you catch Ebola, you die. The rest of my family also tested positive for the virus.

After a few days in the isolation ward, my condition became worse. My mother was also fighting for her life. She was in a terrible state. At that point, the nurses made the decision to move me to another tent. By then, I barely understood what was going on around me. I was unconscious. I was helpless. The nurses had to bathe me, change my clothes and feed me. I was vomiting constantly and I was very weak.

I was feeling severe pains inside my body. The feeling was overpowering. Ebola is like a sickness from a different planet. It comes with so much pain. It causes so much pain that you can feel it in your bones. I'd never felt pain like this in my lifetime.

My mother and father died while I was battling for my life. I didn't know they were dead. It was only one week later, when I had started recovering, that the nurses told me that they had passed away. I was sad, but I had to accept that it had happened. I was shocked that I had lost both my parents. But God spared my life from the disease, as well as the lives of my sister, my niece and my fiancé.

Though I am sad at the death of my parents, I'm happy to be alive. God could not have allowed the entire family to perish. He kept us alive for a purpose.

I am grateful to the workers here for their care. They are very nice people. They really care for their patients. The care, the medication and self-encouragement can help a patient to survive.

When you're sick with Ebola, you always have to encourage yourself: take your medication; drink enough fluids – whether it's oral rehydration solution, or water or juices – but don't keep your system empty. Even if they bring you food and you don't have any

appetite to eat, just eat the soup.

After 18 days in the treatment centre, the nurses came in one morning and took my blood and carried it to the laboratory for testing. Later that evening, at around 5pm, I saw them return. They came and announced to me that I was ready to go home because I had tested negative.

Then I felt that my life had begun again. I went home with joy, despite having lost my parents.

I arrived back home feeling happy, but my neighbours were still afraid of me. Few of them welcomed me back; others are still afraid to be around me – they say that I still have Ebola. There was a particular group that kept calling our house 'Ebola home'. But, to my surprise, I saw one of the ladies in the group come to my house to ask me to take her mother to the treatment centre because she was sick with Ebola. I did it, and I felt happy that at least she knows now that someone cannot go to a supermarket to buy Ebola. It's a disease that anyone, any family, can get. If someone has Ebola, it isn't good to stigmatise them, because you don't know who is next in line to contract the virus.

Now, I am back at the treatment centre, helping people who are suffering from the virus to recover. I am working as a mental health counsellor. I find pleasure in helping people, and that is what brought me here. My efforts here may help other people to survive.

When I am on a shift, I counsel my patients; I talk to them and I encourage them. If a patient doesn't want to eat, I encourage them to eat. If they are weak and are unable to bathe on their own, I help to bathe them. I help them with all my might because I understand the experience – I've been through the very same thing.

I feel happy in my new role. I treat my patients as if they are my children. I talk to them about my own experiences. I tell them my story to inspire them and to let them know that they too can survive. This is important, and I think it will help them.

My elder brother and my sister are happy for me to work here. They support me in this 100 percent. Even though our parents didn't survive the virus, we can help other people to recover. MEH

Médecins Sans Frontières is an international medical humanitarian organisation that delivers aid to people affected by armed conflict, epidemics, natural disasters or exclusion from health care in more than 60 countries around the world. Visit: *www.msf-me.org*

How to avoid catching the flu

By **Leslie Morgan**, OBE DL
CEO, Durbin PLC
Leslie Morgan is a Fellow of the Royal Pharmaceutical Society of Great Britain

For those among us unlucky enough to be vulnerable to such things, seasonal changes can mean sickness is inevitable. The cold weather in particular can leave the best of us with minor ailments such as colds and sore throats. Health experts say that a rise or fall in temperature can distract our immune systems from their task of protecting our well-being. More cases are seen during the winter months because the heat – which is a natural protector against influenza and kills most viruses – has gone away. Secondly, the air is dryer and this thins the lining of the nose and mouth making you more prone to illnesses.

In many countries, influenza is one of the biggest causes of short-term illness. Commonly known as flu, it is most prevalent during the winter months in the northern hemisphere, while most cases increase between April and September in the southern hemisphere. Symptoms include sore throat, fever, headache, fatigue, runny nose, muscular aches and sometimes diarrhoea and vomiting.

Flu can affect anyone, but children under 5, people aged 65 and over and pregnant women are at greater risk. Those with existing conditions such as diabetes or obesity, respiratory problems such as asthma, heart diseases, chronic illnesses or kidney or liver problems often have a weaker immune system, so they are also in a high-risk group. These groups can experience far more severe symptoms such as pneumonia, ear infections, asthma attacks and even heart failure as a result of influenza.

Some people living in hot climates may assume that they will avoid the flu, however it is a global virus that affects everybody. Excessive air conditioning, poor ventilation and a multicultural and ever-changing population who bring viruses from their home countries all contribute to the spread of the virus.

So what is the best way to avoid flu?

The main things people can do to help themselves include drinking plenty of fluids, getting enough sleep and washing hands regularly. Having a good diet is also key, with foods rich in zinc such as beef, wheat germ, pumpkin seeds and spinach, great quality protein such as eggs, lentils, salmon and taking an anti-oxidant supplement.

Having said that, studies have shown that getting a flu injection will also help to substantially reduce the risk of catching it. Not all flu viruses will be preventable however, and the level of protection may vary between people so it's not a 100% guarantee that you'll be flu-free. Nevertheless, if you do catch it, the virus is likely to be milder and shorter-lived than it would otherwise have been.

In November, Saudi Arabia launched a Kingdom-wide vaccination campaign against seasonal flu. The vaccination is suitable for people of all age groups including pregnant women, patients suffering chronic diseases such as diabetes, renal problems, heart and lung disease, and health officials. Speaking at a conference recently, Saudi Arabia's Health Minister Adel Fakeih urged health workers in the public and private sectors to help people take precautionary measures against flu through vaccination. Saudi Arabia is currently offering flu jabs in all government hospitals and nearly 2000 primary healthcare centres for free. School children are also being vaccinated.

In the UK flu shots are also offered by many employers to reduce lost working hours. Flu is one of the biggest causes of short-term illnesses and can harm business through the number of sick days taken, particularly at the end of the year when winter arrives and flu is more prevalent.

Here at Durbin we offer our staff free vaccinations against flu – it benefits them and us as sickness leave is reduced and the spread of the illness is minimised. MEH

Durbin PLC is a British company based in South Harrow, London. Established in 1963, the company specialises in supplying quality assured pharmaceuticals, medical equipment and consumable supplies to healthcare professionals and aid agencies in over 180 countries. As well as reacting rapidly to emergency situations, Durbin PLC responds to healthcare supply needs from local project level to national scale programmes.
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Roche Diagnostics brings the Power of Knowing – the value of diagnostics in healthcare

For healthcare providers to deliver the most optimized care to patients, diagnostics are becoming increasingly important. With quality tools for diagnosis, clinicians can have access to accurate and reliable results in the right time; this equips them with the knowledge and resources to make the correct diagnosis, implement the best treatment, and prevent disease progression by predicting the care needed for the best patient outcome. The value of diagnostics lies in having the right information available, which is why Roche Diagnostics believes in "The Power of Knowing"– a term that defines the value diagnostics bring to our health.

Diagnostics are more than just a precursor to treatment; they are about intervention. The Power of Knowing allows healthcare professionals to manage disease and deliver patient care. As such, it is of paramount importance that the diagnostic tools used are reliable and accurate. Roche Diagnostics is committed to building successful partnerships with laboratories, to provide fast and reliable results needed for life-changing decisions. The broad range of tests offered by Roche Diagnostics, together with their pioneering technologies, contributes to a new phase of sustainable healthcare in disease prevention and management. This involves the integration of multiple areas – prevention, prediction and treatment, which can be seen in Roche's broad range of solutions in areas such as oncology and women's health.

While cervical cancer is the second most common cancer in women between the age of 15 and 44[1], it can be prevented with early detection to improve patient outcomes. The average 5-year survival rate is estimated to be 90% for cervical cancer[2], demonstrating the value of early detection. Roche's human papillomavirus (HPV) test gives clinicians the Power of Knowing whether their patient is at risk of developing cervical cancer in order to proceed with the best preventative measures. The test ultimately saves lives by protecting women from the unnecessary burden of cancer and related treatments later on in life.

Similarly, breast cancer is another common cancer in women worldwide, according to the World Health Organization (WHO). Approximately 15 –25% of breast cancers cases are positive for human epidermal growth factor 2 (HER2)[3]. With early detection, the average 5-year survival rate is estimated to be 89% for breast cancer[4]. Roche Diagnostic's tests that allow early detection of HER2 can eliminate treatment trial and error as well as save time and costs. With our personalised healthcare tests cancer clinicians can better stratify their patients, depending on their diagnosis, into the best treatment decision, eliminating trial and error and saving time, costs, and most importantly, lives.

Early detection and diagnosis is also important in pre-eclampsia, which occurs in 3–5% of pregnancies during the second half of gestation[5]. It is usually difficult to diagnose due to variable features and unspecific symptoms, but with the test to detect soluble form of vascular endothelial growth factor receptor and placental growth factor (sFlt-1/PlFG), clinicians can predict the risk of complications at birth. Subsequent administration of special care and monitoring can then protect the health and safety of the mother and child.

Roche Diagnostics is investing in pushing the boundaries through innovation so that the development of products and solutions that help predict and prevent disease can be consistently delivered. Through the Power of Knowing, healthcare professionals can make the right decisions for their patients at the right time. Roche Diagnostics offers the industry's broadest range of tests and pioneering technologies, the solutions can give an accurate diagnosis, detect risk of disease, predict how disease may progress, and enable the right treatment decision to be made at the first opportunity.

While cervical cancer is the second most common cancer in women between the age of 15 and 44, it can be prevented with early detection to improve patient outcomes.

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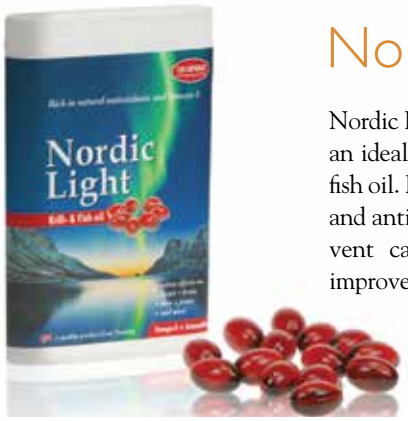
Richard Wolf launches new ureterorenoscopes

Medical instrument manufacturer Richard Wolf presents two new flexible Sensor Ureterorenoscopes: the single-channel ureterorenoscope (URS) `BOA vision´ and a dual-channel URS `COBRA vision´.

Due to the very small sheath diameter of 8.7 Fr., `BOA vision´ can be introduced through Access Sheaths with a diameter of just 9.5 Fr. This makes it particularly suitable for the treatment of children and adult patients with very narrow ureters. `COBRA vision´ also permits the simultaneous option of using one or two working instruments with outstanding irrigation performance in both cases. This significantly reduces the intervention times compared with single-channel renoscopes.

- For more information, visit: *www.richard-wolf.com*



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Nordic Light – Krill & Fish Oil is an ideal combination of krill and fish oil. It is rich in both Omega-3 and antioxidants. It can help prevent cardiovascular diseases. It improves memory and concentration. It has positive effects on skin aging and protects the skin against UV radiation. It has positive digestive effects. It counteracts depression and improves the quality of life. Nordic Light has documented effects on PMS relief. It counteracts sore and stiff joints; and is beneficial for cholesterol.

- For more information, visit: *www.healthgate.me*

Berchtold introduces TABLEGARD Patient Care System to combat hypothermia and provide true pressure relief

Whether it's the development of post-operative pressure ulcers or complications from perioperative hypothermia, patients face a wide range of risks from prolonged surgical procedures.

That's where TABLEGARD comes in. This revolutionary patient care system from Berchtold is the only OR table mattress that provides both pressure management and warmth during surgery. The result is a significant reduction in pressure-related sores and ulcers, as well as anaesthesia-induced hypothermia.

TABLEGARD's innovative design is based on the body's own physiology, mimicking the peristaltic motion of muscles to generate even, gentle movement in 15-minute cycles throughout an extended procedure.

TABLEGARD is also changing the way surgical teams maintain safe core temperatures during procedures, especially with today's ORs being kept extremely cold to prevent cell death. Berchtold's integrated system produces a surface temperature range of 28-43º C, helping reduce the risk of perioperative hypothermia.

The TABLEGARD system is available in different lengths and with or without heater / blower assembly.

For over 90 years Berchtold has been one of the world's leading developers and manufacturers of high quality surgical equipment. The company offers surgical lights, OR tables, ceiling supply units, video and camera systems, and customized surgical solutions.

- For more information, visit: *www.Berchtold.biz*

Timesco Callisto single-use laryngoscopes at the forefront of preventing cross contamination and spread of disease

Ebola, AIDS, Hepatitis C, Sepsis, MERS, with the proliferation of contagious diseases across the world, cross contamination between patients has become a major issue. Timesco single-use laryngoscopes Callisto are leading the way in preventing the spread of microorganisms, infections, spores and prions.

In guidelines published in the association of anaesthetists of Great Britain magazine, *Anaesthesia*, it was recommended that all laryngoscopes blades and handles should be autoclaved and the use of single use devices encouraged. However, autoclaving does not guarantee the total elimination of prions on laryngoscopes.

Timesco's Callisto single use laryngoscopes offer ready-to-use convenience and cost savings compared to reusable laryngoscopes: Guaranteed control of cross contamination; no reprocessing or autoclaving costs; clinically clean, single use pre-packed; will not bend / deform in use ; can be used with fibre reusable handles: Optima, Sirius, Optima XLED and single use handles Callisto S and Callisto LED.

The Callisto system is latex free, non-toxic and can be disposed in standard hospital waste. Timesco products are ISO, CE, FDA, SFDA, etc. worldwide approved.

Timesco Callisto Laryngoscopes are the No. 1 choice for cross contamination prevention.

- For more information on Timesco's full range of products, visit: *www.timesco.com*
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- Arab Health 2015 booth: Z1 F19

Bovie Medical Corporation introduces J-Plasma technology and other new devices at Arab Health 2015

Bovie® Medical Corporation, the first name in electrosurgery, continues to transform the healthcare industry with electrosurgical products for the physician office, outpatient facilities and the hospital operating room.

The Bovie name represents ongoing innovation and superior surgical performance. At this year's Arab Health exhibition, Bovie introduces the helium-based technology J-Plasma® – another historical first destined to transform how surgeries are performed. J-Plasma has recently won the prestigious SLS 2014 Innovation of the Year Award.

Dr Craig E. McCoy, OB/GYN surgeon, reports: "I'm able to treat tissue near vital structures, and actually see it be excised cell layer by cell layer without any thermal spread."

This kind of precision is made possible through the use of cool, tissue-sparing effects found only with helium plasma. There is extremely low risk of injury to surrounding tissue, giving surgeons control at the micron level.

See for yourself how J-Plasma works to deliver remarkably low thermal spread with a high level of precision and versatility across open and laparoscopic gynecological procedures.

Bovie will also be exhibiting its complete line of electrosurgical generators including the new IDS-310, 300 watt operating room electrosurgical generator with tissue fusing technology and the Derm 101 High Frequency Desiccator, an extremely affordable unit for simple skin procedures. Alongside our equipment Bovie also supplies a full line of electrosurgical accessories and Smoke Evacuation products.

- For more information, visit: *www.boviemed.com*
- Arab Health 2015 booth: 1 D59

CIM Med's triply-articulated arm is super-efficient

CIM Med's height-adjustable, triply-articulated arm is incredibly efficient in daily hospital work. If a larger distance is required between the mounting point of the carrier arm and the monitor itself, then this carrier arm system by CIM Med is the ideal solution. The arm is available in an upward as well as downward version. Whatever the position or monitor model, personnel will be able to work ergonomically. An example: finding an ergonomic monitor position is difficult, particularly with underside-mounted patient and observation monitors that are fixed in a high position. A carrier arm oriented downward is an optimal way to counter this problem.

The carrier system can swivel 360 degrees, but an integrated stopper prevents turning beyond a certain limit. This avoids any potential damage to the cabling inside. If need be, staff members can easily change cabling. No tangle of cables also means easier cleaning.

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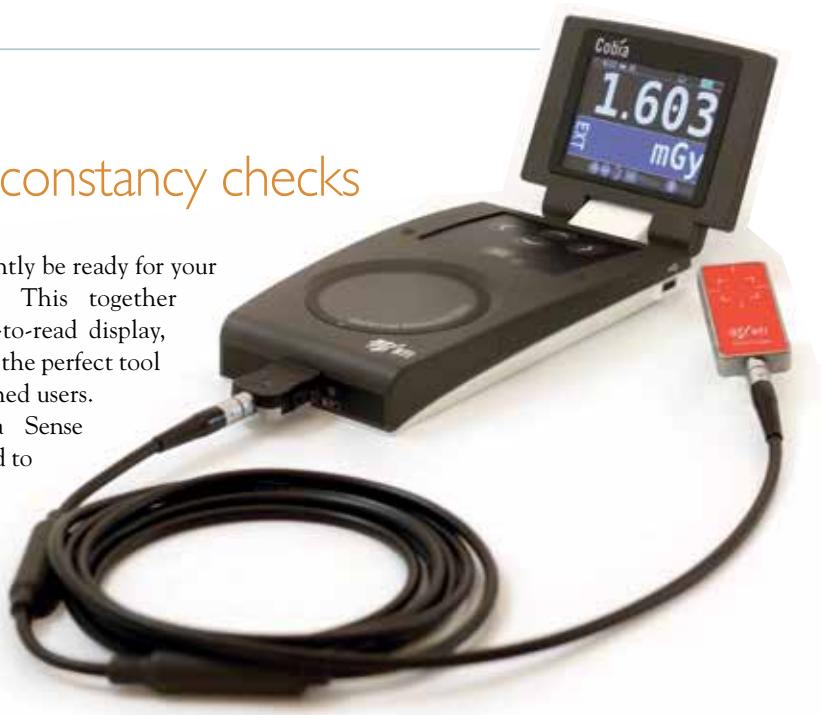
- Arab Health 2015 booth: Z3 E19

Armstrong's Aluminum A-SMART Premier Carts are the perfect fit

Dependable and durable, Armstrong's A-SMART® Aluminum (doesn't rust) Premier™ Carts are the perfect fit no matter what your department. Eighteen colours and hundreds of accessories make A-SMART Carts the most versatile on the market. A-SMART Carts are offered with either a key, breakaway or push-button lock. Also, don't forget that all A-SMART Carts are manufactured to ISO 9001:2008 certified standards, and all full-size A-SMART Carts come with double side-wall construction, stabilizing frame with bumper, soft-grip handles, high-quality swivel casters (two locking, one tracking), and ball bearing drawer slides as standard features.

- For more information, visit: *www.armstrongmedical.com*
- Arab Health 2015 booth: 1 C38

Cobia Sense – sensible X-ray constancy checks



Cobia Sense is dedicated for use with an external detector such as RTI Dose Probe, Light Probe, CT ion chamber or external Invasive mAs probe. The wide selection of external probes enables a big flexibility in the performance of regular constancy checks for most modalities. The measured values can be read directly from the large and clear display, and are stored in the Cobia Sense for later viewing.

As the newest member of the Cobia family, Cobia Sense has the same form factor and large display which features the Cobia's familiar and easy-to-navigate menu structure. The Cobia Sense is targeted for routine constancy checks, with the ambition to make those tasks quick and easy.

Thanks to the Plug-and-Play functionality the Cobia Sense will automatically recognize the different detectors you connect and instantly be ready for your measurements. This together with the easy-to-read display, Cobia Sense is the perfect tool also for untrained users.

With Cobia Sense there is no need to reset between your measurements, so you can remain in the control room until all your measurements are made. The practical data log allows you to store measurements for later viewing.

As well as English, you can choose to run your Cobia Sense in several languages such as Chinese, French, German, Japanese, Russian, Spanish, and Swedish. This can easily be selected via the Cobia menu and we constantly update with more languages.

- For more information, visit: *www.rti.se/products/product-detail/cobia-sense*

CooperSurgical offers range of uterine manipulation devices

CooperSurgical is proud to offer our comprehensive portfolio of surgical devices, providing enhanced visualization and control for pelvic laparoscopic procedures.

The reusable RUMI® II handle is safe, effective, and capable of 140-degree articulation, providing excellent visibility and access and reducing time spent in the operating theater. The redesigned shaft has a reach two full inches (5cm) longer than the original RUMI, and a built-in, friction-free locking mechanism ensures stability during laparoscopic or robotic pelvic surgery.

The RUMI II accommodates an assortment of flexible silicon single-use intrauterine surgical tips, ranging in size from 5.1 mm x 3.75 cm to 6.7 mm x 12 cm, that provide unmatched durability during caudal retraction. The distal ends are soft and flexible enough to reduce the risk of puncture trauma, but strong enough to accommodate intrauterine balloon saline inflation.

For physicians who prefer the light weight of a disposable uterine manipulator but require more strength, we offer the Advincula ArchTM. The radial design permits easy insertion from any angle and a unique curve provides outstanding elevation for superior visualization and manual control.

The Koh-Efficient®, comprised of the Koh Cup® and pneumo-occlusion balloon, can be used with both the RUMI II and Advincula Arch. It fits securely over the cervix and places the fornix on stretch, making it easier to identify and protect the ureters and uterine arteries during pelvic procedures. Surgeons can proceed with confidence knowing they have ensured a reliable "margin of safety". The easy-load Koh-Efficient, which comes in four different sizes to suit a range of patient anatomy, fits snugly and precisely into place, saving valuable surgical time. Select the Ultem® polymeric resin construction for use with electrosurgical equipment or the stainless steel for use with harmonic scalpel or laser procedures.

CooperSurgical is the leading provider of innovative medical devices and procedure oriented solutions that advance the standard of care for women. Our highly reliable and clinically relevant products and services facilitate the delivery of enhanced outcomes for patients regardless of the clinical setting.

- For more information, visit: *www.CooperSurgical.com*
- Arab Health 2015 booth: 1 G52

Fanem's Duetto 2386 Hybrid Unit is state-of-the-art technology

The Duetto 2386 Hybrid Unit, which operates as both an incubator and radiant heat unit, is already available in Brazil. The award-winning equipment, together with its accessories, enables versatile use in every newborn care situation. This characteristic reduces the need to transfer patients from one piece of equipment to another, during different procedures, thereby decreasing handling and contamination.

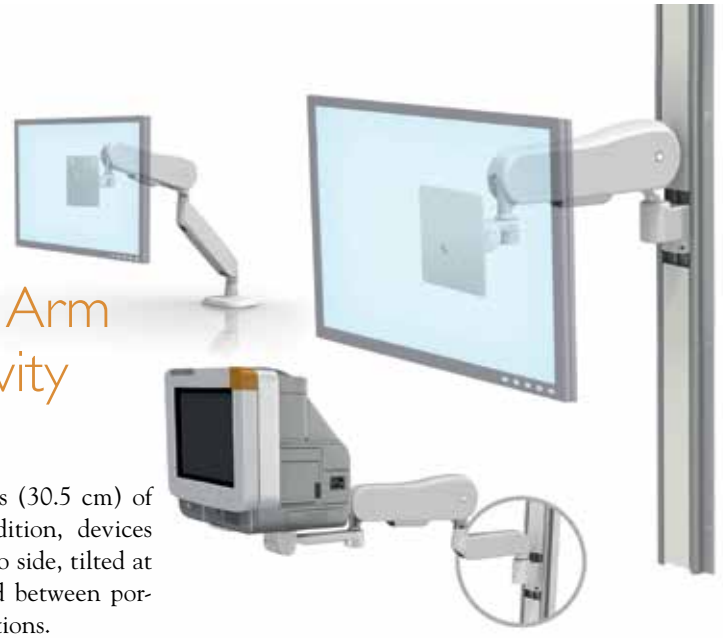
When operated as an infant warmer, the upper part of the hood of the Duetto remains above the radiant heat reflector which, in turn, is positioned externally, eliminating risks of contamination. The front and side access walls fold down, avoiding removal of the patient and permitting up to three professionals to work together in performing critical procedures.

In incubator mode, the hood is spacious and ergonomic, facilitating access and procedures, besides having a safe and stable microclimate, whose air filtration system has sufficient area to retain dirt and microorganisms, thus providing patients with a protective insulation and increasing the useful life of the filter. The Duetto 2386 has five oval hatches with non-toxic fittings; one silicone double tube insert at the unit head, for introducing and positioning the breathing circuits; and eight tube inserts on the four corners of the hood, which enable better positioning of tubes and cables in relation to the patient and sources, thereby avoiding folds, discomfort, disconnection and occasional contamination.

The bed of the Duetto 2386 is spacious and radio-transparent, made of non-toxic, plastic material, with external devices that facilitate operator access and reduce the need for contact with the patient and the equipment internal environment. It has a continuous and smooth operating system, with external manual adjustments for the Trendelenburg, reverse Trendelenburg and high horizontal positions, as well as 360° swivel movement.

● For more information, visit: *www.fanem.com.br*

GCX's smaller VHM-25 Support Arm brings greater flexibility, productivity to healthcare workflows



GCX Corporation, the worldwide leader in medical instrument and IT mounting solutions, introduces the VHM-25™ variable height support arm, a small-profile version of its best-selling VHM™ Series of variable height mounts.

The VHM-25 is available in various configurations to accommodate both IT and medical device mounting applications. Optional horizontal and angled 7-inch (17.8-cm) extension options provide longer reach, while continuing to hide cables internally for improved appearance and cleanability.

GCX created the space-saving, highly flexible design specifically for healthcare environments. The VHM-25 provides mounted devices 12 inches (30.5 cm) of height adjustment; in addition, devices may be pivoted from side to side, tilted at various angles, and rotated between portrait and landscape orientations.

The medical-grade VHM-25 offers healthcare institutions a support arm that's both easy to clean and durable. The seamless top surface is impervious to liquids, while the cast-aluminum housing will stand up to the rough handling and cleaning solutions that are normally applied in healthcare facilities.

GCX Corporation has been serving the healthcare industry exclusively with medical instrument and IT mounting solutions since 1971. Products are marketed directly to hospitals. GCX also has custom product development relationships with original equipment manufacturers. Major product lines include wall mounts, roll stands, ceiling mounts, counter top mounts, pole mounts, and more, along with a variety of mounting accessories. GCX mounting solutions feature space-saving, ergonomic designs to improve both equipment and patient access.

- For more information, visit: *www.gcx.com*
- Arab Health 2015 booth: 1 C59

Harloff introduces new 16-scope storage cabinet

Harloff's 16-scope storage cabinet – SC7836DRDP-16 – is a state of the art stationary cabinet that stores and dries up to 16 scopes. This cabinet features two fans and a HEPA filter for drying scopes. The SC7836DRDP-16 can be purchased with or without the HEPA filtration and drying fans. It accommodates colonoscopies, EUS scopes, TEE probes, bronchoscopes and cystoscopies.

It is constructed of sturdy, 18 gauge steel.

Features:

- Drying fans 100-240VAC Universal Input
- HEPA filter captures up to 99.97% of particles, 0.3 microns, exceeding AORN scope storage recommendations
- Holds up to 16 scopes in a secure stationary location
- Key locking tempered glass double doors
- Engineered to protect scopes and provide easy access
- Removable drip tray
- Scope arm height 60 inches (152 cm)

Assembled Cabinet Dimensions:

- 78.50"H x 36.10"W x 19.25"D (200 cm H x 92 cm W x 49 cm D)
- Cabinet net weight 260 pounds (118 kg)
- For more information, visit: *www.harloff.com*

Neusoft's new NeuViz 64-slice CT scanner

Neusoft Medical Systems Co., Ltd. (Neusoft Medical), a leading manufacturer of medical equipment and service, is a subsidiary of Neusoft Corporation, which is the largest IT solutions & services provider in China. Neusoft Medical has successfully launched its newest NeuViz 64 In/En 64-slice CT scanner. NeuViz 64 In/En is designed to care more, it's patient-oriented, technologist-oriented and radiologist-oriented. The gantry ring is designed to change colors to inform the patient what phase of the scan they are in. This keeps patients aware and informed, reducing anxiety. LCD navigation integrated into the gantry provides a real-time, accurate display of patient information, ECG and scanning parameters. Entertaining graphics amuse the patient and put them at ease, especially effective with pediatric patients. The bold new design of the control panels includes larger knobs which are easier to operate.

The features of NeuViz 64 In/En are as follows:

- Thoughtful design offers you a pleasant aesthetic enjoyment
- Unique Quad-Sampling Technology improves acquisition density and increases scanning speed
- Dose Platform combine with ClearView IR technology provide true ALARA images
- Robust cardiac applications change sophisticated examination to routine scan
- Powerful workstation eases your clinical application with seamless workflow
- For more information, *visit: www.neusoft.com*

Hearing aid and personal sound amplifier, headphones and wireless TV headset

More versatile than a TV headset, a sound amplifier will amplify and give clarity to conversations and voices for people that want to hear better or with greater listening comfort. A personal sound amplifier is also called an assistive listening device.

Personal amplifiers are not a hearing aid, prescribed by the audiologist. You can use personal amplifiers like the TEO and TEO First as a complement to hearing aids with a telecoil position using a neck-loop. One can also listen to the amplified sound with earphones or a headset.

Tinteo's headphones offer a high fidelity sound and balanced frequency response. Bass are present, but not overwhelming. Medium are clear. ABA 122 noise cancelling headphones reduce up to 85 % of the surrounding noise. This allows you to enjoy your music safely even while travelling (plane or train rides). You will not have to endanger your ears by listening loudly.

Tinteo's latest product, TEO Duo headset is a sound amplifier that doubles as a wireless TV headset.

Thanks to a small radio transmitter, the receiver gets the sound of your television. You will then listen using your earphones directly to the sound of the television. Transceiver distance is 30 metres indoors and a 100 metres outdoors. The 2.4 GHz radio technology used is secure and user-friendly: no frequency set-up or automatic pairing and no interferences.

- For more information, call (Dubai) +971 4 338 8316

Or email: *info@healthmart.ae*

Karl Storz's new VISITOR1 enables remote access to the OR

The Karl Storz VISITOR1® system is an intraoperative, mobile robotic communications platform that enables a physician to have remote access to the OR from their home, office, or within the hospital. The VISITOR1™ system is comprised of the Control Station and the VISITOR1 Robot. The Control Station and Robot are linked via the Internet over a secure broadband connection. While seated at the Control Station a trained surgeon can access the Robot to visit and consult with his/her patients and/or colleagues. The VisitOR1 makes "Telesurgical Communication Easy" and allows clinical experts to connect and collaborate in a seamless and effective manner. Clinicians on the remote end can dial in utilizing merely the internet and take full control of a robotic articulating head to interact with the surgical staff as if they were physically in the operating theatre.

It is designed to improve patient outcomes by connecting experts from around the globe to any hospital or clinic in an instant.

Key Features:

- Robotically control your own position in the OR for maximum visualization
- Share images and data files for improved collaboration
- Extend your interactive reach into the OR via laser pointing
- Highlight surgical nuances and consult through telestration
- Mobil access via tablet software
- For more information, visit: *www.karlstorz.com*

Konica Minolta's Sonimage HS1 Ultrasound System offers advanced level of Tissue Harmonics

Konica Minolta's Sonimage HS1 Ultrasound System was developed with the highest image quality as its first priority.

It is equipped with a newly developed high-frequency probe that allows for high sensitivity imaging along with an overall uniform image.

In addition to the new probe an advanced level of Tissue Harmonics was developed (Ultra-Broadband harmonics – Triad-THI), this technology is particularly ideal for use in areas such as orthopaedics, MSK, breast imaging and superficial imaging. Furthermore Sonimage HS1's unique Biopsy Needle Visualisation function reflects the needle tip clearly to ensure safer and more efficient interventional procedures.

Sonimage HS1 features a full touch screen, biaxial large monitor and responsive touch operation for ease of use and even allows for the system to be mounted on the wall of the ER or ambulances. The user interface can be efficiently customised to fit the user's needs and improve workflow. The portable cart enables Sonimage HS1 to be used wherever and whenever needed, adding to its functionality and a quick boot-up time of 15 seconds from standby mode makes sure that Sonimage HS1 is ready to go when you are.

With Sonimage HS1, Konica Minolta continues to contribute to medical imaging through innovative concepts and designs.

- For more information, visit: *www.konicaminolta.eu/healthcare*

Hill Rom's Progressa bed system promotes early patient mobility

Hill-Rom, a global leader in patient support systems introduces the Progressa™ bed system, an innovative intensive care technology designed to actively promote early patient mobility. Progressa is the first bed system to incorporate StayInPlace™ advanced articulation technology that helps keep patients in the optimal position during movements of the bed.

- Complications related to patient immobility include deep vein thrombosis, muscle atrophy and weakness, depression, pulmonary embolism, cardiac muscle atrophy, osteoporosis and constipation.[1,2,3,4,5]
- Many immobility-related complications are associated with prolonged hospitalization.

StayInPlace

Patient migration or sliding down in the hospital bed can lead to repetitive repositioning and increased lift burden for caregivers. Developed by Hill-Rom's ergonomic research labs, the StayInPlace advanced articulation technology matches the movement of the bed with the natural elongation of the spine that occurs when a patient moves from supine to upright positions. StayInPlace helps keep patients optimally positioned to minimize movement toward the foot of the bed as the head of bed is raised.

The Hill-Rom Progressive Mobility™ program is a complement to its mobility product portfolio and incorporates education and protocols to assist healthcare facilities in implementing early mobility therapy safely and efficiently.

■ For more information about early mobility, the Progressa bed system and the Hill-Rom Progressive Mobility program, visit *www.MobilityIsLife.com*

The DiaSpect hemoglobin analyser has measurement time of just 1 second

The new DiaSpect hemoglobin analyzer is the fastest and most convenient hemoglobin analyser available with a measurement result time of just 1 second! The palm-sized device combines laboratory quality performance with unmatched measurement speed and a 10,000 test battery life. The Reagent-free cuvettes can be stored for two and half years (even after opening), providing you with a reliable and highly portable analyser that can be used in almost any environment.

- For more information,
visit: *www.ekfdiagnostics.com*
- Arab Health 2015 booth: Z1 G30

Paxeramed to showcase imaging tech at Arab Health

Boston based PACS and RIS developer Paxeramed Corp. will showcase the next generation medical imaging technologies at Arab Health 2015 in Dubai designed to automate clients' workflow, elevate patient care and cut radiology department PACS costs.

The presented portfolio includes PaxeraUltima360, an enterprise-class data management system that consolidates medical image data from multiple imaging departments into a master directory and associated consolidated storage solution reaching radiologists, clinicians and patients.

The solution provides a single platform that offers anywhere anytime access to varied clinical data and enables study retrieval to relevant, prior exams that might have been done at other facilities through XDS and HIE sharing. PaxeraUltima-360 can manage both DICOM and non-DICOM data and features a smart-streaming technology – the fastest in the industry – allowing almost-instant study viewing and enables users to stay connected to the data from high or low bandwidth.

Designed with productivity in mind the system offers the ability to browse and query from dispersed PACS systems, as well as smart hanging protocols, advanced visualization, patient history timeline and a zero footprint viewer for any browser or mobile device. The patient-centric solution benefits users from having a single place to collect, store, share, and manage health data.

Advanced tools such as PaxeraPACS-Collaboration-Modules (PPCM) includes Instant Messaging, Peer Review, ED Discrepancy, Critical Results and Messaging Center allow specialists to group chat, share studies, consult with each other and offer real-time collaboration without leaving the unified PACS interface. The all-encompassing tools enhance the workflow and help facilities to provide effective and efficient care.

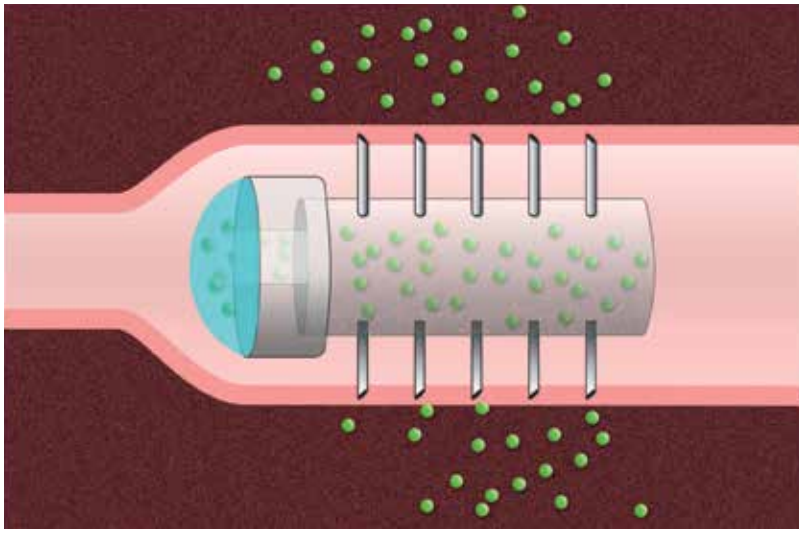
PaxeraUltima-360 incorporates a vendor-neutral Universal Viewer that offers a powerful new way to access different file formats quickly regardless of the file or study size. Paxera Universal Viewer helps clinicians make more informed decisions through multi-ology, multi-site reading and enables users to stay connected to the data and information they need from any browser or mobile device.

■ For more information,
visit: *www.paxeramed.com*
■ Arab Health 2015 booth:
US Pavilion Z4 G28

New drug-delivery capsule may replace injections

Given a choice, most patients would prefer to take a drug orally instead of getting an injection. Unfortunately, many drugs, especially those made from large proteins, cannot be given as a pill because they get broken down in the stomach before they can be absorbed.

To help overcome that obstacle, researchers at Massachusetts Institute of Technology (MIT) and Massachusetts General Hospital (MGH) in the United States have devised a novel drug capsule coated with tiny needles that can inject drugs directly into the lining of the stomach after the capsule is swallowed. In animal studies, the team found that the capsule delivered insulin more efficiently than injection under the skin, and there were no harmful side effects as the capsule passed through the digestive system.



Christine Daniloff/MIT, based on images by Carol Schoellhammer and Giovanni Traverso

A schematic drawing of a microneedle pill with hollow needles. When the pill reaches the desired location in the digestive tract, the pH-sensitive coating surrounding the capsule dissolves, allowing the drug to be released through the microneedles.

"This could be a way that the patient can circumvent the need to have an infusion or subcutaneous administration of a drug," says Giovanni Traverso, a research fellow at MIT's Koch Institute for Integrative Cancer Research, a gastroenterologist at MGH, and one of the lead authors of the paper, which appears in the *Journal of Pharmaceutical Sciences*.

Although the researchers tested their capsule with insulin, they anticipate that it would be most useful for delivering biopharmaceuticals such as antibodies, which are used to treat cancer and autoimmune disorders like arthritis and Crohn's disease. This class of drugs, known as "biologics", also includes vaccines, recombinant DNA, and RNA.

"The large size of these biologic drugs makes them nonabsorbable. And before they even would be absorbed, they're degraded in your GI tract by acids and enzymes that just eat up the molecules and make them inactive," says Carl Schoellhammer, a graduate student in chemical engineering and a lead author of the paper.

Safe and effective delivery

Scientists have tried designing microparticles and nanoparticles that can deliver biologics, but such particles are expensive to produce and require a new version to be engineered for each drug.

Schoellhammer, Traverso, and their colleagues set out to design a capsule that would serve as a platform for the delivery of a wide range of therapeutics, prevent degradation of the drugs, and inject the payload directly into the lining of the GI tract. Their prototype acrylic capsule, 2 cm long and 1 cm in diameter, includes a reservoir for the drug and is coated with hollow, stainless steel needles about 5 mm long.

Previous studies of accidental ingestion of sharp objects in human patients have suggested that it could be safe to swallow a capsule coated with short needles. Because there are no pain receptors in the GI tract, patients would not feel any pain from the drug injection.

To test whether this type of capsule could allow safe and effective drug delivery, the researchers tested it in pigs, with insulin as the drug payload. It took more than a week for the capsules to move through the entire digestive tract, and the researchers found no traces of tissue damage, supporting the potential safety of this novel approach.

They also found that the microneedles successfully injected insulin into the lining of the stomach, small intestine, and colon, causing the animals' blood glucose levels to drop. This reduction in blood glucose was faster and larger than the drop seen when the same amount of insulin was given by subcutaneous injection.

"The kinetics are much better, and much faster-onset, than those seen with traditional under-the-skin administration," Traverso says. "For molecules that are particularly difficult to absorb, this would be a way of actually administering them at much higher efficiency."

Further optimization

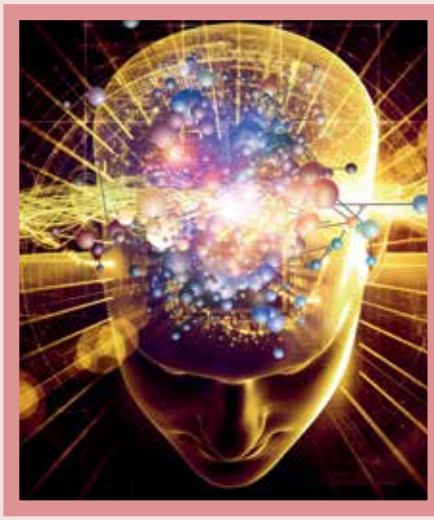
This approach could also be used to administer vaccines that normally have to be injected, the researchers say.

The team now plans to modify the capsule so that peristalsis would slowly squeeze the drug out of the capsule as it travels through the tract. They are also working on capsules with needles made of degradable polymers and sugar that would break off and become embedded in the gut lining, where they would slowly disintegrate and release the drug. This would further minimize any safety concern. MEH

Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
January 2015		
Congress of the International Academy of Legal Medicine & Exhibition	19 – 21 January, 2015 Dubai, UAE	*http://www.ialmdubai.ae/*
IMTEC Oman 2015	19 – 21 January, 2015 Muscat, Oman	*http://www.imtecoman.com/*
9th Annual Healthcare Insurance Forum	25 – 28 January, 2015 Dubai, UAE	*www.healthcareinsurance.informa-mea.com/*
Arab Health	26 – 29 January, 2015 Dubai, UAE	*www.arabhealthonline.com*
The International Conference On Infectious Disease	26 – 27 January, 2015 Jeddah, KSA	*www.waset.org/conference/2015/01/jeddah/ICID*
Qatar International Pain Conference	29 – 31 January, 2015 Doha, Qatar	*www.qipc.hamad.qa/en*
ICPPS 2015: XIII International Conference on Pharmacy and Pharmaceutical Sciences	30 – 31 January, 2015 Dubai, UAE	*www.waset.org/conference/2015/01/dubai/ICPPS*
February 2015		
Oman International Medical Conference	6 – 8 February, 2015 Muscat, Oman	*www.oimc.om/2015*
5th International Conference on Obstetrics, Feto-Maternal & Therapy, "PRESENT INNOVATIONS"	13 – 14 February, 2015 Dubai, UAE	*http://www.fetalmedicine.ae*
7th International Conference on Drug Discovery and Therapy	16 – 19 February, 2015 Dubai, UAE	*http://www.icddt.com/home.php*
UAE International Dental Conference & Arab Dental Exhibition – AEEDC	17 – 19 February, 2015 Dubai, UAE	*http://aeedc.com/*
Arab Paediatric Medical Congress 2015	26 – 28 February, 2015 Dubai, UAE	*www.arabpaediatriccongress.com*
Fetal Medicine, Paediatric Gastro, Hepatology & Nutrition Conference	26 – 28 February, 2015 Abu Dhabi, UAE	*www.atndit/18087-0*
Fetal Medicine, Paediatric Gastro, Hepatology & Nutrition Conference	26 – 28 February, 2015 Abu Dhabi, UAE	*www.atndit/18087-0*
March 2015		
Ajman HealthCare Summit	5 – 7 March, 2014 Ajman, UAE	*http://ahs-ajman.com/index.html*
Dubai Anaesthesia	5 – 7 March, 2015 Dubai, UAE	*www.dubaianaesthesia.com*



Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
DUPHAT 2015	8 – 10 March, 2015 Dubai, UAE	*www.duphat.ae*
QMED 2015	9 – 11 March, 2015 Doha, Qatar	*www.qmedexpo.com* *national@qmedexpo.com* *international@qmedexpo.com*
2015 Gulf Thoracic	11 – 14 March, 2015 Dubai, UAE	*www.saudithoracic.com*
2015 Pan Arab Interventional Society Annual Scientific Meeting	12 – 14 March, 2015 Dubai, UAE	*www.PAIR2015.com*
Kuwait Medica 2015	16 – 18 March, 2015 Kuwait City, Kuwait	*gracy@kuwaituniversal.com* *www.kuwaitmedica.com*
Dentistry 2015	18 – 20 March, 2015 Dubai, UAE	*contact@omicsgroup.com* *www.dentistry2015* *conferenceseries.net*
2nd International Conference and Exhibition on Rhinology & Otology	18 - 20 March, 2015 Dubai, UAE	*http://otolaryngology.* *conferenceseries.net/*
4th International Conference on Vitamin D deficiency	19 – 20 March, 2015 Abu Dhabi, UAE	*www.atnd.it/18549-0*
5th Emirates Haematology Conference 2015	19 – 21 March, 2015 Dubai, UAE	*http://ehc-uae.com/*
IECM Dubai 2015	24 – 26 March, 2015 Dubai, UAE	*osman.khalil@index.ae* *www.emergency.ae*
ABILITIESme 2015	24 – 26 March, 2015 Abu Dhabi, UAE	*jamesmeltz@dmgeventsme.com* *www.abilitiesme.com*
PACD19 – The 19th Pan Arab Conference on Diabetes	24 – 27 March, 2015 Cairo, Eqypt	*www.arab-diabetes.com*
IFM 2015	25 – 27 March, 2015 Dubai, UAE	*index@emirates.net.ae* *www.ifm.ae*
ExpoMED Eurasia 2015	26 – 29 March, 2015 Istanbul, Turkey	*www.expomedistanbul.com* *expomed@reedtuyap.com.tr*
2nd Gulf Liver Summit	27 – 28 March, 2015 Dubai, UAE	*http://2ndgulfliver.* *infoplusevents.com/*
OBS-GYNE 2015	29 – 31 March, 2015 Dubai, UAE	*obsgyne@informa.com*

List your conference:
If you have upcoming conference/exhibition details which you would like to list in the agenda, please email the details to the editor: *editor@MiddleEastHealthMag.com*

Special features* in the next issue of *Middle East Health*:

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- Imaging – Ultrasound
- Anaesthesia and Intensive Care

Plus

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- Worldwide Monitor
- The Laboratory
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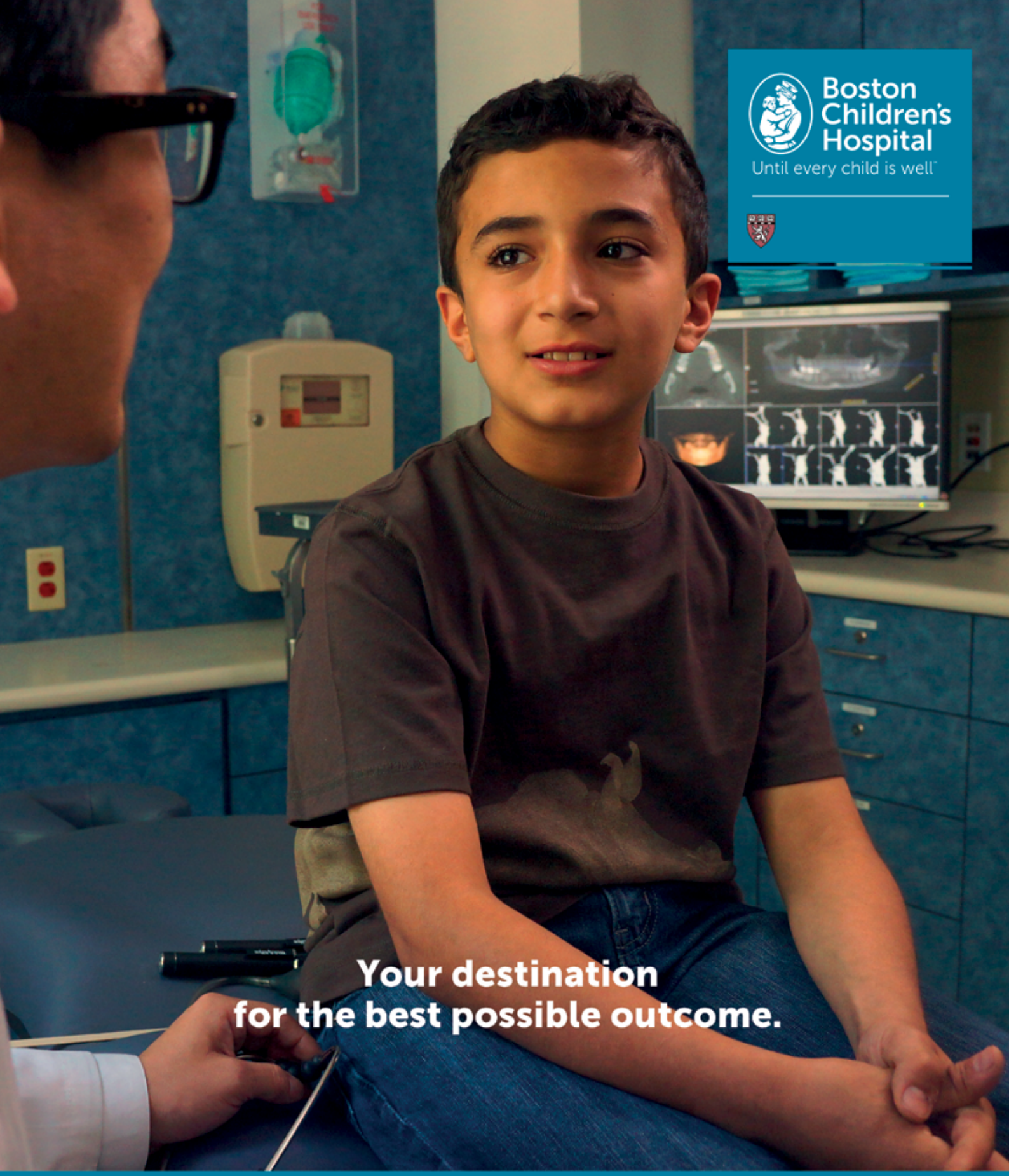
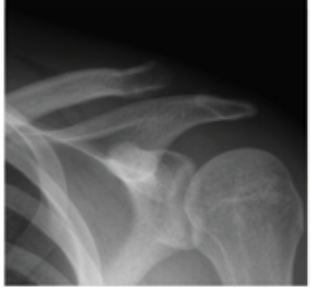
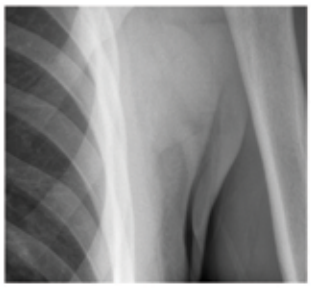


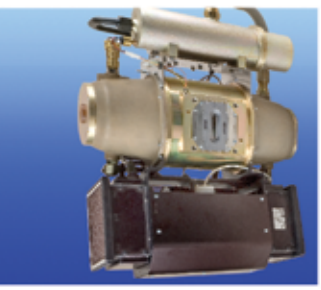
BEST CHILDREN'S HOSPITALS U.S.News HONOR ROLL 2014-15

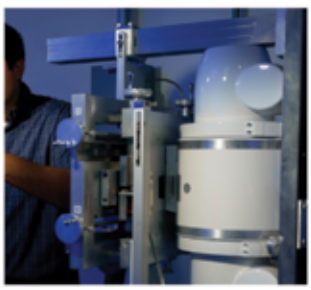
TOGETHER WE'RE #1. Collaborating with Boston Children's Hospital puts the resources of a world-class hospital to work for you and your patients. Every year, our dedicated staff treats 170,000 children from over 100 countries, and we were recently awarded more #1 rankings than any other pediatric hospital in the United States by *U.S.News & World Report*.

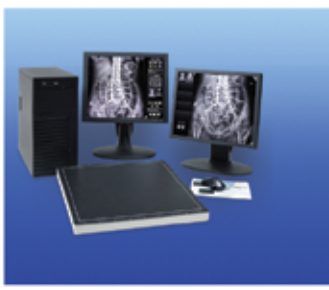
Call +1-617-355-5209 or visit bostonchildrens.org/internationalreferral











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