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March-April 2014

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## Retooling healthcare in the Arab world

Arab Spring complicates  
changing demands

### Anaesthetic safety concerns

Large study shows increased risk  
of mortality with Etomidate use

### Breast cancer

Study shows Magnetic Resonance Imaging  
Using Ultrasound better for diagnosis

### On the frontline

MERS-Coronavirus kills  
Saudi, UAE health workers

#### In the News

- Medical university, teaching hospital for Dubai Silicon Oasis
- Saudi Aramco, Johns Hopkins Medicine in joint venture
- Mafraq Hospital publishes region's first *Atlas of Hematology*
- Measles deaths reach record lows
- New Global Atlas calls for improved palliative care





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# Prognosis

## Open for business

Speaking to medical device manufacturers and healthcare industry service suppliers from around the world at the Arab Health expo in January it was interesting to hear their perspective on doing business in the region. Generally it looks like 2014 is going to be a good year for business, particularly for those involved in the Saudi market. In a massive infrastructure development programme, the Saudi government is continuing to build many new hospitals across the vast desert kingdom, including a number of extensive medical cities. In the private sector there are a number of large, multi-billion dollar, multifaceted infrastructure projects being developed, some of which have healthcare as an anchor project within the development. This points to a massive growth in demand for all kinds of healthcare devices, healthcare IT solutions and hospital management partnerships in the kingdom. It is clear this is the market to be focussed on in this region.

Iraq, too, has massive potential and some companies are bravely venturing into this market, although insecurity continues to plague swathes of the country. Irbil in the north is the exception and appears to have found stability. With huge oil wealth, the government has the funds and is trying to rebuild its healthcare infrastructure. Nonetheless, it remains a place where 'fortune will favour the brave'.

In this issue we publish an interesting article which looks at research from the American University of Beirut on the effect the Arab Spring has had on shifting demands in the regional healthcare sector. It notes that health services in the Arab world are being forced to retool in the face of changing healthcare needs and chronic diseases linked to rising prosperity and ageing populations, even as the region grapples with political turmoil and uncertainty.

And in other news affecting the region, we run a report on the Jeddah Declaration in which Islamic scholars state that Islamic communities must provide safe access for health workers who are vaccinating children against polio. This is an important issue as in several parts of the Arab world, communities, out of fear and ignorance, have blocked, assaulted and even killed health workers who were trying to provide vaccinations for polio. Hopefully this Declaration will go some way to improving the situation.

As always there is more news, new product reviews and interviews in this issue.

Callan Emery

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# middle east monitor

Update from around the region



## 50 doctors complete residency training in SEHA medical facilities

Fifty doctors, the majority Emiratis, completed their residency period of training in Abu Dhabi Health Services SEHA medical facilities as part of SEHA's annual training.

Dr Ali Abdul Kareem Al Obaidli, Group Chief Academic Affairs Officer Corporate Academic Affairs of the SEHA, handed over certificates to the graduate doctors who participated in the session.

The doctors practiced at Sheikh Khalifa Media City, Mafraq, Tawam, and Al Ain hospitals.

At the awards ceremony, Rashed Al Qubaisi, Executive Director of SEHA said that those doctors who completed their residency training in the SEHA hospitals will have a prominent role in the future of Abu Dhabi health care.

He added that SEHA's goal behind the residency programs for physicians is to increase the number of Emirati doctors working in the health sector in Abu Dhabi.

## Report claims Average Age of Death in MENA up by 30 Years

A recent report (*The Global Burden of Disease: Generating Evidence, Guiding Policy, Middle East and North Africa edition, 2013*) notes that over the past 20 years the average age of death in the Middle East and North Africa region has increased by up to 30 years. In addition to this, overeating now causes more health issues than hunger, with chronic diseases such as diabetes rising due to high blood pressure, poor diet, smoking and lack of physical activity. Findings of the paper were presented at the Arab Health Exhibition & Congress in January.

Globally, people are living longer than ever before, the population is getting older, and the decline in child mortality and the number of people around the world is growing. However, living longer does not mean that people are living healthier, they are simply living to an older age but are experiencing more ill health.

"The data has clearly shown that the Arab world has made dramatic progress in reducing mortality and prolonging life. Over the last 20 years, premature death and disability for most communicable, newborn, nutritional, and maternal causes have decreased, with the exception of HIV/AIDS," said Dr Ali Mokdad, Director of Middle Eastern Initiatives and Professor of Global Health at the Institute for Health Metrics and Evaluation at the University of Washington, and co-creator of the report.

"Despite these improvements, a substantial disease burden from contagious communicable, newborn, nutritional, and maternal causes persists in the low-income countries of the Arab World."

The inspiration of the report came from the understanding that policy makers lacked comprehensive and standardized data on diseases, injuries and potentially preventable risk factors for decision-making. While trends in the MENA region were largely consistent with global patterns, certain non-communicable diseases were much more prominent causes of premature death and disability in the region compared to the world as a whole.

## Medical university and teaching hospital to be built at Dubai Silicon Oasis

Dubai Silicon Oasis (DSO), the integrated free zone technology park, in January announced its plans to host a hospital and medical university project developed by Saudi Arabia's Dr Soliman Fakeeh Hospi-

tal (DSFH), in an effort to contribute to academic advancement and extend quality medical services to support the local healthcare industry.

The agreement was signed at the DSOA headquarters by Dr Mohammed Al Zarooni, Vice-Chairman and CEO of DSOA, and Dr Mazen Fakeeh, President and Chairman of the Board of Dr Soliman Fakeeh Hospital. Estimated to be built at a cost of AED1 billion (about US\$272 million) across 150,000 square metres, the project titled 'The University Hospital', will be constructed in two phases. The hospital is expected to be completed by mid-2017, followed by the medical college in 2019.

The DSO-based hospital is expected to create 4,000 new jobs.

The 300-bed teaching hospital will focus on family healthcare and patient-centred services, targeting the growing community of residents in DSO as well as neighbouring areas. The hospital will be equipped to offer secondary and tertiary medical services supported by comprehensive diagnostic centres. It is expected to cater to around 700,000 patients per year, with an estimated 40,000 admissions and 20,000 surgical operations.

The proposed hospital will also function as a full-service medical institution, provisioned with centres of excellence in medical and surgical sub-specialties; mother and child health; cardiology and spine surgery; plastic and cosmetic laser surgery, as well as obesity management.

Named after its patron institution, the Fakeeh Medical University has been designed to complement the new hospital's unique academic care delivery setup and will be equipped with cutting-edge technology and state-of-the-art medical care simulation facilities.

Fakeeh Medical University will partner with local universities, including the Rochester Institute of Technology in DSO; American University of Sharjah; Al Ain University and Dubai Academic City, to help foster collaboration among medical students, researchers and clinical care providers.



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(R to L) Dr Mohammed Al Zarooni and Dr Mazen Fakeeh sign an agreement to build a medical university and teaching hospital at Dubai Silicon Oasis

The University Hospital, along with the Fakeeh Medical University will look to offer theoretical and practical instruction in varied fields, including medicine, nursing, laboratory sciences, radiology, physiotherapy, dentistry, clinical pharmacy, as well as health policy and management. The project will also include a research and development centre for basic sciences in order to develop medical innovations and best practices in the region.

Commenting on this agreement, Dr Mohammed Al Zarooni, said: “The move to host the hospital and the medical university in DSO is in accordance with the directive of His Highness Sheikh Mohammad Bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, to develop the medical tourism industry in the emirate. The initiative is also a step forward in the implementation of the strategy of the Executive office to make Dubai a hub for medical tourism.”

“Recent statistics shows that the number of medical tourists receiving treatment is estimated to increase by 15 per cent each year. Additionally, healthcare spending in the UAE is expected to reach AED40 billion by 2015, while medical tourists are set to cross the 20 million mark for the same period.”

Dr Mazen Fakeeh, President and Chairman of the Board of Dr Soliman Fakeeh Hospital, said: “In our long-standing experience with healthcare services in Saudi Arabia, we have seen, experienced and treated various illnesses that are peculiar to this region. Our guiding motto is to utilise and impart the knowledge gained over the

years in the field to bring about a marked improvement in health services for residents here. By extending our reach to Dubai from our new premises at the high-tech park, we hope to provide our quality healthcare to a wider

cross-section of GCC residents.

“We have taken special care to optimally design the hospital for the convenience of patients. Our trained staff is qualified to provide the best in quality treatments across a range of specializations. As one of the few teaching hospitals in the UAE, we hope to train and enhance the supply of healthcare professionals, who can take their rightful place in the country’s medical resource pool,” Dr Mazen added.

### Medtronic relocates regional HQ to Dubai

Medtronic, a global medical technology company providing therapies to treat cardiac and vascular diseases, diabetes, neurological and spinal conditions, announced in January that it will relocate its regional Middle East and Africa (MEA) headquarters to Dubai.

The company will relocate all its regional operations to TECOM Investment’s DuBiotech. DuBiotech is a freezone dedicated to facilitating and fostering growth of the life sciences industry in the United Arab Emirates.

The company said in a statement it has selected Dubai for its infrastructure, accessibility and its strategic location as a gateway to other markets in the MEA region.

### Saudi Aramco, Johns Hopkins Medicine in joint venture

Saudi Aramco and Johns Hopkins Medicine on January 28 this year inaugurated a first-of-its-kind health care joint venture in Dhahran, Saudi Arabia. The new company, Johns Hopkins Aramco Healthcare Company, was due to begin operations on February 1.

Saudi Aramco is a fully integrated global energy and chemicals enterprise in Saudi Arabia and Johns Hopkins Medicine is a

leading US academic health system with extensive experience in healthcare delivery worldwide. The healthcare joint venture will bring together Saudi Aramco’s long established health care delivery system and its approximately 350,000 beneficiaries and the world-renowned clinical, educational and research expertise of Johns Hopkins Medicine.

Johns Hopkins Aramco Healthcare will deliver high-quality health care to Saudi Aramco’s employees and their families.

“This partnership will result in a comprehensive transformation to further enhance our healthcare standards, and marks the beginning of a new level of care with new lines of treatment, new and enhanced specialties and subspecialties. It will also enable new forays into research and medical education as well as create opportunities for education and training of medical staff,” said Abdulaziz F. Al-Khayyal, Senior Vice President of Industrial Relations at Saudi Aramco.

Johns Hopkins Aramco Healthcare is expected to fuel clinical innovation, serve as a model in the provision of health care and contribute to the development of the health care industry in alignment with Saudi Aramco’s commitment to enabling growth, opportunities and diversification within the Kingdom’s economy.

On a broader time scale, Johns Hopkins Aramco Healthcare will seek to improve population health through scientific innovation, clinical care, and training of clinicians, nurses and health care professionals.

“Together, we will be greater than the sum of our parts, because this joint venture combines Saudi Aramco’s existing health system with the transformative science, clinical care and education that Johns Hopkins is known for,” said Paul B. Rothman, M.D., dean of the medical faculty and CEO of Johns Hopkins Medicine. “Johns Hopkins Aramco Healthcare will become an incubator for clinical and scientific progress and will address some of the region’s most pressing health challenges, including cardiovascular disease, diabetes and other chronic conditions, which are on the rise worldwide.”

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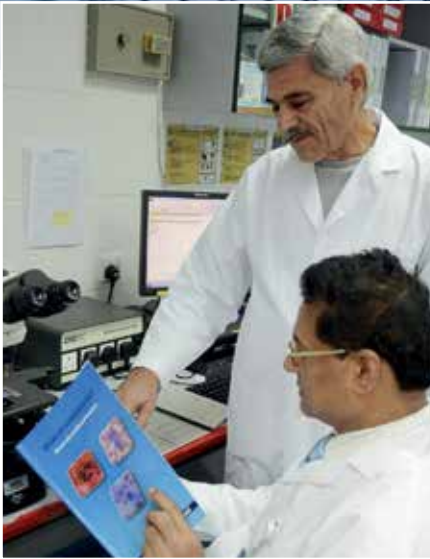
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Mohammad Kazemi (standing), Senior Medical Laboratory Technologist, Mafraq Hospital, shows off the new *Atlas of Hematology*

### Mafraq Hospital publishes region's first *Atlas of Hematology*

At the 5th Annual SEHA Research Conference held in Abu Dhabi recently, SEHA (Abu Dhabi Health Services Company PJSC) honoured Mafraq Hospital's Senior Medical Laboratory Technologist, Mohammad Kazemi, for publishing the Middle East's first '*Atlas of Hematology*'. Mafraq Hospital is owned and operated by SEHA.

The *Atlas of Hematology* includes four parts: red blood cells series, white blood cells series, megakaryocytes series and blood parasites. It contains 201 high-quality coloured illustrated blood slides which cover almost all morphological abnormalities of blood cells and pathogen blood parasites. The book also includes normal reference ranges, differential diagnosis, comparison tables and troubleshooting.

The *Atlas* has been acknowledged by the Higher College of Technology (HCT) as a resource of teaching for a profession in medical laboratory students. "This reference serves as an excellent resource to supplement and complement the theoretical training component of preparing students for a profession in Medical Laboratory Technology (Hematology)," said Dr Kathleen Meehan, Associate Dean – Health Sciences at HCT, Abu Dhabi.

The *Atlas of Hematology* has been compiled and edited by Mohammad Kazemi. Commenting on the initiative, Kazemi said: "This *Atlas* is the result of collaborative efforts. It is part of Mafraq Hospital's ongoing efforts to improve healthcare services and standards in Abu

Dhabi. To that end, our objective was to gather our collective experience and put together trusted and practical content for medical students, researchers, physicians and paramedical professionals locally, as well as internationally."

### International meeting in Doha looks at latest research in cancer immunotherapy

Sidra Medical and Research Center in Doha and the Society for the Immunotherapy of Cancer (SITC) hosted the "Updates on Immunotherapy of Cancer and Immunoscore" event in January, with leading authorities in oncology and immunotherapy traveling to Doha to share the latest research on novel cancer treatments, which use the body's own protective response.

Immunotherapy uses the immune system's T-cells to find and kill cancerous cells while avoiding the damage to healthy tissue commonly caused by many of the current forms of treatment, such as radiation therapy, chemotherapy and surgery.

"Our immune system is elegantly structured to recognize self from non-self, vigorously attacking cells deemed foreign. The goal of cancer immunotherapy is to understand these mechanisms and to promote anti-tumour immune responses. Genetics and disease risk assessment will be one of the Centers of Excellence at Sidra and we look forward to continuing our relationship with SITC and other international institutions in the immunotherapy arena to bring personalized treatments to patients," said Sidra's Chief Research Officer and SITC President, Dr. Francesco Marincola.

Speakers debated the latest research advances, focusing on currently approved and emerging tumor immunotherapy approaches, as well as the latest country updates on the initiative Immunoscore, which is an effort to change international practice around cancer prognosis for patients. The Immunoscore initiative advocates incorporating immune scoring as a prognostic factor and introducing this parameter as a marker to classify cancers as part of the routine diagnostic and prognostic assessment of tumours. As such, SITC, with the help of lead investigator Jérôme Galon, PhD from INSERM's Cordeliers Research

Center in France, initiated a worldwide task force to validate this practice.

Dr Galon pointed out: "This is the first worldwide effort to introduce a standardized immune test into cancer classification. This is a novel paradigm for cancer with major implications for immunotherapy."

### Sheikh Khalifa Medical City awarded ISO 20000 for IT Service Management

Sheikh Khalifa Medical City (SKMC), the flagship institute in Abu Dhabi's SEHA's healthcare system, has been awarded ISO/IEC 20000-1:2011 (ISO 20000) certification, the highest international standard for IT service management.

The hospital was awarded the accreditation following a rigorous auditing process carried out by the British Standards Institution (BSI) to ensure that SKMC's IT service management systems operate to the highest possible standards.

"Obtaining this certification is a reflection of our commitment to on-going improvement, knowledge sharing and innovation within SKMC. This is the result of the great teamwork of all colleagues in the IT department as well as the support from SEHA. It is with great delight that we accept the prestigious certificate from BSI, which further consolidates our efforts to enhance the quality of services we provide," said Ahmad Yahya, Acting Chief Information Officer at SKMC.

ISO 20000 is the first global standard that specifically targets the IT Service Management with an integrated set of management processes for effective delivery of services. The standard adopts a process approach for establishing, implementing, operating, monitoring, reviewing, maintaining and improving an organisation's IT Service Management System.

### Sharjah's Al Qassimi Hospital performs first cochlear implant

A five-year-old girl underwent a life-changing surgery in late January at Al Qassimi Hospital in Sharjah to treat her deafness, in cooperation with Sharjah City for Humanitarian Services (SCHS). Mozan, a Sudanese national, was one



Surgeons perform the first cochlear implant at Al Qassimi Hospital in Sharjah

of two patients to undergo the first cochlear implant surgeries, which officially launched the cochlear implant program at the Al Qassimi Hospital.

Dr Abdulla Ibrahim, Head of ENT Department at Al Qassimi Hospital said: “The cochlear implant surgeries performed are a major step forward for Al Qassimi Hospital to offer severely hearing impaired and deaf patients an attainable chance to successfully regain their hearing. Expanding our ENT Department and offering the latest technology of hearing implants in combination with the highest quality standards in surgery and aftercare will position Al Qassimi as one of the leading hospitals in the UAE, and the region, to perform successful cochlear implant surgeries.”

Mozan received a Concerto cochlear implant from MED-EL, one of the world’s leading providers of hearing implant systems. The device directly stimulates the hearing nerve. It is the world’s smallest titanium cochlear implant, which makes it perfect for children.

The surgery was performed in close cooperation with Prof. Dr. Abdulrahman Hagr, a leading surgeon from Riyadh, Saudi Arabia, and he added: “The surgery for Mozan took less than two hours and was performed only after comprehensive testing to ensure that this cochlear implant is the perfect choice for Mozan. The surgery was minimally invasive and full recovery usually takes only a couple of days. As with Mozan’s case, the earlier the surgery is performed on a child, there is a better chance of success in regaining or activating their hearing. The longer the patient waits, the rate of success decreases because the most critical period for speech and language development is in the early years of childhood.”



Dr Karsten Suhre, Professor of Physiology and Biophysics at WCMC-Q

### Researchers at WCMC-Q and HMC discover new quick test for diabetes

A discovery by researchers at WCMC-Q and HMC could lead to a quick, non-invasive screening test for diabetes, allowing sufferers who don’t know they have the disease to access treatment quicker.

Currently, doctors test for diabetes using either blood or urine analyses. But these are inconvenient and not suitable for a comprehensive public screening program as they generally have to be carried out by a nurse or doctor.

Now researchers at Weill Cornell Medical College in Qatar (WCMC-Q) and Hamad Medical Corporation (HMC) have discovered a way of testing for diabetes using a swab of an individual’s saliva. The discovery means that samples could easily be taken in schools or sports associations, or even during regular visits to the dentist, making the implementation of diabetes screening programs – and thus early intervention - much more viable.

Dr Karsten Suhre, Professor of Physiology and Biophysics at WCMC-Q, said it is vitally important to diagnose patients who have diabetes as early as possible to allow them to access treatment, and the saliva test is one way of expediting that.

The researchers have discovered that people with diabetes have a reduced amount of 1,5-anhydroglucitol (1,5-AG) in their saliva. This is a substance similar to sugar. Scientists have long known that 1,5-AG can be used as a biomarker for diabetes in blood but the discovery by WCMC-Q and HMC enables a test for it to be done via a simple swab of the mouth, which greatly increases its potential importance as a quick, non-invasive test for diabetes.

The study was conducted by researchers in Qatar and involved 369 people, approxi-

mately half of whom were Arabic, and half Asian. It is the first time that a new research technique called metabolomics has been used in a diabetes study of this size on saliva, plasma, and urine samples in parallel.

The study was due to be published in the *Journal of Clinical Endocrinology & Metabolism*.

### Agfa workshop highlights new imaging, clinical information tech

Agfa HealthCare recently held a workshop in the United Arab Emirates to highlight new technologies that enable healthcare providers to view multidisciplinary image information by unifying the patient record across departments and create a true longitudinal patient-imaging record.

Mike Reagin, CIO of Cleveland Clinic Abu Dhabi (CCAD), presented the significant technical challenges of a modern multi-site healthcare organization and explained how they were able to build a highly advanced medical imaging network.

They are able to do this with Agfa’s ICIS (Imaging Clinical Information System), an enterprise clinical IT platform that provides a comprehensive view of multidisciplinary patient imaging records. It unifies the patient record across regions, facilities and departments, creating a true longitudinal patient-imaging record, and allows data sharing across hospitals, whether or not the same vendor delivered their individual PACS.

Jean-Pierre Slabbaert, Agfa HealthCare’s Director of Information Technology for the Export region, remarked: “The ICIS technology enables healthcare providers to create, collaborate, exchange, and manage a comprehensive medical imaging record through the continuum of care. It is a solution that lets hospitals go beyond the borders of a single, individual department, enhancing care collaboration.”

The Agfa-Gevaert Group, headquartered in Mortsel, Belgium, is one of the world’s leading companies in imaging and information technology. Agfa develops manufactures and markets analogue and digital systems for the printing industry (Agfa Graphics), for the healthcare sector (Agfa HealthCare), and for specific industrial applications (Agfa Materials). 

# worldwide monitor

## Update from around the globe

### New oncology imaging database promotes wider access to data

Curie-Cancer, the body responsible for developing Institut Curie's industry partnership activity, and Strand Scientific Intelligence, (Strand) have launched the Curie Image Database (CID), a breakthrough image analysis and management platform that they developed jointly over the past two years at the Cell and Tissue Imaging Core Facility of the Institut Curie (Pict-IBiSA).

CID was created using Strand's award-winning Avadis platform. It now enables over 250 scientists at Institut Curie and 10 other collaborating institutions across Europe to effectively manage heterogeneous imaging data and complex analysis workflows. CID (or Avadis iMANAGE outside the Institut Curie network) provides shared, secure and open access to image life cycle data as well as image analysis algorithms.

"Institut Curie's expertise in advanced imaging platforms and Strand's ability to engineer superior scientific software have come together to create a scalable, secure and efficient 'open access' platform for microscopy images and analysis algorithms," says Professor Vijay Chandru, co-founder and CEO of Strand. "We are excited by the launch of this platform at the world's leading cancer research institute. Strand has built an advanced genome sequencing-based diagnostic platform for oncology. Going forward we would like to explore with Institut Curie an advanced decision support platform for oncologists that integrates genomic signatures of cancers and imaging data towards better diagnosis and treatment of cancer patients."

Jean Salamero, scientific director of Cell and Tissue Imaging Core Facility at Curie-Cancer, said: "Our goal was not only to provide an image 'management' system but also an interactive research tool that allows data and analysis sharing for distant and multidisciplinary projects between teams from different labs and institutes that is able to handle the exponential growth and complexity of scientific and biomedical images generated by advanced microscopy systems.

"Funding through the France Bio-Imaging program and Cancerpole-IdF, a

French network of institutions dedicated to oncology, allowed us to link CID to a new and secure storage infrastructure and to promote access to image processing on dedicated clusters. Going forward, we would like to integrate this image database with other types of data, like genomic data or clinical and anatomy-pathological data related to clinical projects, resulting in an even more effective weapon in our fight against cancer."

Damien Salauze, director of Curie-Cancer, said: "Such a partnership project may ultimately help with the treatment of cancer. We are delighted to have contributed to the implementation of this technology developed by an international SME like Strand, whose roots are in India.

"This partnership embodies the principles of the Institut Carnot label which we were awarded by the French government in 2011 in recognition of our drive to provide genuine solutions for industry and ultimately for patients."



Cell and Tissue Imaging

<http://pict-ibisa.curie.fr/>

### 10 countries to benefit from GAVI Alliance HPV vaccination campaign

An estimated 206,000 girls in 10 developing countries are expected to benefit from the introduction of human papillomavirus (HPV) vaccine, which protects against the leading cause of cervical cancer, announced the GAVI Alliance on World Cancer Day.

The latest round of approved HPV vaccine introductions will see 10 countries begin targeted demonstration projects. The new approvals bring the total number of countries lined up to receive GAVI support for HPV vaccine to 21.

"HPV vaccine offers the best hope at protecting young girls from cervical cancer, one of the leading cancer killers of women in low-income countries," said Dr Seth Berkley, GAVI Alliance CEO. "Current estimates show that by 2035 cervical cancer could claim the lives of 416,000 women each year, most of them living in developing countries. The good news is that since GAVI began supporting HPV

last year, there has been a real surge in demand for this vaccine. Our goal is to ensure that the vaccine reaches girls no matter where they live."

The ten countries planning to implement HPV vaccine demonstration projects over the next three years are Benin, Burundi, Cameroon, Cote d'Ivoire, Gambia, Liberia, Mali, Senegal, Solomon Islands, and Togo.

Three doses of the vaccine will be administered to girls in schools over a six month period while out-of-school girls will be reached through health facilities and community outreach programmes.

The demonstration projects provide countries with an opportunity to gain experience in reaching girls with vaccines outside the usual routine immunisation schedule and to make informed decisions about whether to apply for a national introduction. The wide reach of the immunisation programmes also provides an opportunity for countries to implement other health interventions that may benefit young adolescent girls.

An estimated 266,000 women die every year from cervical cancer, of which more than 85% live in low-income countries, according to the latest statistics published by the International Agency for Research on Cancer (IARC). Without changes in prevention and control, cervical cancer deaths are expected to rise to 416,000 by 2035, with over 95% expected to be women living in poor countries.

Women in developing countries often lack access to cervical cancer screening and treatment, making HPV vaccine the best prevention tool against cervical cancer. Unlike most other vaccines, which are administered to children under the age of five, HPV vaccines are given to girls aged nine to 13. Vaccination against HPV is more effective before a person is infected with the virus. Immunising girls before initiation of sexual activity, that is before exposure to HPV infection, is a key strategy to prevent cervical cancer.

The World Cancer Day campaign, organised by the Union for International Cancer Control (UICC), has the tagline



“Debunk the Myths”. The campaign is focusing on four general misconceptions around cancer which are common around the world, including the myth: “there is nothing I can do about cancer”. Several cancers are triggered by infections, including liver, cervical cancer, stomach and some lymphomas, some of which can currently be prevented with existing vaccines – hepatitis B vaccine against liver cancer and HPV vaccine against cervical cancer.

### Health experts urge government action on obesity

The International Association for the Study of Obesity (IASO) in January published a 10-point action plan for governments to tackle obesity.

The IASO Policy Briefing comes at a time when there is increasing need to tackle the rising levels of obesity and related non-communicable diseases (NCDs) in virtually all countries of the world.

“We’ve seen the evidence, we’ve got the strategies, now what we need is action,” said IASO Policy Director, Dr Tim Lobstein.

The proposals come as governments prepare to report on their progress on tackling obesity and NCDs at the United Nations later this year. The Policy Briefing calls on governments to take a systems wide approach to tackling obesity and to work with civil society, especially to monitor the drivers of disease and to hold all stakeholders accountable for progress. It also calls for further steps to be taken to strengthen nutrition security by protecting consumers, primarily children, from inducements to consume unhealthy products.

In preparing their report, IASO gathered experts for a 2-day ‘meeting of the minds’ at the New York Academy of Medicine in September 2013 which brought together officials from the World Health Organization and the OECD, along with local and national government representatives and public health experts, advocacy groups, community activists and some private corporations.

Dr Lobstein, who convened the meeting, said: “The result of getting together such a wide group of people was explosive, with some radical proposals to tackle over-

consumption, calls for stronger regulation through tough Public Health Acts, and calls for more transparent disclosures of agri-food company lobbying activities and their support for political parties.”

The briefing recommendations include a strong emphasis on government leadership and action in order to reduce preventable deaths while improving economic performance.


“We call on governments to strengthen their legislative powers so they can intervene in markets for public health purposes. Failure to act will not be sustainable, especially in low-income countries,” said Dr Lobstein.

“We know that governments in low-income countries have little control over the food supplies and trade and investment deals which destroy traditional, healthier diets.”

In isolation governments are reluctant to undertake market interventions as they don’t want to be seen to restrict people’s freedoms. However there is a good case for clear traffic light labelling on products, for banning junk food marketing to children, and for adjusting the existing subsidies and taxes to increase the consumption of healthier foods.”

“As obesity and consequent diseases put increasing strain on health services, governments will have no choice but to act,” he added. “The sooner they start, the cheaper and more effective their actions will be.”

Professor Walter Ricciardi, President of the European Public Health Association, welcomed the report, commenting: “This report shows why governments must act against the drivers of the obesity epidemic, asserting their democratic mandate to defend the health of their populations against powerful vested interests.”

 The prevention of obesity and NCDs: challenges and opportunities for governments

<http://tinyurl.com/o4za5d2>

### Deaths from measles reach historic low

New mortality estimates from WHO show that annual measles deaths have reached

historic lows, dropping 78% from more than 562,000 in 2000 to 122,000 in 2012. During this time period, an estimated 13.8 million deaths have been prevented by measles vaccination and surveillance data showed that reported cases declined 77% from 853,480 to 226,722.

These gains are a result of global routine measles immunization coverage holding steady at 84% and 145 countries having introduced a routine second dose of measles vaccine to ensure immunity and prevent outbreaks. In addition to routine immunization, countries vaccinated 145 million children during mass campaigns against measles in 2012 and reached more than 1 billion since 2000, with the support of the Measles & Rubella Initiative.

Despite the impressive gains made, progress towards measles elimination remains uneven with some populations still unprotected. Measles continues to be a global threat, with five of six WHO regions still experiencing large outbreaks and with the Region of the Americas responding to many importations of measles cases. The African, Eastern Mediterranean and European regions are not likely to meet their measles elimination targets on time. The Region of the Americas has achieved measles elimination and continues to maintain this status while the Western Pacific region is approaching its target.

Routine measles vaccination coverage is an important progress indicator towards meeting Millennium Development Goal Four because of its potential to reduce child mortality and widely recognized as a marker of access to children’s health services.

Launched in 2001, the Measles & Rubella Initiative is a global partnership led by the American Red Cross, United Nations Foundation, U.S. Centers for Disease Control and Prevention (CDC), UNICEF and WHO.

The Measles & Rubella Initiative is committed to ensuring that no child dies from measles or is born with congenital rubella syndrome; reducing measles deaths by 95% by 2015; and achieving measles and rubella elimination in at least five regions by 2020. The WHO Region of the Americas has sus-

tained measles elimination since 2002 and WHO Western Pacific Region is on track to reach its goal. All six regions have established measles elimination goals.

The Measles & Rubella Initiative join others in celebrating World Immunization Week, April 24-30 to promote one of the world's most powerful tools for health – the use of vaccines to protect people of all ages against disease.

### **New Global Atlas calls for healthcare systems to implement palliative care**

Only 1 in 10 people who need palliative care – that is medical care to relieve the pain, symptoms and stress of serious illness – is currently receiving it. This unmet need is mapped for the first time in the *Global Atlas of Palliative Care at the End of Life*, published jointly by the World Health Organization (WHO) and the Worldwide Palliative Care Alliance (WPCA).

Palliative care is more than just pain relief. It includes addressing the physical, psychosocial and emotional suffering of patients with serious advanced illnesses and supporting family members providing care to a loved one.

About one third of those needing palliative care suffer from cancer. Others have progressive illnesses affecting their heart, lung, liver, kidney, brain, or chronic, life-threatening diseases including HIV and drug-resistant tuberculosis.

It is estimated that every year more than 20 million patients need palliative care at the end of life. Some 6% of these are children. The number of people requiring this care rises to at least 40 million if all those that could benefit from palliative care at an earlier stage of their illness are included. Hospice and palliative care often encompasses some support to family members, which would more than double care needs.

In 2011, approximately 3 million patients received palliative care, the vast majority at the end of their life. Although most palliative care is provided in high-income countries, almost 80% of the global need for palliative care is in low- and middle-income countries. Only 20 countries worldwide

have palliative care well integrated into their healthcare systems.

“The Atlas shows that the great majority of the global need of end-of-life care is associated with noncommunicable diseases such as cancer, heart disease, stroke and lung diseases,” says Dr Oleg Chestnov, WHO Assistant Director-General for Noncommunicable Diseases and Mental Health. “While we strengthen efforts to reduce the burden of the biggest killers in the world today, we must also alleviate the suffering of those with progressive illness who do not respond to curative treatment.”

The Atlas calls on all countries to include palliative care as an essential component to every modern healthcare system in their moves towards universal health coverage. This means addressing barriers such as:

- 1) lack of policies recognizing palliative care and the need for care both at the end of life and during progressive illnesses;
- 2) lack of resources to implement services, including access to essential medicines, especially pain relievers;
- 3) lack of knowledge of health care professionals, community volunteers and members of the public about the benefits of palliative care.

“Our efforts to expand palliative care need to focus on bringing relief of suffering and the benefits of palliative care to those with the least resources,” adds David Prail, Co-Chair of the WPCA. “This will take courage and creativity as we learn from each other how to integrate palliative care into existing but very limited healthcare systems.”

The importance of palliative care is being emphasized by the WHO Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 and the most recent WHO essential medicines list that includes a specific section on medicines for palliative care.



Global Atlas of Palliative Care at the End of Life [www.who.int/cancer/publications/palliative-care-atlas](http://www.who.int/cancer/publications/palliative-care-atlas)

### **Philips sets up Healthcare Informatics Solutions and Services group**

Philips announced in January the for-

mation of Healthcare Informatics Solutions and Services, a new business group within Philips' Healthcare sector that offers hospitals and health systems the customized clinical programs, advanced data analytics and interoperable, cloud-based platforms necessary to implement new models of care.

Building off a proven track record in improving the health of aging and at-risk populations, Healthcare Informatics Solutions and Services will partner with healthcare providers to improve access, lower cost and enhance quality across the continuum of care, from screening and diagnosis, to treatment and monitoring, and after care at home.

“Healthcare systems today are changing the way they operate, how decisions are made and how patients receive care,” said Deborah DiSanzo, chief executive officer, Philips Healthcare. “This requires a significant overhaul of complex organizations, as well as the associated actionable data about each patient population they serve. As we continue to expand the tools, analytics, consulting and support, we are paving the way for providers to transition into more integrated, collaborative care.”

### **World Health Day puts focus on vector-borne diseases**

World Health Day is celebrated on 7 April every year to mark the anniversary of the founding of WHO in 1948. Each year a theme is selected that highlights a priority area of public health. The day provides an opportunity for individuals in every community to get involved in activities that can lead to better health. The topic for 2014 is vector-borne diseases.

Vectors are organisms that transmit pathogens and parasites from one infected person (or animal) to another. Vector-borne diseases are illnesses caused by these pathogens and parasites in human populations. They are most commonly found in tropical areas and places where access to safe drinking-water and sanitation systems is problematic.

The most deadly vector-borne disease, malaria, caused an estimated 660,000

deaths in 2010. Most of these were African children. However, the world's fastest growing vector-borne disease is dengue, with a 30-fold increase in disease incidence over the past 50 years. Globalization of trade and travel and environmental challenges such as climate change and urbanization are having an impact on transmission of vector-borne diseases, and causing their appearance in countries where they were previously unknown.

In recent years, renewed commitments from ministries of health, regional and global health initiatives – with the support of foundations, nongovernmental organizations, the private sector and the scientific community – have helped to lower the incidence and death rates from some vector-borne diseases.

World Health Day 2014 will spotlight

some of the most commonly known vectors – such as mosquitoes, sandflies, bugs, ticks and snails – responsible for transmitting a wide range of parasites and pathogens that attack humans or animals. Mosquitoes, for example, not only transmit malaria and dengue, but also lymphatic filariasis, chikungunya, Japanese encephalitis and yellow fever.

The campaign aims to raise awareness about the threat posed by vectors and vector-borne diseases and to stimulate families and communities to take action to protect themselves. A core element of the campaign will be to provide communities with information. As vector-borne diseases begin to spread beyond their traditional boundaries, action needs to be expanded beyond the countries where these diseases currently thrive.

More broadly, through the campaign, the WHO is aims to assist:

- families living in areas where diseases are transmitted by vectors know how to protect themselves;
- travellers know how to protect themselves from vectors and vector-borne diseases when travelling to countries where these pose a health threat;
- in countries where vector-borne diseases are a public health problem, ministries of health put in place measures to improve the protection of their populations; and
- in countries where vector-borne diseases are an emerging threat, health authorities work with environmental and relevant authorities locally and in neighbouring countries to improve integrated surveillance of vectors and to take measures to prevent their proliferation M&H

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# the laboratory

## Medical research news from around the world

### Scientists say checking cervical lesions is better than blood test to measure immune cell response to HPV treatment

Preliminary results of a small clinical trial show that a vaccine used to treat women with high-grade precancerous cervical lesions triggers an immune cell response within the damaged tissue itself. The Johns Hopkins scientists who conducted the trial said the finding is significant because measuring immune system responses directly in the lesions may be a more accurate way to evaluate so-called “therapeutic” vaccines than by the conventional means of blood analysis.

“It’s difficult to measure immune cell responses to therapeutic vaccines, but we believe that clinical studies could tell us more about the value and function of the vaccines if we check for the response in the lesions, where the immune system is fighting precancerous cells,” says Connie Trimble, MD, associate professor of gynecology and obstetrics, oncology and pathology at Johns Hopkins’ Kimmel Cancer Center.

Results of the first 12 women enrolled at Johns Hopkins on a clinical trial led by Trimble are reported online in the January 27, 2014 issue of *Science Translational Medicine*. Each of the women was diagnosed with high-grade precancerous cervical lesions linked to a strain of the human papillomavirus (HPV16) most commonly associated with cervical cancer. In a bid to treat the lesions and prevent cervical cancer, they received three vaccine injections in the upper arm over an eight-week period.

Two types of vaccines were used for the study: one constructed with genetically engineered DNA molecules that teach immune system cells to recognize premalignant cells expressing HPV16 E7 proteins, and one that is a non-infectious, engineered virus that targets and kills precancerous cells marked by HPV16 and HPV18 E6 and E7 proteins.

Seven weeks after the third vaccination, the investigators surgically removed cervical lesions from all of the women. Blood samples and cervical tissue were collected from each patient at the beginning and

end of the trial, letting scientists compare immune cell responses before and after vaccination.

In three of six patients treated with the highest dose of the vaccine, and one patient in each of the two groups receiving lower doses of the vaccine, the cervical lesions disappeared. The first patient was treated in 2008, and the 12th in 2012. None of the 12 patients has, so far, developed more lesions.

Among those vaccinated, the investigators found significant increases of CD8 T-cells, the “killer” cells of the immune system, in cervical tissue. Blood samples failed to show as strong a pre- and post-vaccination effect. The investigators also said the vaccine did not have the unwanted consequence of altering the number of T-regulatory cells, which suppress immune system responses.

“We found striking immune system changes within cervical lesions, which were not as evident in the patients’ peripheral blood samples,” says Trimble.

The investigators also measured gene expression of post-vaccinated cervical cells in three of the patients and found increased expression of several genes associated with activation of the immune system. They found many similarities in T-cell receptors in the cervical tissue of two of the vaccinated patients, “suggesting that the T-cells are seeing the same thing,” says Trimble.

The Johns Hopkins team says it plans to enrol some 20 more patients, testing a combination of the vaccines and a topical cream to enhance the immune response locally.

Trimble explains that the location of cervical lesions gives scientists an advantage in their vaccination approach. “It’s important that we can monitor these cervical lesions closely,” says Trimble.

She says that the conventional practice of measuring vaccine effectiveness via blood tests probably began with mouse models used for immunotherapy research. “But the way that HPV and the immune system behave in humans may be far different,” she says.

HPV causes nearly all cervical, anal, vaginal, and penile cancers and nearly two-thirds of oral cancers. In the cervix, about 20 to 25% of high-grade lesions will disappear spontaneously. Because there is no standard way to predict lesions that will disappear, the current standard of care for these lesions is surgical removal. Current preventive vaccines for HPV are not effective on women already exposed to the ubiquitous virus.

### Brain uses serotonin to perpetuate chronic pain

Setting the stage for possible advances in pain treatment, researchers at The Johns Hopkins University and the University of Maryland report they have pinpointed two molecules involved in perpetuating chronic pain in mice. The molecules, they say, also appear to have a role in the phenomenon that causes uninjured areas of the body to be more sensitive to pain when an area nearby has been hurt. A summary of the research was January 23 in the journal *Neuron*.

“With the identification of these molecules, we have some additional targets that we can try to block to decrease chronic pain,” says Xinzhong Dong, Ph.D., associate professor of neuroscience at the Johns Hopkins University School of Medicine and an early career scientist at Howard Hughes Medical Institute. “We found that persistent pain doesn’t always originate in the brain, as some had believed, which is important information for designing less addictive drugs to fight it.”

Chronic pain that persists for weeks, months or years after an underlying injury or condition is resolved afflicts an estimated 20 to 25% of the population worldwide. It can be caused by everything from nerve injuries and osteoarthritis to cancer and stress.

In their new research, the scientists focused on a system of pain-sensing nerves within the faces of mice, known collectively as the trigeminal nerve. The trigeminal nerve is a large bundle of tens of thousands of nerve cells. Each cell is a long “wire” with a hub at its cen-



tre; the hubs are grouped together into a larger hub. On one side of this hub, three smaller bundles of wires – V<sub>1</sub>, V<sub>2</sub> and V<sub>3</sub> – branch off. Each bundle contains individual pain-sensing wires that split off to cover a specific territory of the face. Signals are sent through the wires to the hubs of the cells and then travel to the spinal cord through a separate set of bundles. From the spinal cord, the signals are relayed to the brain, which interprets them as pain.

When the researchers pinched the V<sub>2</sub> branch of the trigeminal nerve for a prolonged period of time, they found that the V<sub>2</sub> and V<sub>3</sub> territories were extra sensitive to additional pain. This spreading of pain to uninjured areas is typical of those experiencing chronic pain, but it can also be experienced during acute injuries, as when a thumb is hit with a hammer and the whole hand throbs with pain.

To figure out why, the researchers studied pain-sensing nerves in the skin of mouse ears. The smaller branches of the trigeminal V<sub>3</sub> reach up into the skin of the lower ear. But an entirely different set of nerves is responsible for the skin of the upper ear. This distinction allowed the researchers to compare the responses of two unrelated groups of nerves that are in close proximity to each other.

To overcome the difficulty of monitoring nerve responses, Dong's team inserted a gene into the DNA of mice so that the primary sensory nerve cells would glow green when activated. The pain-sensing nerves of the face are a subset of these.

When skin patches were then bathed in a dose of capsaicin – the active ingredient in hot peppers – the pain-sensing nerves lit up in both regions of the ear. But the V<sub>3</sub> nerves in the lower ear were much brighter than those of the upper ear. The researchers concluded that pinching the connected-but-separate V<sub>2</sub> branch of the trigeminal nerve had somehow sensitized the V<sub>3</sub> nerves to “overreact” to the same amount of stimulus.

Applying capsaicin again to different areas, the researchers found that more nerve branches coming from a pinched

V<sub>2</sub> nerve lit up than those coming from an uninjured one. This suggests that nerves that don't normally respond to pain can modify themselves during prolonged injury, adding to the pain signals being sent to the brain.

Knowing from previous studies that the protein TRPV1 is needed to activate pain-sensing nerve cells, the researchers next looked at its activity in the trigeminal nerve. They showed it was hyperactive in injured V<sub>2</sub> nerve branches and in uninjured V<sub>3</sub> branches, as well as in the branches that extended beyond the hub of the trigeminal nerve cell and into the spinal cord.

Next, University of Maryland experts in the neurological signaling molecule serotonin, aware that serotonin is involved in chronic pain, investigated its role in the TRPV1 activation study. The team, led by Feng Wei, M.D., Ph.D., blocked the production of serotonin, which is released from the brain stem into the spinal cord, and found that TRPV1 hyperactivity nearly disappeared.

Says Dong: “Chronic pain seems to cause serotonin to be released by the brain into the spinal cord. There, it acts on the trigeminal nerve at large, making TRPV1 hyperactive throughout its branches, even causing some non-pain-sensing nerve cells to start responding to pain. Hyperactive TRPV1 causes the nerves to fire more frequently, sending additional pain signals to the brain.”

● doi: 10.1016/j.neuron.2013.12.011

### **Depression in pregnant mothers may alter pattern of foetal brain growth**

Depression is a serious mental illness that has many negative consequences for sufferers. But depression among pregnant women may also have an impact on their developing babies.

Children of depressed parents are at an increased risk of developing depression themselves, a combination of both genetic and environmental factors. These children also display alterations in the amygdala, a brain structure important for the regulation of emotion and stress. However, prior

work in this area has assessed children years after birth, which means that the timing of these alterations has remained unidentified.

Researchers led by Dr Anqi Qiu at the National University of Singapore now have the answers, with their new work published in the December 2013 issue of *Biological Psychiatry*.

They set out to perform a direct analysis of prenatal maternal depression and variation in the foetal development of the amygdala. To do so, they recruited 157 pregnant women who completed a depression questionnaire during their 26th week of pregnancy. Later, within two weeks of birth, newborns underwent magnetic resonance imaging scans to ascertain the structure of their amygdala and diffusion tensor imaging scans to determine the integrity of the amygdala's pattern of neural connections.

The volume of the amygdala did not differ between the infants regardless of their mothers' depression status. However, the researchers found significantly reduced structural connectivity (i.e., lower fractional anisotropy and lower axial diffusivity) in the right amygdala of infants of mothers with high levels of depression symptoms. In other words, the amygdala's microstructure (e.g., its “wiring”) was abnormal in the infants born to depressed mothers.

This important finding suggests that a propensity for abnormal amygdala function, a feature of mood and anxiety disorders, may be transmitted from mother to child during foetal life. This finding suggests one new path that a history of maternal depression might contribute to a life-long increase in the vulnerability to mental illness.

This study provides added evidence supporting the notion that mental health screening should be included among the medical evaluations that women undergo when they discover that they are pregnant. Indeed, the authors conclude that their study supports that “interventions targeting maternal depression should begin early in pregnancy”.

● doi: 10.1016/j.biopsych.2013.06.019



### **Research shows childhood influences may affect adult eating habits**

New research has examined the influence of advertising on adult eating habits and suggests that exposure to beloved characters of our childhood are still influencing our food choices as adults. Popular and long-standing food advertising characters include Ronald McDonald, the Laughing Cow and Tony the Tiger.

The research, led by Dr Paul Connell of Cass Business School in Dubai, part of City University London, suggests that adults could have a positive bias toward brands with which they had an affinity as kids.

The research has important implications in the Gulf region where consumption of junk food is extremely high and obesity poses a real health burden. World Health Organisation statistics suggest 20 to 30% of people in the Middle East are obese and addressing the exposure to unhealthy brands as children could offer an interesting approach in tackling the condition.

Increased consumption of more energy-dense, nutrient poor foods with high levels of sugar and saturated fats (fast foods), in combination with reduced physical activity, have led to obesity rates that have risen three-fold or more since 1980 in many areas globally, including the ME, according to the WHO.

Dr Connell comments: "People should check the labels of the products they've loved since childhood. It's possible that affectionate feelings for brand characters mean they are overlooking relevant nutritional information. Many advertising characters have been around for decades, so parents should be mindful that their judgment of products associated with ads they saw as children themselves, might be clouded, particularly when making dietary choices for their children."

The research also suggests that public health and safety campaigns aimed at children may affect them throughout their lives, suggesting that governments and schools have a responsibility to educate children from a young age on the importance of nutrition.

Dr Connell adds: "We recommend that health-oriented media campaigns tar-

geted at children should aim to relate to children on an emotional level, for example, by emphasizing loveable characters and fun narratives."

Further research by Dr Connell and his colleagues also discovered a link between exposure to healthy images and a decrease in consumption of junk food. The team found that when individuals are exposed to healthy images and words, they were more able resist unhealthy snacks later in the day.

The research poses an interesting approach to affecting eating habits and could be explored in the regions schools as a tactic to positively influence children's meal-time choices. The results also have a wider significance, informing those who play a vital role in improving public health; food marketers, the media and the government.

Professor Connell said: "The timings of healthy advertisements and public service messages can be optimised in order to help people adhere to healthier lifestyles by boosting their levels of self-regulation over the course of the day."

### **Fit teenagers are less likely to have heart attacks in later life**

Researchers in Sweden have found an association between a person's fitness as a teenager and their risk of heart attack in later life. In a study of nearly 750,000 men, they found that the more aerobically fit men were in late adolescence, the less likely they were to have a heart attack 30 or 40 years later.

The study, published online 8 January 2014 in the *European Heart Journal* found that the relationship between aerobic fitness and heart attack occurred regardless of the men's body mass index (BMI) when they were teenagers. However, fit but overweight or obese men had a significantly higher risk of a heart attack than unfit, lean men.

Professor Peter Nordström, of Umeå University, Umeå, Sweden, who led the research, said: "Our findings suggest that high aerobic fitness in late adolescence may reduce the risk of heart attack later in life. However, being very fit does not appear to fully compensate for being overweight or obese in respect to this risk. Our

study suggests that it's more important not to be overweight or obese than to be fit, but that it's even better to be both fit and a normal weight."

Prof Nordström and his colleagues analysed data from 743,498 Swedish men who underwent medical examinations at the age of 18 when they were conscripted into the Swedish armed forces between 1969-1984. Aerobic fitness was measured by a cycle test where the resistance was gradually increased until they were too exhausted to continue.

The researchers found that every 15% increase in aerobic fitness was linked to an approximately 18% reduced risk of a heart attack (myocardial infarction or MI) 30 years later after adjusting for various confounding factors including socioeconomic background and BMI. The results also suggested that regular cardiovascular training in late adolescence was independently associated with an approximately 35% reduced risk of an early heart attack in later life.

"There were 7,575 myocardial infarctions in 620,089 men during the total follow-up time where aerobic fitness was measured, which means the cumulative incidence was about 1222 per 100,000 men," explained Prof Nordström. "There were 271,005 men (43.7%) who were normal weight or lean, and who had an aerobic fitness that was better than the average. Among these lean, fit men there were 2176 MIs, resulting in a cumulative incidence of about 803 MIs per 100,000 men. Thus, the cumulative incidence of MIs was reduced by about 35% in this group."

However, he warned that the study showed only that there was an association between fitness and a reduction in heart attacks, and it could not show that being aerobically fit caused the reduced risk of heart attack.

"The relationship between aerobic fitness and heart disease is complex and may well be influenced by confounding factors that were not investigated in this study. For instance, some people may have a genetic predisposition to both high physical fitness and a low risk of heart disease. In a recent study of twins, we found that 78% of the variation in aerobic fitness at the time of



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scription is related to genetic factors.”

Prof Nordström said: “As far as we know, this is the first study to investigate the links between an objective measure of physical fitness in teenagers and risk of heart attack in the general population. Further studies are needed to investigate the clinical relevance of these findings, but given the strong association that we have found, the low cost and easy accessibility of cardiovascular training, and the role of heart disease as a major cause of illness and death worldwide, these results are important with respect to public health.”

● doi: 10.1093/eurheartj/eh527

### **New combination treatment offers breakthrough for Hep C therapy**

Efforts to cure hepatitis C, the liver-damaging infectious disease, are about to get simpler and more effective, according to new research at Johns Hopkins and elsewhere.

In a study reported in the January 16 2014 issue of the *New England Journal of Medicine*, researchers say combination treatments involving a pair of experimental, oral antiviral drugs, daclatasvir and sofosbuvir, were safe and highly effective in the treatment of hepatitis C. The combination therapy worked well even in the patients who are hardest to treat, in whom the conventional “triple therapy” with hepatitis C protease inhibitors, telaprevir or boceprevir, plus peginterferon and ribavirin had failed to cure the infection.

“This research paves the way for safe, tolerable and effective treatment options for the vast majority of those infected with hepatitis C,” says study leader Mark Sulkowski, MD, medical director of the Johns Hopkins Center for Viral Hepatitis. “Standard treatments for the disease are going to improve dramatically within the next year, leading to unprecedented advances for the treatment of patients infected with the hepatitis C virus.”

The research was conducted on 211 men and women with any of the three major types of the disease who were treated at 18 medical centres across the United States and Puerto Rico. Among patients with genotype 1 – the most common strain of

the infection in the United States – 98% of the 126 previously untreated patients and 98% of 41 patients whose infections remained even after the triple therapy were considered cured, with no detectable virus in their blood three months after the treatment had stopped. Results were similar in study participants infected with genotypes 2 or 3, strains which are less common in the United States.

The study participants took a daily combination of 60 milligrams of daclatasvir and 400 milligrams of sofosbuvir, with or without ribavirin.

In December last year, the US FDA approved sofosbuvir in combination with peginterferon and ribavirin for the treatment of genotype 1 infection and in combination with only ribavirin for genotype 2 and 3 infection. Daclatasvir has not yet been approved by the FDA.

Sulkowski says that if daclatasvir and other new drugs for hepatitis C win approval from the FDA, the dreaded weekly injections of peginterferon will be a thing of the past.

Sulkowski, a professor at the Johns Hopkins University School of Medicine, also says that the so-called “pill burden” of what had been standard therapy for genotype 1 could go down from some 18 pills per day and one injection per week to as few as one or two pills per day and no injections. Side effects from the new pill combination were generally mild, but included fatigue, headache and nausea, a safety profile that Sulkowski says compares favourably with that of the peginterferon-based therapy, which is tied to severe side effects which may include fatigue and depression.

The new study is one of the first to show that hepatitis C can be cured without the use of ribavirin, which is known to cause anemia.

● doi: 10.1056/NEJMoa1306218

### **New test for meningitis**

A new test for meningitis – which could help deliver faster and more effective treatments for patients – has been developed through University of Strathclyde-led research.

The onset of meningitis is often rapid and severe, particularly when a bacterial

infection is the cause – and the latest research could speed up diagnosis, leading to better outcomes for patients.


Dr Karen Faulds, a Reader in Strathclyde’s Department of Pure and Applied Chemistry, led the study. She said: “Meningitis is a hugely virulent and, in some forms, potentially highly dangerous infection. The type of antibiotic used to treat it depends on the strain of meningitis, so it is essential to identify this as quickly as possible.”

Several types of bacteria cause meningitis and each is sensitive to different antibiotics. Dr Faulds and PhD student Kirsten Gracie, from the Centre for Molecular Nanometrology at Strathclyde – with partners at the University of Manchester – used a spectroscopic imaging technique known as SERS (surface enhanced Raman scattering) to identify which bacteria were present in a single sample, with a view to analysing cerebral spinal fluid from patients suspected to have meningitis.

Dr Faulds said: “The great advantage of the SERS technique is that it gives sharp, recognisable signals, like finger printing, so we can more easily discriminate what analytes – or chemical substances – are present in a mixture.”

A series of DNA probes, containing dyes detectable by SERS, made it possible to single out the different pathogens, three types of which *Haemophilus influenzae*, *Streptococcus pneumoniae* and *Neisseria meningitidis* were tested for. The faster the type of bacteria can be identified by DNA analysis, the faster patients can receive the most effective antibiotic for their condition.

This also reduces the need for broad-band antibiotics, overuse of which is increasing bacterial resistance. Combining the SERS technique with chemometrics – data-driven extraction of information from chemical systems – means the amount of bacteria in a sample can be measured whilst simultaneously identifying the bacteria. The chemometrics work was carried out in collaboration with Professor Roy Goodacre at the University of Manchester.

● doi: 10.1039/c3sc52875h 





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# First Databank and NAS forge Middle East healthcare alliance

In 2013, global provider of clinical drug knowledge, First Databank™ (FDB) announced a new partnership with NAS, one of the largest healthcare benefits management firms in the region.

In support of its goal to deliver world class claims processing and efficient management, NAS is licensing FDB's market leading electronic drug database, Middle East Drug Knowledge (MEDK). MEDK integrates with the NAS technology and assists with the automation of NAS clinical solutions, including claims processing. FDB and NAS are pleased to share this jointly developed Case Study on their partnership.

## Electronic Healthcare Claims Management Case Study

### About NAS United Healthcare Services

Headquartered in Abu Dhabi, United Arab Emirates, NAS is a third party administrator providing expertise in healthcare claims management and cost containment techniques. Since 2002, NAS has carved a unique niche in the regional healthcare sector due to its excellent service standards and in-

novative, customer focused solutions to the benefit of about 1m members. NAS has staffed offices across the Gulf region and has adopted a highly innovative approach, being the first third party administrator to develop an online e-claims and e-prescribing solution within the UAE.

### Online e-claims

Historically, most healthcare claims have been processed manually, creating a significant operational overhead. NAS wanted to develop a system to automate their clinical solutions and integrate them into their existing portfolio of healthcare services.

A mandated deadline had also been introduced by the Health Authority of Abu Dhabi (HAAD) to provide Pharmacy Benefit Management (PBM) services to all insured members of the Emirate while meeting internationally recognised standards.

By automating its systems NAS became able to adjudicate a much larger volume of claims, in a faster more efficient way. Ensuring that patient safety was not compromised was an essential pre-requisite for the company.

NAS's short-term goal was to have a full e-prescribing system available with online Drug Utilisation Reviews (DUR's) within the mandated deadline imposed by HAAD. Longer term goals were set to pro-

vide an ever increasing depth and breadth of integration in clinical rules/claims within the e-prescribing solution.

### Harnessing technology to achieve efficiencies

Demonstrating value to NAS's customers was also a key requirement to the company. MEDK from FDB was recommended to NAS as a trusted drug knowledge base which incorporates all Gulf Cooperation Council (GCC) drugs.

MEDK was selected as it can be fully integrated with open tools and supported in NAS's online solution. It also provides regular monthly updates of all newly licenced drugs for the region, as well as a clear product development roadmap into the future. This ensured that the knowledge base remained up-to-date and relevant.

More importantly, MEDK provides dynamic alerts to ensure the safety of the patient through cross-checks regarding drug



prescription data which include drug-drug interactions, duplicate therapy, contraindications and indications.

Using the Medication Names Concepts™ feature ensures that all data can support the clinical workflow in the NAS e-prescribing system.

**“FDB offered a superior product which met the true needs of the Middle East market. It is the only one that provides a comprehensive solution that allows us to implement fully localised solutions to each individual GCC market. NAS clients and about one million members are seeing great results in both the quality of care and cost savings through our PBM/e-prescribing solutions.” – Tom O’Connor, RX Strategists LLC, PBM Consultant to NAS.**

### Achieving Measurable Results

The new online e-claim and e-prescribing system met the goals of compliance, but also improved the system overall.

The new system helped NAS understand the constituents of what goes into a drug and a drug claim. It has allowed NAS to put a coding structure together giving a better view of the business from



both safety and quality perspectives.

NAS became the first third party administrator to meet the mandated standard in Abu Dhabi within deadline underlining its position as an innovator in the region.

From an economic point of view, the new system achieved the stated objectives by increasing the volume of claims handled, particularly around DUR's. This has provided significant cost and efficiency reductions. These savings are passed onto the insurers, while demonstrating clear benefits to the members themselves.

Other tangible results in drug usage safety were also achieved. MEDK provides enhanced capability around the active checking of drug prescriptions against the electronic patient record, highlighting

possible areas for concern such as drug-drug interactions or duplicate therapy.


The insurance related records are held in a central database. This is not a complete clinical record, but does represent primary, secondary, pharmacy and any other information pertaining to a patient episode from an insurance point of view.

This single database provides valuable data to the pharmacy and GP community in understanding the types of drugs being prescribed as well as prescribing behaviour in general.

Understanding this type of information ultimately means that NAS is able to make well-informed strategic decisions regarding its current and future planning.

More importantly, it also means that

significant improvements have been made to the quality of care and communications provided to their customers.

**“NAS built the PBM/e-prescribing engine to benefit our clients and members across the UAE and other GCC countries. MEDK from FDB has been a critical part of our overall solution to improve quality and reduce costs across the prescription medicine delivery system. We are very excited about building on the great success we have seen in Abu Dhabi and rolling this solution out in other GCC countries. NAS looks forward to continue working with FDB in implementing world class solutions for these markets.”**  
– Joe Boulos, Group CEO, NAS United Healthcare Services. 



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# gene pool

Genetic research news from around the world



## Non-coding DNA implicated in type 2 diabetes

Variations in non-coding sections of the genome might be important contributors to type 2 diabetes risk, according to a new study.

DNA sequences that don't encode proteins were once dismissed as "junk DNA", but scientists are increasingly discovering that some regions are important for controlling which genes are switched on.

The new study, published in *Nature Genetics*, is one of the first to show how such regions, called regulatory elements, can influence people's risk of disease.

Type 2 diabetes affects over 300 million people worldwide. Genetic factors have long been known to have an important role in determining a person's risk of type 2 diabetes, alongside other factors such as body weight, diet and age.

Many studies have identified regions of the genome where variations are linked to diabetes risk, but the function of many of these regions is unknown, making it difficult for scientists to glean insights into how and why the disease develops. Only around two per cent of the genome is made up of genes: the sequences that contain code for making proteins. Most of the remainder is shrouded in mystery.

"Non-coding DNA, or junk DNA as it is sometimes known, is the dark matter of the genome. We're only just beginning to unravel what it does," said leading au-

thor Professor Jorge Ferrer, a Wellcome Trust Senior Investigator from the Department of Medicine at Imperial College London.

In the new study scientists mapped the regulatory elements that orchestrate gene activity in the cells of the pancreas that produce insulin, a hormone that regulates blood sugar.

In type 2 diabetes, the tissues become less responsive to insulin, resulting in blood sugar levels being too high. Most people can compensate when this happens by producing more insulin, but in people with type 2 diabetes, the pancreas cannot cope with this increased demand.

"The cells that produce insulin appear to be programmed to behave differently in people with type 2 diabetes," said co-author Mark McCarthy, a Wellcome Trust Senior Investigator at the University of Oxford. "This study provides some important clues to the mechanisms which are disturbed in the earliest stages of the development of type 2 diabetes, and may point the way to novel ways of treating and preventing the disease."

The team identified genome sequences that drive gene activity in insulin-producing cells specifically. They found that these sequences are located in clusters, and that genetic variants known to be linked to diabetes risk are also found in these clusters.

"Many people have small DNA variants in such regulatory elements, and these variants affect gene expression in the cells that produce insulin. This knowledge will allow us to understand the detailed mechanisms whereby specific DNA variants predispose to diabetes," said Professor Ferrer.

● doi: 10.1038/ng.2870

## Biomarker Alliance set up to create standards needed for personalized medicine

A new independent, non-profit organization, the National Biomarker Development Alliance (NBDA), has been set up in the United States. The mission of the NBDA is to address the complex and urgent challenge of creating the standards needed to support end-to-end evidence-based biomarker development in order to significantly advance precision (personalized) health care.

Effective high quality biomarkers are critical to ultimately realizing the promise of precision (personalized) medicine. The NBDA, will be disease "agnostic" and is the first independent trans-sector organization that brings together key stakeholders from academia, the private sector, payers and patients/advocates to ultimately change the current dismal success rate of biomarker discovery, development and validation.

"Creating the standards and systems for successful biomarker development is complex but achievable through a new generation of networks of stakeholders that integrate knowledge to solve critical problems of this scale," stated Dr Anna Barker, President, Director and Co-Founder of the NBDA, Co-Director of Complex Adaptive Systems and Professor at Arizona State University, and former Deputy Director of the National Cancer Institute.

"The NBDA was developed not just to relegate the flawed and fragmented approaches to biomarker development processes to history but also to serve as a working example of what purposeful convergence of scientific knowledge and multi-sector collaboration can accomplish," said Dr Barker.

The NBDA will achieve its goals through a management construct and systems-based approach that integrates and leverages biomarker knowledge networks from all of these stakeholder communities. "We were pleased to enable the development of the NBDA," said Dr Rick Shangraw, Chief Executive Officer of the Arizona State University Founda-



tion (ASUF). “Increasingly transformative ideas will be accomplished through new organizational constructs such as NBDA that facilitate the convergence of knowledge to address major societal problems.”

Biomarkers are signals, or indicators (markers) of normal or disease-related processes or measures of pharmacologic response to therapy. They are the key to realizing a future in which patients are treated based on identifying molecular changes in their disease. These molecular profiles will empower physicians to select targeted therapies using molecular diagnostics versus today’s one ‘size fits all’. Currently, too many drugs and biomarkers fail in late stages of regulatory review, as most explicitly evidenced by the disturbing historical lack of success of many phase III clinical trials for cancer.

Powered by advanced genomic and other technologies, biomarker discovery has become a major focus for investigators working in nearly all areas of biomedical research.

“Reflecting on the 150,000 papers that documented thousands of biomarker discoveries,” Dr George Poste, interim Chief Science Officer of the NBDA, Co-Director of Complex Adaptive Systems and Regents Professor at ASU and Former President of Research & Development for SmithKline Beecham (now GlaxoSmithKline), stated that “a discovery” does not mean that the technical process was robust, that the findings could be independently reproduced, or that they measure a meaningful change in biology that addresses clinically meaningful questions.

Unfortunately, in the face of this tsunami of biomarker discovery, the approval of protein biomarkers has changed little since the 1990s, with less than 1.5 approved per year by the US Food and Drug Administration (FDA). Moreover, less than 100 biomarkers are used routinely in the clinic today. Failure to develop and implement standards based end-to-end systems approaches for biomarker development has also essentially stalled the advancement of the diagnostics industry, especially smaller biotechnology companies focused on molecular diagnostics. The explosion of genomics-based assays and other non-regulated laboratory developed tests (LDTs) discourages companies from pursuing more rigorous, uncertain and expensive FDA biomarker/diagnostic approval pathways. The undervaluation of biomarkers and reimbursement ambiguities further discourages investment in the field.

“The NBDA is a potentially transformative approach to not just identifying and advancing successful biomarkers, but it will also serve to energize and support the development of the diagnostics industry,” said Mara Aspinall, CEO, Ventana Medical Systems and Co-Founder, DxInsights.

The NBDA is well underway in setting up demonstration projects to develop standards and/or create ideal pathways for four “classes” of biomarkers: genomics, proteomics, imaging and complex biomarkers (e.g., biosignatures). In addition, the NBDA is assembling a database of all guidelines, standard operation procedures and standards developed to date on the collection, stewardship and management of biospecimens. Once assembled, NBDA will organize a consensus conference to define “standards” for the

field that can be agreed to by the stakeholder communities. Dr Carolyn Compton, NBDA’s Chief Medical Officer, Professor at ASU, and former President and CEO of the Critical Path Institute will lead this effort. “I know from long experience, that this is not an easy task, but I believe that we already have a great deal of the information needed to get this done and identification of critical knowledge gaps will guide needed research,” said Dr Compton.

“Creating and broadly implementing the standards (guidelines, standard-operating procedures, best practices, etc.) needed to successfully discover and develop the effective biomarkers we need is not the job of the FDA, but it is the job of the affected stakeholders. A successful NBDA promises to reduce health care costs by accelerating drug development, empowering the diagnostics industry and improving patient engagement and outcomes,” said Dr Barker. “Continuing to tolerate the failure of biomarkers means that the promise of precision medicine will never materialize for patients and that would be tragic and costly.” MEH

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## New ambulance simulator will help train first responders

Dubai Healthcare City (DHCC) has received an ambulance simulator from Mediclinic Middle East (MCME). The ambulance used for simulation is integral to emergency response training at DHCC's Khalaf Ahmad Al Habtoor Medical Simulation Center (KHMSC), which is the first comprehensive simulation training facility of its kind in the region.

The simulation sessions with the ambulance will provide medical students and health professionals with a realistic first responder experience in a risk-free environment. Trainees will be able to learn from scenarios across a range of crisis interventions such as cardiac arrest management,

and emergencies including trauma, breathing difficulties and obstetrics.

Commenting on the donation, Marwan Abedin, Chief Executive Officer, DHCC, said: We are always looking to train the next generation of medical professionals in near-realistic conditions and this generous donation from Mediclinic Middle East helps further our goal. The ability to practise in simulated scenarios is key to developing confidence to prepare for real-life critical medical situations.

"The collaboration between Mediclinic Middle East and Dubai Healthcare City further reaffirms our strategic partnership towards building capacity in healthcare." MEH

## Collaboration to strengthen simulation training

In January DHCC met with Dr Ralf Krage, President of the Society in Europe for Simulation Applied to Medicine (SESAM) a network of simulation professionals, and members of the ADAM Simulation Group at the VU University Medical Centre, Amsterdam.

Raja Al Gurg, Vice-Chairperson of the Dubai Healthcare City Authority (DHCA), DHCC Board members and the management of the Khalaf Al Habtoor Foundation met with the European delegation and discussed the use of simulation in medical education as well as opportunities for collaboration and knowledge sharing.

As a result, SESAM, ADAM Simula-

tion Group at the VU University and Mohammed Bin Rashid Academic Medical Centre (MBR-AMC), the education and research arm of DHCC, agreed to formalise future collaborations with the aim of strengthening the use of simulation training in medical education.

Some of the ideas discussed and to be explored further include integrating simulation in the local undergraduate curricula by partnering with UAE-based universities. MBR-AMC is home to Khalaf Ahmad Al Habtoor Medical Simulation Center, the first of its kind in the UAE and which enables training of healthcare professionals using simulation. MEH

## Mediclinic City Hospital expands to include new oncology unit

Mediclinic City Hospital, in DHCC, is expanding its facilities. A new North Wing will offer, among other specialties, oncology services such as diagnostic, medical and radiotherapy services. It will house 43 outpatient consultation suites, 17 day care rooms, 12 dialysis suites, 11 dedicated oncology beds, two theatres and a rehabilitation centre with two fully-equipped gymnasiums. The North Wing will also include an expanded reference laboratory.

The new oncology unit will be built in

association with Mediclinic Group's sister company in Switzerland, Hirslanden Private Hospital Group.

David Hadley, CEO, Mediclinic Middle East commented: "The North Wing extension of Mediclinic City Hospital in DHCC continues apace. Thanks to agreements now in place with our technology partners Varian Medical Systems International and GE Healthcare, I am very excited by the even wider levels of service that will be available to our patients once the facility opens its doors in 2015." MEH



Representatives of DHCC and Cambridge University Hospitals sign an MoU to provide paediatric emergency training courses in the UAE.

## Training courses for paediatric emergency

DHCC has signed a Memorandum of Understanding (MoU) with UK-based Cambridge University Hospitals to provide paediatric emergency training courses to medical and healthcare professionals in the UAE.

The paediatric emergency training courses are the first of a series of courses with Cambridge University Hospitals planned for 2014.

Critical events in pediatrics are less frequent than those occurring with adults, which makes being ready to successfully manage these events as important. Healthcare providers will at some point be required to manage acutely ill or injured children, however very few of them have the opportunity to practice the necessary skills during medical training or practice.

Via the MoU, academics from Cambridge University Hospitals will conduct two different paediatric courses at DHCC's Khalaf Ahmad Al Habtoor Medical Simulation Center (KHMSC), located within the Mohammed Bin Rashid Academic Medical Center (MBR-AMC).

The first course, Managing Emergencies in Paediatric Anesthesia (MEPA), aims to give all anesthesiology trainees the opportunity to develop management strategies for emergencies in paediatric anesthesia. The second course, MAnAging Ill Children (MAGIC), covers more common paediatric and neonatal emergencies through the use of high fidelity simulation.

Marwan Abedin, Chief Executive Officer, Dubai Healthcare City commented: "While both theoretical and practical skills are important aspects of medical training, training for independent decision making especially during emergencies is as critical yet not as common. Moreover, it is rarely possible to train medical professionals on the management of the severely ill as not only are such patients scarce but naturally they are even more in need of an experienced physician. The training becomes even more difficult when the patient is a child." MEH

## Advertorial



## Sheikh Khalifa Medical City's Nuclear Medicine Department brings new technology to capital's residents

### State-of-the-Art SPECT/CT Gamma Camera provides instant, precise information

Specialist physicians at Sheikh Khalifa Medical City (SKMC) have shed light on a new state-of-the-art machine being utilised in the hospital.

The machine, which blends two essential and complementary medical imaging technologies on one innovative scanner, provides the ability to capture two types of medical images with the one machine – single photon emission computed tomography (SPECT) and computed tomography (CT).

The SPECT/CT system combines the two images into a single image, and presents combined results to aid physicians in mak-

ing treatment decisions instantly, and with the most precise information available.

“This machine, the only one available in the country, allows for better diagnosis of conditions due to better images,” said Dr Raqwana Baharoon, Consultant Physician in Nuclear Medicine at SKMC.

“It acts like a navigator – rather than a surgeon having to go in and undertake a significant amount of exploration, the SPECT/CT machine localises exactly where the issue is, which the surgeon can then target. It's able to convert life threatening cases into much simpler ones,” Dr Baharoon added.

Dr Baharoon commented that this kind of specialised technology expands the role of nuclear medicine into routine surgical planning, orthopaedics, advanced cardiology and much more.

“For example, prior to the introduction on this machine, if we had a very obese patient going into surgery, cardiac studies would only provide defect images and we could not be totally sure that the patient's heart could sustain surgery. The SPECT/CT machine removes this uncertainty. It offers a precise diagnosis, the exact location of any lesions, as well as attenuation correction,” she added. MEH

# Virus kills Saudi and UAE healthcare workers

At the time of going to press WHO reports that the most recent laboratory-confirmed cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection include cases in Saudi Arabia, United Arab Emirates, Jordan and Oman. Two of the fatal cases include healthcare workers from the UAE and Saudi Arabia.

Globally, from September 2012 to the time of going to press, 28 February 2014, WHO has been informed of a total of 184 laboratory-confirmed cases of infection with MERS-CoV, including 80 deaths.

- On 20 December 2013 a 59-year-old man became sick with fever, cough and shortness of breath in Oman. He was admitted to hospital in North Batinha Governorate on 24 December. On 28 December his condition deteriorated and he was transferred to an intensive care unit and was diagnosed with pneumonia. The patient died on 30 December. Lab tests confirmed MERS-CoV. WHO reports that the patient had a history of daily exposure to camels and other farm animals and also participated in camel race events. In addition, the man was a heavy smoker.

- On 29 December 2013 a 54-year-old man, a healthcare worker from Riyadh, developed respiratory illness symptoms. He was hospitalized on 4 January 2014. The patient received medical treatment in an intensive care unit. He died on 14 January 2014. Samples tested positive for MERS-CoV after his death. The patient was a healthcare worker. He had a history of chronic disease and had no history of contact with animals or contact with known cases of MERS-CoV. In addition, he had no travel history. WHO reported the investigation was ongoing.

- On 31 December 2013 a 48-year-old man from Jordan became ill and developed fever, dry cough, difficulty in breathing, abdominal pain and vomiting. He was admitted to a hospital on 9 January 2014. While there, his condition worsened and on 16 January he was placed on mechanical ventilation. The patient died on 23 January. A sample taken

from the patient on 21 January tested positive for MERS-CoV. WHO reports that the patient had underlying health conditions and had travelled to the United Kingdom from 12 November to 25 December 2013 seeking treatment for his underlying conditions. The patient had no history of animal contact and is believed to have not attended any large social events in the previous 30 days. It is reported that he had received 2 guests from Kuwait between 25 December and 31 December, 2013. Further investigations are ongoing in Jordan and UK.

- On 19 January 2014 a 60-year-old man from Riyadh became ill. He had underlying medical conditions. He was hospitalized on 24 January and died on 28 January. Respiratory specimens confirmed MERS-CoV. Details of his possible contact with animals are unknown, and he has no history of contact with a laboratory-confirmed case.

- Among the six new cases reported from UAE, three were from one family in Abu Dhabi, including a 32-year-old pregnant woman who died on 2 December 2013. Before her death, the woman gave birth to a healthy baby, who had no evidence of MERS-CoV infection.

- One of the recent cases from UAE was a 33-year-old healthcare worker who provided direct care for a 68-year-old patient with laboratory-confirmed MERS-CoV infection. The healthcare worker subsequently developed severe disease requiring mechanical ventilation and haemodialysis. The healthcare worker died on 16 January 2014. The 68-year-old patient, a Dubai man, also subsequently died.

- On 23 January 67-year-old man from Riyadh became ill. He was hospitalised on 25 January. The patient had an underlying medical condition. He had no reported history of contact with animals or with a previously laboratory-confirmed case.

- On 3 February a 22-year-old man from Saudi Arabia's Eastern Region became ill. He was hospitalised on 9 February and died on 12 February 2014. The patient had an underlying

ing medical condition. He had no reported history of contact with animals or a previously laboratory-confirmed case.

## WHO recommendations

Based on the current situation and available information, WHO encourages all Member States to continue their surveillance for severe acute respiratory infections (SARI) and to carefully review any unusual patterns.

The WHO advises that as MERS-CoV infections may be acquired in healthcare facilities there is a need to continue to strengthen infection prevention and control measures. Healthcare facilities that provide care for patients suspected or confirmed with MERS-CoV infection should take appropriate measures to decrease the risk of transmission of the virus to other patients, healthcare workers and visitors. Education and training for infection prevention and control should be provided to all healthcare workers and regularly refreshed.

Early identification of the MERS-CoV is important, but not all the cases could be reliably and timely detected, especially when disease is mild or presents atypically. Therefore, it is important to ensure that standard precautions are consistently used for all patients and all work practices all of the time, regardless of suspected or confirmed infection with the MERS-CoV or any other pathogen. Droplet precautions should be added when providing care to all patients with symptoms of acute respiratory infection, and contact precautions plus eye protection should be added when caring for confirmed or probable cases of MERS-CoV infection. Airborne precautions are indicated when performing aerosol generating procedures.

When the clinical and epidemiological clues strongly suggest MERS-CoV, the patient should be managed as potentially infected, even if an initial test on a nasopharyngeal swab is negative. Repeat testing should be done when the initial testing is negative, preferably on specimens from the lower respiratory tract. **MEH**



# Chinese scientists report first human death associated with new bird flu virus – H10N8

Chinese scientists have identified a new avian flu virus – H10N8 and the first human fatality from this virus has been reported.

The first human fatality was a woman, from Nanchang City in China, who presented to hospital with fever and severe pneumonia on November 30, 2013. Despite antibiotic and antiviral treatment she deteriorated rapidly, developed multiple organ failure, and died 9 days after illness onset.

Tests on tracheal swab samples established that the virus was a new genetic reassortment avian-origin H10N8 virus (JX346). Whole genome sequencing indicated that all the genes of the virus were of avian origin, with six internal genes derived from avian H9N2 viruses that are circulating in poultry in China.

“A genetic analysis of the H10N8 virus shows a virus that is distinct from previously reported H10N8 viruses having evolved some genetic characteristics that may allow it to replicate efficiently in humans. Notably, H9N2 virus provided the internal genes not only for the H10N8 virus, but also for H7N9 and H5N1 viruses,” explained author Dr Yuelong Shu from the Chinese Center for Disease Control and Prevention, Beijing.

“[The results suggested that] JX346 might originate from multiple reassortments between different avian influenza viruses. The H10 and H8 gene segments might have derived from different wild bird influenza viruses reassorted to give rise to a hypothetical H10N8 virus in wild birds, which infected poultry and then reassorted with H9N2 viruses in poultry to give rise to the novel reassortant JX346 (H10N8) virus,” said Dr Shu.


“Importantly, the virus had a mutation in the PB2 gene that is believed to be associated with increased virulence and adaption in mammals, and could enable the virus to become more infectious to people,” explained co-investigator Dr Qi Jin from the Chinese Academy of Medical Sciences and

Peking Union Medical College in Beijing.

Further investigation revealed the woman had visited a live poultry market a few days prior to infection, suggesting the incubation time was about four days, similar to other avian influenza virus infections. However, no H10N8 virus was found in samples collected from the poultry site the patient visited, and the source of the infection remains unknown.

The H10N8 strain was previously isolated from a water sample taken from China’s Dongting Lake in Hunan Province in 2007, and detected at a live poultry mar-

ket in Guangdong province in 2012. But human infection with an N8 subtype has never been reported before.

Co-author Dr Mingbin Liu from Nanchang City Center for Disease Control and Prevention concludes by warning that the pandemic potential of this novel virus should not be underestimated. “A second case of H10N8 was identified in Jiangxi Province, China on January 26, 2014. This is of great concern because it reveals that the H10N8 virus has continued to circulate and may cause more human infections in future.” 

## H1N1 kills 25 in Egypt in 2 months

In Egypt, 25 deaths have been associated with Influenza A (H1N1) pdm 2009 in December and January, according to the WHO.

Egypt’s Ministry of Health and Population notified the WHO of an increase in seasonal influenza activity. In some governorates, severe respiratory illnesses have been reported, of which a few were laboratory confirmed as Influenza A (H1N1) pdm 2009. The WHO said in a statement this type of seasonal influenza pattern has been observed in other countries in the region as well as globally.

The WHO said they are working closely with the Ministry of Public Health and Population in Egypt to continuously assess and monitor the situation.

The influenza A (H1N1) pdm 2009 virus first emerged as a new virus that was responsible for pandemic influenza in 2009. WHO declared the end of the pandemic influenza in August 2010. Since then this virus has been circulating in humans as seasonal influenza virus.


Seasonal influenza viruses can cause mild to severe illness including death. The elderly, children under 5 years, pregnant women and people with un-

derlying chronic health conditions are at higher risk of severe illness and complications.

### Prevention

The WHO issued the following recommendations to prevent the spread of the disease: people who are ill should cover their mouth and nose with a tissue when coughing or sneezing, and wash their hands regularly, stay home when they are unwell, and keep a distance of a least one metre from healthy people, where possible.

WHO recommends annual vaccination against seasonal influenza to prevent severe illness. The currently available seasonal influenza vaccine is protective against the circulating flu viruses including the influenza A (H1N1) pdm 2009.

People should seek medical care if they are short of breath or have difficulty in breathing, or if the fever continues for more than three to five days. For young children, parents should seek medical care if the child has fast or difficult breathing, continuing fever or convulsions. 



Aljalaa Hospital, Benghazi. A patient in the trauma section receives care from a Libyan doctor.

## Arab Spring complicates shifting demands in health sector

A recent report by IRIN news service looks at a new series of papers put together at the American University of Beirut and published by *The Lancet*, which notes that health services in the Arab world are being forced to retool in the face of changing healthcare needs and chronic diseases linked to rising prosperity and aging populations, even as the region grapples with political turmoil and uncertainty.

A series of papers – Health in the Arab World: a view from within – examines the changes and challenges of regional health care. They look at the situation across the Arab League, including, at one end of the scale, Mauritania, Somalia and Yemen, and at the other end, the wealthy Gulf kingdoms. While there are still countries with high levels of child mortality and malnutrition, the region overall has seen remarkable progress over the past 20 years, according to the Global Burden of Disease data, on which the reports are based.

In 1990, malnutrition was still in the top 10 causes of death in the region; by 2010, it had dropped to number 16. Malaria, measles, tuberculosis and meningitis are also down. The biggest killers today are two

non-communicable conditions – heart disease and stroke.

These, along with diabetes, are responsible for a huge and growing burden of chronic ill-health. While this is true in many regions, the Arab world, especially the middle and higher income countries, has particularly strong risk factors: rich and sugary diets; lack of exercise, particularly among women; and very high rates of smoking.

Six out of the 10 countries with the highest incidence of diabetes in the world are in this region. “Most of the Arab countries’ ministries of health are very good at treating,” said Ali Mokdad, a professor at Seattle’s Institute of Health Metrics and Evaluation. “But we need to put more effort into prevention... This is a must for us in the

Measures to reduce smoking, for example, are complicated when eight of the countries in the region have state-owned tobacco companies.

Arab world, to engage the medical system in prevention. We will fail if we don’t do so.”

Women in particular face pressures that militate against healthier lifestyles. “Most women would love to go to [the] gym or play sports,” Egyptian healthcare worker Fawzeya Abdel Aizem, 48, told IRIN. “In the past, men used to like overweight women, but nowadays it’s the opposite. Cultural norms have changed. Women think dif-

ferently. Whether housewives or working women, they're no longer happy about being fat. They would like to go to gym and lose weight. But it's about financial status and time."

At a meeting in London to launch the series, speakers recognized that promoting good health requires action beyond the remit of health ministries. Measures to reduce smoking, for example, are complicated when eight of the countries in the region have state-owned tobacco companies.

Mokdad stressed that the situation requires urgent action, as it is likely to worsen. "Keep in mind that 70% of our population in the Arab world is less than 40," he said. "So we are looking at a nightmare coming ahead of us in terms of the burden of chronic diseases. Even if we maintain the same levels, the fact that our population is increasing and we are ageing means we will be faced with a larger problem."

### Depression among women

The region is also afflicted by an unusually high – and rising – incidence of major depressive disorders and anxiety, especially among women. Even in peaceful parts of the Arab world, stresses on women have grown. Times are hard economically, and as the region undergoes urbanization, people are losing their support networks of friends and family. Women, in particular, become very isolated.

The expectations placed on married women to manage their households can be stifling. "Women are responsible for everything, even if they work. That includes raising their kids, taking care of them, cooking," says Nariman Mohammed, a retired Egyptian accountant.

"My daughter, for example, has kids and has no time to think of anything else other than educating her children. She has to sit literally next to her son, in his first year of college, for him to study because he's so dependent on his mother."

Hoda Rashad, a social science professor at the American University in Cairo, told IRIN: "We are still, in the medical profession, focusing on the mortality indicators. However, in all our countries we are feeling that the frustration of people is quite high. Much more needs to be done on understanding the burden of mental health, but also linking it to some cultural determinants..."

If you are a woman and you are educated and have some income in your hands and then you are denied your potential, there is frustration. That's part of it. The other part is that when you are from some social group and public policies do not protect you enough, so you are under threat – these are our diseases now."

### Unrest takes a toll

The most recent Global Burden of Disease data is from 2010, but health conditions are known to be worse in areas where fallout from the Arab Spring and the "war on terror" have led to ongoing conflict.

In the Levant, which previously had some of the best health services in the Arab world, healthcare systems have been devastated. Refugees are streaming across borders, from Syria and Iraq, often requiring healthcare. Many are members of the middle class, living independently in urban areas rather than in camps, placing the burden on local healthcare providers.

Iraq, which used to have a strong national health system, now rents whole wards in public hospitals in Lebanon to accommodate patients it can no longer treat inside the country.

Omar Dewachi, of the American University of Beirut, told the London meeting: "The war on terror has blurred a lot of the relationships between military and civilian, between healthcare and warfare, and we see how these lines don't exist anymore... One of the things we talk about is how healthcare, or medicine and health, has become not only just an outcome of war but also a tactic of war. It has been used by states and militias, state and non-state actors, in the practice of war."

He cited the example of attacks on hospitals in Bahrain by government forces, which accused the facilities of treating opposition activists.

### Hope for universal healthcare access

Some of the authors of the series saw the Arab Spring, with its original agenda of greater social justice, as an opportunity to improve access to healthcare. User fees are still in force in the Arab world, though they have been abandoned elsewhere; across the region, between 50% and 70% of healthcare costs are now paid out of patients' pockets, a burden that falls most heavily on the poor.

Keep in mind that 70% of our population in the Arab world is less than 40. So we are looking at a nightmare coming ahead of us in terms of the burden of chronic diseases. Even if we maintain the same levels, the fact that our population is increasing and we are ageing means we will be faced with a larger problem.

In a paper on four of the Arab Spring countries – Egypt, Libya, Tunisia and Yemen – the authors point to European and Latin American countries where revolutionary movements and social unrest were drivers for the provision of universally accessible healthcare. This has not yet happened in the recent uprisings, in which the most vociferous demands have been for political and economic concessions.

Yet universal access will prove increasingly important as the region shifts away from infectious diseases and towards chronic conditions. While a poor family may be able to afford occasional private treatment for acute illnesses, the burden of chronic care can only be borne by strong public healthcare systems.

The authors call this "a golden opportunity to capitalize on the social equity dynamic" created by the uprisings. But they also warn: "If policymakers and societies in Arab countries with uprisings do not focus on universal health coverage, it will be lost to the many other priorities and challenges that these countries are facing."

 Health in the Arab world: a view from within  
[www.thelancet.com/series/health-in-the-arab-world](http://www.thelancet.com/series/health-in-the-arab-world)



## Islamic scholars issue declaration stating health workers must be allowed to vaccinate children against polio

The world's leading Islamic scholars, led by the Grand Imam of the Holy Mosque of Mecca, at a meeting in Jeddah in late February, issued a statement calling on all Islamic communities to provide safe access for health workers who are vaccinating children against polio.

In a strongly worded "Jeddah Declaration" they said that protection against diseases is obligatory and admissible under Islamic Shariah, and that any actions which oppose preventive health measures, such as vaccinations, and cause harm to humanity are un-Islamic.

The scholars adopted six-month Plan of Action to address critical challenges facing polio eradication efforts in the few remaining polio-endemic parts of the Islamic world. These included overturning a ban on vaccinations, improving access to children in some areas, preventing deadly attacks on health workers, and clarifying misconceptions by the community about mass vaccination campaigns.

During the first meeting of the Global Islamic Advisory Group (IAG) for polio eradication, religious leaders denounced violence against health workers involved in polio vaccination campaigns, noting that

such violence caused lasting harm to children and communities. The remarks were made in the context of a growing climate of violence against health workers and facilities in situations of conflict and instability, such as in Pakistan, Somalia and Syria.

The scholars reiterated the safety and acceptability in Islam of vaccination against polio, saying it was a sin to claim the contrary and expose children to unnecessary risk. While most of the world – including the Muslim community of nations – is polio-free, the three countries which remain endemic for polio are largely Muslim: Pakistan, Nigeria and Afghanistan.

The scholars expressed alarm that failure to vaccinate and protect children in parts of these countries threatens the rest of the Muslim world. Poliovirus from Pakistan and Nigeria has caused paralytic outbreaks of polio in Syria and Somalia respectively. Both the latter countries have seen their health infrastructures collapse in conflict, leaving children unvaccinated and making outbreak response particularly challenging.

Representing various schools of Islamic scholarship and thought, the IAG was convened following a consultation of leading scholars in March 2013. The group is

intended to bolster the support of the Islamic community and leadership to polio eradication and to communicate trust in the safety and effectiveness of vaccination.

The six-month action plan will also focus on support for Pakistan and Somalia, which have the highest number of children paralyzed by polio. IAG members will speak with national and local religious leaders about the religious duty of parents and communities to protect children and to allow health workers to carry out their duties in safety. The group also resolved to ensure that information on the safety of vaccination is easily available to relevant religious and community leaders and to advocate for financial and technical support for polio eradication with the Islamic donor community.

The IAG is co-chaired by the International Islamic Fiqh Academy and Al Azhar Al Sharif. The Jeddah-based Fiqh Academy and the Cairo-based Al Azhar Al Sharif, together with the Islamic Development Bank and Organization of Islamic Cooperation (OIC) are the major founding members of IAG. The group met at the headquarters of the 57-member OIC in Jeddah, Saudi Arabia. IMEH

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## A DEFINING MOMENT FOR HEALTH IT IN THE REGION

Research

# Ultrasound directed to the brain can boost human sensory performance

US-based Virginia Tech Carilion Research Institute scientists have demonstrated that ultrasound directed to a specific region of the brain can boost performance in sensory discrimination.

Whales, bats, and even praying mantises use ultrasound as a sensory guidance system – and now a new study has found that ultrasound can modulate brain activity to heighten sensory perception in humans.

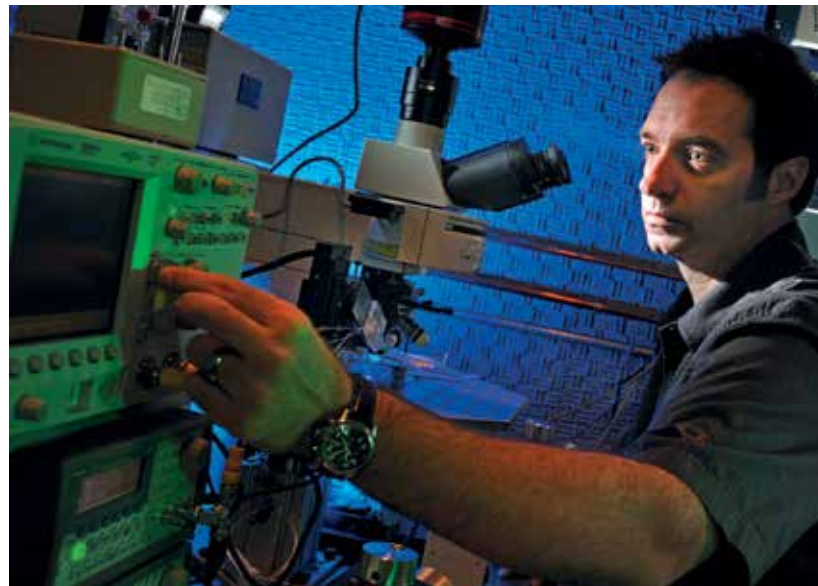
The study, published online January 12, 2014 in *Nature Neuroscience*, provides the first demonstration that low-intensity, transcranial-focused ultrasound can modulate human brain activity to enhance perception.

“Ultrasound has great potential for bringing unprecedented resolution to the growing trend of mapping the human brain’s connectivity,” said William “Jamie” Tyler, an assistant professor at the Virginia Tech Carilion Research Institute, who led the study. “So we decided to look at the effects of ultrasound on the region of the brain responsible for processing tactile sensory inputs.”

The scientists delivered focused ultrasound to an area of the cerebral cortex that corresponds to processing sensory information received from the hand. To stimulate the median nerve – a major nerve that runs down the arm and the only one that passes through the carpal tunnel – they placed a small electrode on the wrist of human volunteers and recorded their brain responses using electroencephalography, or EEG. Then, just before stimulating the nerve, they began delivering ultrasound to the targeted brain region.

The scientists found that the ultrasound both decreased the EEG signal and weakened the brain waves responsible for encoding tactile stimulation.

The scientists then administered two classic neurological tests: the two-point discrimination test, which measures a subject’s ability to distinguish whether two nearby objects touching the skin are truly two distinct points, rather than one; and the frequency discrimination task, a test that measures sensitivity to the fre-



William Tyler, an assistant professor at the Virginia Tech Carilion Research Institute, studied the effects of ultrasound on the region of the brain responsible for processing tactile sensory inputs.

quency of a chain of air puffs.

What the scientists found was unexpected.

The subjects receiving ultrasound showed significant improvements in their ability to distinguish pins at closer distances and to discriminate small frequency differences between successive air puffs.

“Our observations surprised us,” said Tyler. “Even though the brain waves associated with the tactile stimulation had weakened, people actually got better at detecting differences in sensations.”

Why would suppression of brain responses to sensory stimulation heighten perception? Tyler speculates that the ultrasound affected an important neurological balance.

“It seems paradoxical, but we suspect that the particular ultrasound waveform we used in the study alters the balance of synaptic inhibition and excitation between neighbouring neurons within the cerebral cortex,” Tyler said. “We believe focused ultrasound changed the balance of ongoing excitation and inhibition processing sensory stimuli in the brain region targeted and that this shift prevented the spatial spread of excitation in

response to stimuli resulting in a functional improvement in perception.”

To understand how well they could pinpoint the effect, the research team moved the acoustic beam one centimetre in either direction of the original site of brain stimulation – and the effect disappeared.

“That means we can use ultrasound to target an area of the brain as small as the size of an M&M,” Tyler said. “This finding represents a new way of noninvasively modulating human brain activity with a better spatial resolution than anything currently available.”

Based on the findings of the current study and an earlier one, the researchers concluded that ultrasound has a greater spatial resolution than two other leading noninvasive brain stimulation technologies – transcranial magnetic stimulation, which uses magnets to activate the brain, and transcranial direct current stimulation, which uses weak electrical currents delivered directly to the brain through electrodes placed on the head.

“Gaining a better understanding of how pulsed ultrasound affects the balance of synaptic inhibition and excitation in targeted brain regions – as well as how it influences

the activity of local circuits versus long-range connections – will help us make more precise maps of the richly interconnected synaptic circuits in the human brain,” said Wynn Legon, the study’s first author and a postdoctoral scholar at the Virginia Tech Carilion Research Institute. “We hope to continue to extend the capabilities of ultrasound for non-invasively tweaking brain circuits to help us understand how the human brain works.”

“The work by Jamie Tyler and his colleagues is at the forefront of the coming tsunami of developing new safe, yet effective, noninvasive ways to modulate the flow of information in cellular circuits within the living human brain,” said Michael Friedlander, executive director of the Virginia Tech Carilion Research Institute and a neuroscientist who specializes in brain plasticity. “This approach is providing the technology and proof of principle for precise activation of neural cir-

cuits for a range of important uses, including potential treatments for neurodegenerative disorders, psychiatric diseases, and behavioural disorders. Moreover, it arms the neuroscientific community with a powerful new tool to explore the function of the healthy human brain, helping us understand cognition, decision-making, and thought. This is just the type of breakthrough called for in President Obama’s BRAIN Initiative to enable dramatic new approaches for exploring the functional circuitry of the living human brain and for treating Alzheimer’s disease and other disorders.”

A team of Virginia Tech Carilion Research Institute scientists – including Tomokazu Sato, Alexander Opitz, Aaron Barbour, and Amanda Williams, along with Virginia Tech graduate student Jerel Mueller of Raleigh, N.C. – joined Tyler and Legon in conducting the research. In addition to his position

In neuroscience, it’s easy to disrupt things. We can distract you, make you feel numb, trick you with optical illusions. It’s easy to make things worse, but it’s hard to make them better. These findings make us believe we’re on the right path.

at the institute, Tyler is an assistant professor of biomedical engineering and sciences at the Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences. In 2012, he shared a Technological Innovation Award from the McKnight Endowment for Neuroscience to work on developing ultrasound as a noninvasive tool for modulating brain activity.

“In neuroscience, it’s easy to disrupt things,” said Tyler. “We can distract you, make you feel numb, trick you with optical illusions. It’s easy to make things worse, but it’s hard to make them better. These findings make us believe we’re on the right path.”

● doi:10.1038/nn.3620 **MEH**



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# Breast cancer – combining imaging techniques for quicker and gentler biopsies

Taking tissue samples can often be a traumatic experience for breast cancer patients. There are also significant costs associated with the procedure when magnetic resonance imaging is used. Fraunhofer scientists working on the MARIUS project are developing a more cost-effective biopsy method that is easier on patients. They showcased new alternative technologies and techniques combining MR and ultrasound imaging at MEDICA 2013 in Düsseldorf, Germany in November.

How can you tell if a breast tumour is malignant? This isn't a question that ultrasound and X-rays, or even magnetic resonance scans, can answer alone. Doctors must often extract tissue samples from an affected area with a fine needle for detailed examination. This sort of biopsy is often undertaken with the help of ultrasound, with doctors observing a screen for needle guidance. Unfortunately, around 30% of all tumours are invisible to ultrasound. In some cases, magnetic resonance imaging (MRI) is used to ensure correct needle insertion. This process involves two steps: the imaging itself, which takes place inside the MRI scanner, and the insertion of the biopsy needle, for which the patient must be removed from the machine to insert the needle accurately. This process is often repeated several times before the sample is finally taken. This exhausts patients and is also costly, because the procedure occupies the MRI scanner for a significant period.

In the joint MARIUS project (Magnetic Resonance Imaging Using Ultrasound – systems and processes for multimodal MR imaging), experts from both the Fraunhofer Institute for Biomedical Engineering IBMT in St. Ingbert and the Fraunhofer Institute for Medical Image Computing MEVIS in Bremen are working together towards a quicker and gentler alternative.

## Combining imaging techniques intelligently

The new technique would require just one scan of the patient's entire chest at the beginning of the procedure, mean-



MR-compatible ultrasound research platform for multimodal imaging and a combination of the advantages of MR imaging and ultrasound imaging for ultrasound-supported movement tracking of internal organs during MRT imaging.

ing that the patient only has to enter the scanner once. The subsequent biopsy is guided by ultrasound; the system would transform the initial MRI scan and accurately render it on screen. Doctors would have both the live ultrasound scan and a corresponding MR image available to guide the biopsy needle and display exactly where the tumour is located.

The biggest challenge is that the MRI is performed with the patient lying prone, while during the biopsy she lies on her back. This change of position alters the shape of the patient's breast and shifts the position of the tumour significantly. To track these changes accurately, researchers have applied a clever trick: While the patient is in the MRI chamber during the scan, ultrasound probes, which resemble ECG electrodes, are attached to the patient's skin to provide a succession of ultrasound images. This produces two comparable sets of data from two separate imaging techniques.

When the patient undergoes a biopsy in another examination room, the ultrasound probes remain attached and continually record volume data and track the changes to the shape of the breast. Special algorithms analyze these changes and update the MRI scan accordingly. The MR image changes analogously to the ultra-

sound scan. When the the biopsy needle is inserted into the breast tissue, the doctor can see the reconciled MRI scan along with the ultrasound image on the screen, greatly improving the accuracy of needle guidance towards the tumour.

## Ultrasound equipment suitable for use in an MRI Scanner

To realize this vision, Fraunhofer researchers are developing a range of new components. "We're currently working on an ultrasound device that can be used within an MRI scanner," says IBMT project manager Steffen Tretbar. "These scanners generate strong magnetic fields, and the ultrasound device must work reliably without affecting the MRI scan." Ultrasound probes that can be attached to the body to provide 3D ultrasound imaging are also being developed by the team as part of the project.

The software developed for the technique is also completely new. "We're developing a way to track movements in real time by means of ultrasound tracking," explains MEVIS project manager Matthias Günther. "This recognizes distended structures in the ultrasound images and tracks their movement. We also need to collate a wide range of sensor data in real time." Some of the sensors gather



## Recent acquisitions in diagnostic ultrasound market light way for positive year ahead – analyst

Major deals concluded within the diagnostic ultrasound imaging market throughout 2013 translate into “a year to look forward to” in 2014, as innovation is fuelled by heightened demand in what has previously been considered a technologically conservative market, says an analyst with research and consulting firm GlobalData.

According to Niharika Midha, GlobalData’s Analyst covering Diagnostic Imaging, a pattern has emerged across the various deals being undertaken in the diagnostic ultrasound market. The majority of acquisitions made in 2013 have resulted in diversified product portfolios, allowing companies to strengthen their high- and low-end offerings.

Midha says: “A good example of this is Analogic Corporation’s acquisition of Canadian-based Ultrasonix, which resulted in the expansion of Analogic’s ultrasound product portfolio from the offering of its existing ultrasound imag-

ing subsidiary, BK Medical. Analogic paid \$83 million in cash for Ultrasonix, underscoring the former company’s efforts to increase its market presence by introducing systems that can be purchased at different price points.”

Analogic went on to acquire a majority stake in PocketSonics in October 2013, further enhancing its pipeline on the point-of-care ultrasound front. GlobalData expects strong growth for Analogic’s ultrasound business segment in the coming fiscal year, as point-of-care technology and price-sensitive economies are estimated to offer maximum potential for expansion. Indeed, the company’s ultrasound business generated 27% of its fiscal year revenue in 2013.

Another major deal was the acquisition of Zonare Medical Systems by Chinese ultrasound manufacturer Mindray, for \$102 million. This has allowed Mindray to capture a share in the high-end ultrasound market and will ultimately enable it to gain additional share in all developed

nations where it currently lags behind other market players.

The year ended with Konica Minolta acquiring the ultrasound business segment of Panasonic Healthcare. Konica Minolta, which is keen on venturing into this space, launched a handheld system in December 2013, while adding products from Panasonic Healthcare’s portfolio, effective in January 2014.

Midha continues: “We’re expecting similar deals to continue taking place throughout 2014, as giant firms look to expand their product portfolios by swallowing up smaller companies that have developed novel technologies with proven superiority to existing products.

“Diagnostic ultrasound is currently the most widely used and steadily growing imaging technique across the globe, and acquisitions provide an opportunity both for established companies to increase their presence in the market and for new players to gain entry,” the analyst concludes. **MEH**

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... continued from page 38

data about the position and orientation of the attached ultrasound probes while others track the position of the patient.

The team showcased the entire concept and an initial demonstrator of the technology in November at the MEDICA 2013 trade fair in Düsseldorf. The next version is set to be completed next year. Whereas the IBMT team is developing the hardware and new ultrasound techniques, the MEVIS working group is concentrating on the software.

The primary objective of MARIUS is to develop ultrasound tracking to aid breast biopsies. Nevertheless, the developed components could also be used in other applications. For instance, the MARIUS system and its movement-tracking software could allow slow imaging techniques such as MRI or positron emission tomography (PET) to accurately track the movements of organs that shift even when a patient is lying still. Aside from the liver and the kidneys, which change shape and position during breathing, this includes the heart, whose

contractions also cause motion. Thanks to a technique applied to reconstruct the image, the heart would appear well defined on MRI scans instead of blurred. The jointly developed technology could also be applied to treatments that use particle or X-ray beams. For tumors located in or on a moving organ, the new technology could target the rays so that they follow the movement. These beams could hit the tumor with more precision than currently possible and reduce damage to healthy surrounding tissue. **MCH**

## Research

# Study on MRI-ultrasound for targeted prostate biopsy shows improved sensitivity

Using Magnetic Resonance Imaging-Ultrasound (MRIUS)- guided prostate biopsy has high sensitivity to detect prostate abnormalities compared with transrectal ultrasonography (TRUS biopsy) of MRI positive findings.

The study won the first prize from Karl Storz for best poster at the EAU 13th Central European Meeting (CEM) held in October last year in Prague, Czech Republic.

“The systematic 12-core transrectal ultrasound guided biopsy (TRUS biopsy) which is currently considered the standard of care for the diagnosis of prostate cancer (PCa), misses many small, non-palpable and ultrasound invisible lesions,” said presenting author Anna Katarzyna Czech of the Dept. of Urology, Jagiellonian University in Krakow, Poland.

Although the new imaging modalities, including MRI, have improved the rate of tissue abnormality detection, Czech said these procedures are time consuming and uncomfortable for a patient which limits their use. “However, by fusing MRI with TRUS images it became possible for the urologist to perform the MRI guided TRUS biopsies in the office setting,” she added.

In their study, Czech and colleagues used the real-time fusion of TRUS images with previously recorded MR images

(MRIUS), based on linear interpolation of pixels. Eighty men, who had prostate lesions detected exclusively in the transrectal prostate magnetic resonance imaging, were included in the study. All men were randomised into two groups (40 patients each) and underwent TRUS guided biopsy.

In group I, TRUS biopsies of MRI identified lesions were performed, while in group II: biopsies of the lesions visualised in MRI were performed using MRIUS method which allowed for the real-time fusion of TRUS images with previously recorded MR images.

Histopathological examination of TRUS guided prostate biopsy of MRI identified lesions was positive for prostate cancer in 8 cases, for ASAP and HGPIN in 3 and for chronic prostatitis in 5. No microscopic pathologies were identified in 24 patients. In group II, there were 17 cases of prostate cancer, 8 of ASAP and HGPIN, and 8 of chronic prostatitis found. In 8 out of 40 men, histopathological examination identified no abnormalities.

In their results, the researchers said MRI-US guided prostate biopsy yielded 22.5%, 10% and 7.5% more prostate cancer, ASAP and HGPIN and chronic prostatitis cases, respectively compared with TRUS biopsies of the MRI identified lesions.

The sensitivity to identify microscopically confirmed prostate abnormalities was

40% (95% CI: 24.9-56.7) with TRUS guided prostate biopsy of MRI identified lesions and 80% (95% CI: 64.4-90.9) with MRIUS method. This difference was statistically significant (p=0.001).

“Fusion technology guided biopsy yielded 42.5% more prostate abnormalities than the TRUS biopsy of MRI positive lesions. Moreover, MRIUS targeted biopsies were sufficient in all PCa cases to determine their clinical significance, making the fusion technology a potential solution for the patients with clinical suspicion of prostate cancer,” explained Czech.

She added that further research will determine the relevance of an endorectal coil used during MRI for prostate deformation, and gland volume measurements, as well as the feasibility of MRIUS in order to detect PCa in larger prostates.

She also noted that the use of 3Tesla MRI for fusion technology, which would eliminate use of endorectal coil, needs to be investigated. Despite these limitations the authors pointed out that MRIUS guided prostate biopsy has high sensitivity to detect prostate abnormalities. “It markedly improved ability to detect clinically significant lesions compared with TRUS biopsy of MRI positive findings,” they said. **MCH**

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# New designer drug shows fast onset of sedation and quick recovery

Developed using molecular-level techniques, the “designer” sedative drug remimazolam provides a promising new alternative for sedation in patients undergoing colonoscopy, reports a study in the November 2013 issue of *Anesthesia & Analgesia*, official journal of the International Anesthesia Research Society (IARS).

“Remimazolam has the attributes of a sedative drug, with success rates comparable with recent studies of other drugs,” according to the new research, led by Dr Mark T. Worthington of Johns Hopkins Hospital, Baltimore.

## Benzodiazepine-type sedative

The researchers evaluated the use of remimazolam, a new benzodiazepine-type sedative drug, for sedation in patients undergoing colonoscopy. As described in a recent article in *Anesthesia & Analgesia*, remimazolam is an example of new anesthetic and sedative drugs being developed with the use of molecular-level techniques. Remimazolam was specifically designed to have a faster onset, more predictable effects, and shorter recovery time



compared to currently available sedatives.

In the “dose-finding” study, 44 volunteers received one of three different doses of remimazolam. Across dose groups, remimazolam successfully provided an adequate level of sedation for colonoscopy in three-fourths of patients.

Remimazolam achieved adequate sedation less than one minute after drug

administration. Afterwards, all subjects “rapidly recovered to fully alert” – the median recovery time was less than 10 minutes.

A few subjects did not achieve adequate sedation or had minor adverse events, such as a drop in blood pressure. There were no serious or unexpected adverse events, however.

## Large study reports increased risk of death in patients

Patients receiving the widely used anaesthesia drug etomidate for surgery may be at increased risk of mortality and cardiovascular events, according to a study published in the December 2013 issue of *Anesthesia & Analgesia*, official journal of the International Anesthesia Research Society (IARS).

The study adds to safety concerns over etomidate’s use as an anaesthetic and sedative drug.

“There is accumulating evidence for an association between mortality and etomidate use, both in critically ill patients and now in [non-critically ill] patients under-

going noncardiac surgery,” according to an editorial by Drs Matthieu Legrand and Benoît Plaud of Paris-Diderot University.

The editorial comments on a new study by Dr Ryu Komatsu of the Cleveland Clinic and colleagues, who assessed the risk of adverse outcomes in patients receiving etomidate for induction of anaesthesia. Rates of death and cardiovascular events in about 2,100 patients receiving etomidate were compared to those in a matched group of 5,200 patients receiving induction with a different intravenous anaesthetic, propofol. All patients had severe but non-critical medical con-

ditions – ASA physical status III or IV – and were undergoing noncardiac surgery.

The results showed significantly higher risks in patients receiving etomidate. The etomidate group had a 250% increase in the risk of death within 30 days. (Absolute risk of death was 6.5% with etomidate versus 2.5% with propofol.) Patients receiving etomidate also had a 50% increase in the risk of major cardiovascular events.

The results are “striking and troubling”, but the study is not the first to raise safety concerns over etomidate, according to Drs Legrand and Plaud write.

Further experiments showed that the sedative effect of remimazolam could be rapidly reversed using flumazenil – an approved medication that blocks the benzodiazepine receptor. Patients regained full alertness within one minute after flumazenil injection.

Colonoscopy is commonly performed as a screening test for colorectal cancer. For this and other brief medical procedures, some form of sedative is needed to minimize patient discomfort and optimize performance of the procedure. The ideal sedative would have a fast onset and good quality of sedation, along with rapid recovery time.

Conventional benzodiazepines provide effective sedation but relatively long recovery times – patients may not return to their normal level of alertness and functioning for several hours after the procedure. The new study is the first to compare the effects of various doses of remimazolam as sedative for colonoscopy.

The new results show “very encouraging” success rates with remimazolam, Dr Worthington and coauthors write. With its fast onset and quick recovery time – including the ability to reverse sedation almost immediately, if needed – remimazolam could be a valuable new sedative option for use in colonoscopy and other brief medical procedures. However, the researchers note that further studies will be needed to “refine the optimal dosing regimen” before remimazolam goes into widespread clinical use.

● doi: 10.1213/ANE.0b013e3182a705ae

## Researchers identify technique to reduce children’s post-op pain after high-risk surgery

Researchers at Children’s Hospital of Orange County (CHOC Children’s), one of the United States’ 50 best children’s hospitals, have identified a new technique that will significantly decrease pain for children following high-risk urology surgeries. Findings of the pain management technique were published in the December 2013 online issue of the *Journal of Pediatric Urology*.

“While pain management is a fundamental part of pediatric surgical recovery and care for pediatric patients, current options involve strong prescription painkillers that can put patients at risk for adverse side effects and possible complications,” said study investigator Antoine E. Khoury, M.D., chief of pediatric urology at CHOC Children’s. “This study demonstrates a major advancement in pain management for pediatric urology patients, significantly reducing postoperative pain and the need for pain medicine.”

The research team evaluated continuous infusion of local anesthesia using the ON-Q pain relief system to improve pain control in children undergoing urological procedures. While the ON-Q system is well-established as an effective pain management technique for adults, this is the first study

that evaluates its pain management effectiveness in children.

Study results found that the ON-Q pump system decreased the amount of pain experienced by children on the first and second postoperative days, and that it significantly reduced the need for narcotics. During the study, nurses assessed patients’ pain using the Visual Analog Scale (VAS) and the Face, Legs, Activity, Cry, Consolability Scale (FLACC), depending on the child’s age, for both the test group and a control group, which received standard-of-care pain management.

The pump delivers the anesthetic in an automatic continuous drip, so patients and their caregivers don’t have to worry about adjusting the dosage. It is also contained in a pouch, so kids are able to move freely as they recover. Researchers recommend conducting additional clinical studies to further validate this technique as a superior option for postoperative pain management in children undergoing surgery.

**Reference:** Hidas G., et al., Application of continuous incisional infusion of local anesthetic after major pediatric urological surgery, *Journal of Pediatric Urology* (2013). **MEH**

## receiving etomidate for anaesthesia

Previous reports have suggested an increased risk of death in patients receiving etomidate in emergency situations or during critical illness, particularly sepsis. Subsequent randomized trials did not show an increased risk of death in critically ill patients receiving etomidate.

### Butterfly effect

It’s unclear how etomidate – a drug with only short-lasting effects – can affect patient outcomes several weeks later. Borrowing a metaphor from physics, Drs Legrand and Plaud suggest that it may represent a so-called butterfly effect, with “very small

differences in the initial state of a physical system [making] a significant difference to the state at some later time”.

While noting that the new study has some important limitations, Drs Legrand and Plaud write: “These findings are of major importance in light of the high number of patients who potentially receive etomidate each year worldwide.”

Large-scale studies will be needed to definitively establish the safety of etomidate; a study in critically ill patients is already underway.

Pending those results, the editorial authors conclude: “Since safe and efficient

alternatives exist, a wise choice might certainly be the use of other anaesthetic agents for induction of anaesthesia.”

● doi: 10.1213/ANE.0000000000000003

The etomidate group had a 250% increase in the risk of death within 30 days. These findings are of major importance in light of the high number of patients who potentially receive etomidate each year worldwide.

# Automated system promises precise control of medically induced coma

Putting patients with severe head injuries or persistent seizures into a medically induced coma currently requires that a nurse or other health professional constantly monitor the patient's brain activity and manually adjust drug infusion to maintain a deep state of anaesthesia. Now a computer-controlled system developed by Massachusetts General Hospital (MGH) investigators promises to automate the process, making it more precise and efficient and opening the door to more advanced control of anaesthesia. The team, including colleagues from Massachusetts Institute of Technology (MIT), reports successfully testing their approach in animals in *PLOS Computational Biology*.

"People have been interested for years in finding a way to control anaesthesia automatically," says Emery Brown, MD, PhD, of the MGH Department of Anaesthesia, Critical Care and Pain Medicine, senior author of the report. "To use an analogy that compares giving anaesthesia to flying a plane, the way it's been done is like flying a direct course for hours or even days without using an autopilot. This is really something that we should have a computer doing."

As part of a long-term project investigating the physiological basis of general anaesthesia, Brown's team at MGH and MIT has identified and studied patterns of brain activity reflecting various states of anaesthesia. One of the deepest states called burst suppression is characterized by an electroencephalogram (EEG) pattern in which brief periods of brain activity – the bursts – are interrupted by stretches of greatly reduced activity that can last for

seconds or longer. When patients with serious head injuries that cause a build-up of pressure within the skull or those with persistent seizures are put into a medically induced coma to protect against additional damage, the goal is to maintain brain activity in a state of burst suppression.

Although anesthesiologists have had computer-assisted technologies for many years, no FDA-approved system exists that completely controls anaesthesia administration based on continuous monitoring of a patient's brain activity. Until the current study, Brown notes, no one had demonstrated the level of control required for a completely automated system. Keeping patients at a precise level of brain activity for several days, as required for medically induced coma, appeared to be both a feasible goal and one that cried out for the sort of computer-controlled system called a brain-machine interface.

Adapting programs they had previously developed to analyze the activity of neurons, Brown's team developed algorithms to read and analyze an EEG pattern in real time and determine a target level of brain activity – in this case the stage of burst suppression. Based on that target, an automated control device adjusts the flow of an anesthetic drug to achieve the desired brain state, and real-time analysis of the continuous EEG readings is fed back to the system to insure maintenance of the target. When the researchers tested their system in a rodent model, the actual EEG-based measure of burst suppression tracked the target trajectory almost exactly.

"As far as we know, these are the best results for automated control of anaesthesia that have ever been published,"

As far as we know, these are the best results for automated control of anaesthesia that have ever been published.

says Brown, who is the Warren M. Zapol Professor of Anesthesia at Harvard Medical School and the Edward Hood Taplin Professor of Medical Engineering and Computational Neuroscience at MIT. "We're now in discussions with the FDA for approval to start testing this in patients." The MGH has also applied for a patent for the technology.

Among the benefits of such a system, Brown explains, would be the ability to maintain medical coma at a more precise, consistent level than can be done manually and using lower doses of anaesthetic drugs, a reduction that is possible with any computer-assisted technology. Eliminating the need to devote one intensive-care nurse on each shift to continuous monitoring of one patient would significantly change ICU staffing needs. Further development of the system to control and maintain the full range of anaesthesia states should introduce a powerful new tool to the entire field.

● doi: 10.1371/journal.pcbi.1003284

# OpenAnesthesia app version 2.0 released for anesthesiology residents, physicians

The International Anesthesia Research Society (IARS) has released version 2.0 of its self-study app for its educational initiative OpenAnesthesia (OA) for anesthesiology residents, CRNAs, SRNAs and physicians. A new set of 150 review questions has been added, for in-app purchase, for a total of 351 questions. The app is free to download on the Apple App Store.

In addition to more questions, a new feature of the app is Community Responses. Users can see how their peers answered the same question. For app keywords, dynamic synching has been added to provide the latest definitions and updates, which are made daily to keywords on [OpenAnesthesia.org](http://OpenAnesthesia.org).

Edward C. Nemergut, MD, founder of OpenAnesthesia, says: "The 2.0 release of our Self-Study app brings us closer to our

goal of community learning and real-time self-assessment. The enthusiastic reception of the Self-Study app supports our hypothesis that learners value the content on OpenAnesthesia, as well as a study tool that is convenient to use any time."

The OA Self-Study App for the iPhone and iPad is designed to help resident anesthesiologists, physicians, and those in the related health professions to improve their knowledge of basic and advanced concepts of the field. The OA app contains all anesthesiology keywords from 2008-2013 and features more than 350 questions that review essential core concepts. Each question has been written by a physician editor and contains a full explanation of the answer, along with links to related keywords and reference material in OpenAnesthesia, PubMed, and the journals *Anesthesia & An-*

*algnesia and A&A Case Reports*.

OpenAnesthesia, sponsored by the IARS, was founded in 2009 and has quickly become a leading reference source for anesthesiology residents, physicians, CRNAs and other medical professionals. The OpenAnesthesia website has become one of the most widely used references for resident anesthesiologists and physicians. The site offers numerous content sources anesthesiology, including a rich multimedia section with podcasts, TEE of the Month, Article of the Month, video summaries of issues of *Anesthesia & Analgesia*, Question of the Day, and Virtual Grand Rounds in Obstetric Anesthesia. OA also serves as a medical wiki that allows users to instantly author and edit medical content related to anesthesiology.

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# More than 3900 companies exhibit at Arab Health

Arab Health, organised by Informa Life Sciences Exhibitions, took place from 27-30 January this year at the Dubai International Convention & Exhibition Centre. More than 3900 companies from 63 countries exhibited their products and services.

There were 19 healthcare conferences with an estimated 9000 delegates.

The exhibition also included for the first time a training centre where specialists ran hands-on training sessions using the latest medical equipment and technology.

*Middle East Health* attended the event and spoke to many exhibitors and representatives of national pavilions. Following is a brief selection of what some exhibitors had to say about their products.

## Carestream introduces small x-ray detector for paediatric imaging

*Middle East Health* spoke to Maurice Faber, Carestream's new regional General Manager for Emerging Markets, about the company's product portfolio with respect to the Middle East market.

At Arab Health, Carestream exhibited their portfolio of x-ray systems and healthcare information solutions.

### Paediatric imaging

Specifically they showed a new integrated system of hardware and software tailored to the specific needs of paediatric imaging. The system is designed to provide excellent image acquisition, processing and review.

Faber noted that the solution includes the "Carestream DRX 2530C detector, which is unique in the market as it is small enough to fit into an incubator".

The 25cm X 30cm detector is designed to fit into paediatric incubator trays and offers higher DQE (detective quantum efficiency), which reduces radiation dose compared to CR cassettes or gadolinium scintillator detectors.

### New image acquisition software

"We have also introduced new image acquisition software for our PACS," Faber said. "It is designed to support Carestream's wireless DR and CR imaging systems. It is also compatible with our mini PACS."



The Carestream DRX 2530C detector for paediatric imaging

The software, called Image Suite, offers Web-based patient scheduling, image review and reporting, and flexible archiving solutions.

The company is also improving their Vue PACS Digital Breast Tomosynthesis Module as work in progress. This new module is scheduled to include the display of DICOM-compliant 2D synthetic views, which are calculated from the 3D dataset. The use of synthetic views is being considered as an alternate approach to reducing dosage to patients while allowing full advantage of the benefits of digital breast tomosynthesis.

Carestream has another work in progress: a new generation of their Vue RIS platform that will offer integrated RIS/PACS reporting which will expedite physician access to



Maurice Faber, Carestream's new regional General Manager for Emerging Markets

patient information and images.

Talking business, Faber noted that the company continues to receive a lot of requests for its DRX technology to convert analog x-ray to digital.

He added that they had recently won a large tender from the Saudi Ministry of Health to supply products from their entire portfolio to hospitals run by the MOH. Faber declined to give details, but it is well known the MOH has embarked on a massive hospital infrastructure development programme which spans the whole kingdom. He reiterated that Saudi Arabia remains their biggest market in the region "and the UAE is strong", and added "the Middle East is the strongest market of all emerging markets in terms of growth". MEH



# Carefusion show off new technologies

CareFusion, a leading global medical technology company, introduced several new health care solutions at the Arab Health expo to help hospitals in the GCC region improve medication management and respiratory care.

The new health care solutions help to solve challenges for hospitals in safely storing, dispensing and administering medication, improving respiratory care practices and improving infection prevention protocols. While the new solutions ultimately benefit patients, the technologies were designed to create a more cohesive partnership among nursing, pharmacy, respiratory therapists, surgeons, IT and hospital administration to streamline processes and reduce variation in care. In addition, CareFusion has

developed interoperability solutions to enable its devices and technologies to share data with other health care information technology systems from companies including Cerner and Epic.

“Our technologies help hospitals standardize and simplify their processes, which help improve safety and efficiency of caring for patients,” said Maher Elhassan, vice president for the Middle East and South Africa region for CareFusion, based in Dubai. “Through improving medication management, respiratory care and infection prevention, we can help hospitals improve the quality and reduce the cost of care.”

## Medication management

With new Pyxis Pharmogistics software to help manage inventory and workflow,

combined with the new Pyxis ES platform, CareFusion is introducing its most advanced medication management solution to date to the GCC region. Pharmaceutical inventory management is a critical component to controlling costs, and Pyxis Pharmogistics software from CareFusion can help manage the right amount of inventory for a hospital or health system. The software enables near real-time visibility across a health system to help hospitals keep costs down and free-up pharmacy staff to redeploy to clinical activity. All medications can be scanned upon receipt at the hospital with Pyxis Pharmogistics software creating an enterprise-wide inventory management model to help ensure optimized inventory levels and visibility across the hospital or health system.

# Philips celebrates 100 years of research

Philips is celebrating 100 years of research this year and to mark the occasion the company is introducing three new and innovative imaging products – the Vereos PET/CT, the first PET/CT system in the industry to use digital silicon photomultiplier detectors instead of traditional analog detectors; IQon Spectral CT, the world's first spectral-detector CT system; and a premium ultrasound system called EPIQ.

All three imaging systems were on show at Arab Health. Middle East Health spoke to Diego Olego, Chief Strategy and Innovation officer, Philips Healthcare and Diederik Zeven, General Manager, Philips Healthcare Middle East & Turkey about the new products.

## Vereos PET/CT

The new digital Vereos PET/CT provides significantly improved performance compared to analog systems including an approximately two-times increase in sensitivity gain, volumetric resolution and quantitative accuracy compared to analog systems, such as Philips' GEMINI TF 16. Olego points out that these radical improvements can ultimately be translated into high image quality, increased diagnostic confidence, improved treatment planning and faster workflows.

Olego explained that with the new system less radioactive tracer is required to produce PET images compared to analog systems, which is a major benefit for the patient.

“The system has much better temporal

and spatial resolution,” he said. “And the dynamic range is far superior to the analog system.”

The system has the shortest bore in the industry and has integrated ambient lighting.

## IQon Spectral CT

The IQon Spectral CT system is the world's first spectral-detector CT system built from the ground up for spectral imaging. It uses colour to identify the composition of an image without involving time-consuming protocols. In the same way that white light is made up of a spectrum of colours, the X-ray beam used in CT scanners also consists of a spectrum of X-ray energies. With the development of a fundamentally new spectral detector that can discriminate between X-ray photons of multiple high and low energies simultaneously, Philips' IQon Spectral CT adds a new dimension to CT imaging, delivering not only anatomical information but also the ability to characterize structures based on their material makeup within a single scan.

After a spectral CT examination, clinicians can interpret the conventional grey-scale anatomical images, and if necessary, access the spectral information that was acquired during the same scan. The IQon Spectral CT system's retrospective on-demand data analysis is made possible via Philips' iPatient platform, allowing clinicians to easily experience the benefits of spectral CT routinely within traditional radiology workflows.


Philips has consistently driven innovation in CT, explained Zeven, most recently with the introduction of its proprietary Iterative Model Reconstruction (IMR) technology to simultaneously reduce CT radiation dose and enhance image quality for a broad range of applications.

Olego explained that all these products are designed with ease of use in mind. And this applies directly to one of the key issues in healthcare – retaining trained people.

“You may think that by introducing these new products radiologists will need to be retrained to use them, but they are all easy to use with one clear function for anatomical scans, including clinical reference, etc – which all results in more efficient and cost-effective workflow,” said Olego.

## EPIQ ultrasound

Philips' EPIQ ultrasound system delivers excellent image resolution and detail along with exceptional levels of information. It was designed to meet the needs of the contemporary ultrasound department, providing enhanced clinical information and faster, more consistent exams that are easier to perform.

Philips' proprietary nSIGHT imaging architecture introduces a totally new approach to forming ultrasound images, offering an exceptional level of clinical performance. Unlike conventional systems that form the image line by line, nSIGHT creates images with optimal resolution down to the pixel level. 

# Immunotherapy for cancer research shows promise

Researchers at Baylor St Lukes Medical Center, Houston, Texas have seen some promising results from immunotherapy treatment for cancer patients. *Middle East Health* spoke to Luis H. Camacho, MD, MPH, the director of the Cancer Center at the medical center about their research on immune mediated therapies for oncology.



Luis H. Camacho, MD, MPH

“Our research [at Baylor St Lukes] focusses on four different patient populations: Those with pancreatic cancer; patients with liver disease – as we have a very large liver transplant programme; patients with endocrine cancers; and patients with neoplastic conditions – cancer in general,” explained Dr Luis H. Camacho.

“For these patients we do have phase 1 clinical trials ongoing to test new drugs. One of these is for a combination of immunotherapy with novel targeted molecular therapies – which target different molecular changes within cancer cells.”

Looking specifically at immune mediated therapies for patients with solid tumours, he explained that the research is focussed a lot on the antibodies for PD-1 receptors and its ligand PD-L1.

PD-1 is a 288 amino acid cell surface protein molecule that in humans is encoded by the PDCD1 gene. PD-1 stands for ‘Programmed Death -1’ receptor and PD-L1 is the ‘Programmed Death Ligand 1’ receptor on cancer cells that negatively regulate the immune system. “So that once you bind the receptors you enhance the body’s immune

system and its ability to attack the cancer, as the immune system can now recognise antigens and proteins on the surface of cancer cells,” Dr Camacho explained.

“In essence it is a reverse effect and the beauty of this is you are not really targeting the tumour, you are targeting the host.”

The studies published to date targeting PD1 and its ligand PD-L1, demonstrate that antibodies targeting this pathway may also induce substantial anti-tumour with durable responses in patients with different tumour types. Preliminary data also suggest a safer and manageable toxicity profile.

“What we have seen, especially with patients with lung cancer [non-small cell lung cancer], they have the ability to respond to these treatments about 20-30% of the time, which is huge, as in the past lung cancer has never been amenable to this treatment.

“The median survival for a patient with metastatic lung cancer is about a year and now a third of these patients who do respond, do so for about two years and their disease either becomes stable or shrinks.”

He said some of this research is in the phase 2, phase 3 trial stages and maybe by

the end of this year the companies involved will begin applying for FDA approval.

Dr Camacho explained that the upside of this is that the side-effects are different compared to chemotherapy or radiotherapy. By blocking these receptors your immune system is strengthened, although by doing this, your immune system can attack your own organs that are susceptible to this which can result in side-effects such as diarrhoea, broncho-spasms or hypothyroidism for example. “These side-effects are on the whole manageable. They are different side-effects – patients don’t lose their hair or suffer nausea, for example.”

He said the treatment does look promising as the response to this treatment is generally more durable. “The response to chemotherapy generally lasts four to six months, whereas with this treatment it can be a year or more.” He noted that some patients he has treated have had a positive response to treatment for several years. **MEH**

## EKF Diagnostics announces breakthrough

EKF Diagnostics, the global *in vitro* diagnostics business, announced a major breakthrough for its ‘PointMan’ DNA enrichment technology for potential use in future cancer testing and treatment.

The first successful results of a collaboration between EKF Molecular Diagnostics and the Institute of Life Sciences at Swansea University have demonstrated the detection of gene mutations in blood from samples archived in the Wales Cancer Bank. The Com-

pany’s PointMan technology was used to analyse the whole blood of cancer patients diagnosed with metastatic melanoma (skin cancer that has spread) enabling the identification of gene mutations associated with response to drug treatment.

Crucially, the results observed for mutations in the gene BRAF were consistent with the formalin fixed paraffin embedded (FFPE) tissue samples. FFPE being the laboratory standard method to prepare all biopsy samples for pathology review in order to diagnose

the cancer. These results have been confirmed by DNA sequencing which had failed to identify the mutations prior to sample enrichment through EKF’s PointMan technology.

Dr Ricardo Del Sol, Senior Lecturer, ILS Swansea University, commented: “These results are a clear indication of the potential for PointMan to enable the use of a blood sample to assess the mutation status of cancer patients. We look forward to continuing this important work with EKF Molecular to validate our findings.”

# Sobhi Batterjee wins Arab Health 2014 award for 'Outstanding Contribution of an Individual to the Middle East Healthcare Industry'

## Saudi German Hospitals Group wins two awards at Arab Health

Arab Health, the largest healthcare conference and exhibition in the region, honoured Engr. Sobhi Batterjee, President and CEO of Saudi German Hospitals Group with the prestigious Arab Health 2014 award for Outstanding Contribution of an Individual to the Middle East Healthcare Industry.

Saudi German Hospitals Group - Jeddah Orthopaedic Department also received an award for excellence in surgery services.

Engr. Batterjee said he dedicates this award to the Arab community and noted that this was possible with the dedication of over 6,000 SGH staff. He added: "This award increases the commitment of the Group to continue its dedicated work for the benefit of the community even with greater vigour and to provide quality healthcare services through innovative business models."

Engr. Batterjee's dedication and efforts have been recognized regionally and received many prestigious awards which include H.H. Sheikh Mohammad Bin Rashid Al Maktoum Award for the 'Best Arab Management Personality', Healthcare Industry CEO Award, National



Engr. Sobhi Batterjee (right), President and CEO of Saudi German Hospitals Group, receives the Arab Health 2014 award for Outstanding Contribution of an Individual to the Middle East Healthcare Industry.

Medal of Cedar – Grade Knight by the Government of Lebanon, Ernst & Young (E&Y)'s Entrepreneur of the Year award for the MENA region, among others.

Saudi German Hospital Group, established more than 25 years ago, is the premier group in the region offering world class services and facilities. SGH Group is the largest healthcare group in the region

and all its hospitals are JCI accredited to ensure highest standards of care to all its patients.

The SGH Group has also been recognised for being in the list of Top 100 Saudi Brands, 50 most admired companies of the GCC, Employer Achievement Awards 2013, Rated as Number One Healthcare Brand in the region. **MEH**

## in DNA enrichment technology

Julian Baines, CEO of EKF, commented: "This is a major step forward not just for the Company but also for the future testing of cancer patients where we hope that less-invasive testing will become routine using our PointMan technology. We are looking forward to continuing to work with ILS Swansea to continue to build the evidence base. Further evidence will be generated from other collaborations and I look forward to providing further updates during 2014."

EKF Molecular's portfolio of PointMan

DNA enrichment products include; BRAF, KRAS, EGFR, NRAS and JAK2. PointMan, is a real-time PCR technology that provides reliable and extremely sensitive detection for cancer mutations. It is highly efficient in amplifying the target sequence of interest, whilst suppressing amplification of the wild-type. The resulting sample is effectively enriched for the mutation, thereby having the potential to offer industry leading sensitivity in a wide variety of sample types, including whole blood. This is dem-

onstrated in the ILS Swansea study.

Julian Baines added: "This achievement is in line with the Company's vision to change current DNA extraction and detection practices and address the fast growing companion diagnostics market. Current collaborations focus on the unmet requirements for patient monitoring from a peripheral sample thereby negating the requirement for a surgical procedure to obtain a tissue biopsy and screening for early cancer diagnosis." **MEH**

Advertorial



## New generation of Operating Room Management Systems: more flexible application, secure data

Medical instrument manufacturer Richard Wolf presents 'core nova' at this year's Arab Health

Operating Room Management Systems have made a significant contribution toward increasing efficiency in hospitals through central control of all equipment in the operating room, digital access to all preoperative patient data, and direct documentation of operations. The new generations of Operating Room Management Systems offer users a significantly more flexible area of application, simplified installation and they are also intended to permit safe and authorized access to patient data and medical devices in compliance with the latest data protection guidelines. A unique feature of this system is the newly developed Operating Management System 'core nova' which medical instrument manufacturer Richard Wolf is presenting in the public domain at this year's Arab Health. According to information provided by the manufacturer, 'core nova' sets new standards for system scalability and data security.

"By contrast with the previous model, 'core nova' is ideally suited to operating theaters in hospitals and larger medical practices because it has the option of individual, scalable adjustment to suit individual requirements. This means that the system can be integrated in existing IT and server infrastructures. It can also be deployed for mobile applications on a conventional video cart. Irrespective of whether it is a mobile or fixed application of the system, the exchange of all patient data

takes place exclusively over an encrypted and secure network. For example, access to the connected devices and data is restricted by certificates to authorized users. Operations can also be monitored and logged," according to Timo Haller, Head of Product Marketing Integration at Richard Wolf.

Functions which are distributed over lots of individual devices in the management systems currently on the market have been integrated within a few units in 'core nova'. This has made the footprint of the system noticeably smaller. Power consumption has been noticeably reduced and purchase costs have been brought down significantly. The proven simple operation of the system from the previous 'core model has been further improved. For example, 'core nova' uses a simple network cable to link up the instruments and systems being controlled, ranging from documentation, through operating-room lamps and tables, to several user workstations, and software providing independent recognition without any adjustments having to be made ("Plug & Play"). This significantly reduces the workload for IT managers.

When IT managers in particular are assessing the new system, they are likely to be very interested in the fact that the integrated data-protection and data-security concepts used in 'core nova' lay the foundations for operation in compliance with the DIN

EN 80001 standard published in 2011. This standard defines principles for risk management in networks connected to medical devices. It is intended to preclude network failures and prevent malware from impacting negatively on the network.

The first launch of 'core nova' is taking place on the exhibition stand of Richard Wolf at Arab Health in January in Dubai (booth 6G10/Dubai International Convention & Exhibition Centre). On request, the company's field staff will then be presenting the system to doctors, purchasers, medical technicians, and IT managers in hospitals. The first installation of the system is planned in a German hospital for the beginning of 2014. **M&E**

### Richard Wolf

**Richard Wolf GmbH** is a mid-sized company manufacturing medical instruments. It employs a workforce of more than 1,500 and maintains a global network of fourteen subsidiaries and 130 foreign representatives. The company develops, manufactures and markets a large number of products for minimally invasive surgery and endoscopy in human medicine, and for extracorporeal shock wave lithotripsy and technoscopy.

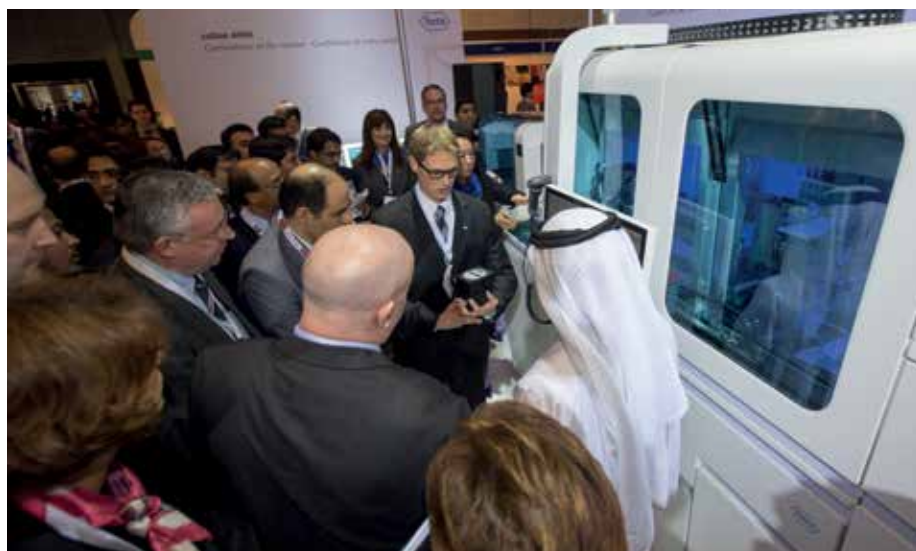
# Roche Diagnostics Middle East sets the standard high for automation, blood safety and medical value at Arab Health 2014

Under the theme of *Doing now what patients need next*, Roche Diagnostics was one of the largest exhibitors with its unrivalled exhibition booth and lounge at the 39th Arab Health congress, held from January 27-30th. With a booth located front and center at Arab Health, Roche Diagnostics displayed its varied innovative solutions in an impressive state-of-the-art laboratory set-up including: Total Lab Automation (stand-alone cobas 4000, connected MPA, cobas 6000, cobas 8000, cobas p 501) combined with the future of Molecular Diagnostics (cobas 6800 with a dedicated cobas p 312), the complete Roche Tissue Diagnostics product range, the Point-of-Care portfolio and Diabetes Care.

## A new era in blood safety, automation and training

The first of Roche Diagnostics' notable launches during Arab Health was the Roche Blood Safety Solutions (RBSS). The RBSS is a comprehensive portfolio of blood safety testing that combines the previous success of the widely adopted Nucleic Acid Testing with serology testing in just one source. The launch of RBSS and unveiling of the cobas 6800 garnered support from several industry professionals, who were present to support Roche Diagnostics. Alongside Dr Michael Heuer, President of Europe, Middle East, Africa and Latin America Roche Diagnostics, Dr. Paul Brown, President of Roche Molecular Diagnostics, and Moritz Hartmann, General Manager of Roche Diagnostics Middle East was an exclusive guest from the local healthcare industry. Dr Amin Hussain Al Amiri, Assistant Undersecretary for Medical Practices and Licensing at the UAE Ministry of Health, applauded Roche Diagnostics' contribution to the region's healthcare. He said: "This solution will improve the quality of services to blood banks in the Middle East."

The unique position of Roche Diagnostics




as the only company to provide Serology and Nucleic Acid Testing, both relevant technologies for blood banks, was highlighted to a selected group of Key Opinion Leaders at the RBSS Dinner. Special guests included Her Excellency Andrea Reichlin, Ambassador of Switzerland to the UAE and Dr Harry Bos, Director of the Sanquin Division of Diagnostics, who shared his evaluation of the cobas 6800 at Sanquin, a well-recognized reference in blood transfusion safety.

In addition, the cobas u 601 was launched by Jean-Claude Gottraux, President Roche Professional Diagnostics, as a solution that meets the growing automation trend and quality standards.

Furthermore, at the annual Roche Symposium, 400 customers heard directly from Hartmann, Dr Heuer, Dr Brown and Gottraux how novel diagnostic solutions can facilitate treatment decision-making and Roche's dedication to improve diagnostics. The event was the ideal platform for the launch of Roche Diagnostics' training catalogue, a one-of-a-kind service for customers across the region.

**Roche Lounge introduces Medical Value and Personalized Laboratory Consultation**

Away from the crowds in the exhibition hall, the Roche Lounge provided customers an intimate location to interact with the Roche team with a Medical Value Room and the Personalized Laboratory Consultation. The Medical Value Room took visitors out of the congress and into a closed and quiet dark room to experience patient stories and medical facts of differentiated assays. With examples of the cobas TnT-hs test in acute myocardial infarction, Elecsys sFlt-1 and PlGF in pre-eclampsia, cobas EGFR test in lung cancer and cobas HPV test in cervical cancer, the medical value of Roche Diagnostics products was demonstrated. For customers who visited the Personalized Laboratory Consultation area received a personalized brochure of customized workflow solutions and the respective system specifications optimized for their needs.

Arab Health once again reaffirmed the growth opportunities in the Middle East's healthcare sector, which Roche Diagnostics has been able to capture as an industry leader and role model that others will eventually follow. 

Advertorial

## ARC Devices showcases new range of non touch digital infrared thermometers



Established in 2013, ARC Devices is pushing the boundaries of medical device technology to deliver the latest benefits in health care through their range of vital signs monitoring devices.

With global market expansion and a new range of thermometers planned for 2014, ARC Devices continues to lead the way in vital signs monitoring by bringing new technology to today's connected, health conscious world.

Debuting in the Middle East at Arab Health 2014, ARC Devices joined exhibitors to showcase their exciting new range of innovative non touch digital infrared thermometers in the region. Maria Archer, Chief Operating Officer of ARC Devices, explains more about the highly anticipated product range.

### Market leaders

First in the range and sold extensively within the UK and the USA, VeraTemp is currently the market leading non touch digital thermometer for both consumer and clinical use. As used in UK NHS hospitals and in a number of US hospitals, the non touch functionality and unparalleled accuracy of the device sets a new standard in patient care, contributing to cross infection and contamination control in the clinical setting.

By simply pointing the thermometer at the forehead at a distance of approximately three finger width's away (5-8cm / 2-3.4 inches) and clicking the activation button, a stable and accurate temperature reading is immediately generated.

For families, it delivers accurate and rapid readings for peace of mind and the handy traffic light system allows worried parents to check their child's temperature is within a normal range without having to disturb a sleeping child or cause unnecessary distress.

Lightweight, colourful and reassuringly accurate, ARC's stylish new product range, coming in 2014, features the most advanced sensor technology and a host of new features to improve the user experience.



### Improved sensor technology for faster, accurate readings

With a sleek new look and built with new sensor technology for improved accuracy and ease of use, the new consumer range of devices, ARC temp1 and ARC temp2, are a must-have for any household. Complete with a handy 'WallNut' mountable holder for easy storage, temperature taking has never been so easy.

### The ultimate tool for the pioneering professional

The new clinical range of thermometers, ProTemp1 and ProTemp2, raises the bar in setting the standard of patient care, allowing a patient centric approach to vital signs monitoring for the first time.

With enhanced standard features as seen in the current market leading device, the new range will also boast dual sensor technology, allowing the clinician to take readings not only from the forehead but also from the throat for further core body temperature accuracy.

In addition, the ProTemp1 will include patient profiles for improved accuracy, including gender and age profiles, as well as multiple memory functions to capture more patient data.

The ProTemp2 will deliver the ultimate in professional vital signs monitoring, featuring an anti-microbial finish to further

reduce risk of contamination or cross infection and induction charging for rapid recharge and reduced consumable costs.

### Five to ten times more cost effective

Cost savings are increasingly important to all healthcare providers, something ARC has been cognisant of when developing their new range of non touch devices. ARC's thermometers are stand-alone and do not require any consumables, providing significant cost and time savings.

In a cost comparison of the 'whole cost' of different thermometers currently used in hospital and clinical settings, ARC's new product range was shown to offer between five and ten times more cost effective temperature measurements over a two year period than any other clinical thermometer.

### The future for connected health

ARC Devices are continually striving to engineer new technology for patient centric application in vital signs monitoring to meet the needs of both consumers and clinicians. Marking the shift in the treatment paradigm towards connected health monitoring, future developments will embrace 'Connected Health' infrastructures and wireless connectivity with patient record systems, offering accelerated ease of use and substantial cost savings to clinical and remote monitoring. **IMEH**

## Advertorial

# Masimo announces CE marking of O<sub>3</sub> Regional Oximetry

Masimo returned to Arab Health with another breakthrough technology – O<sub>3</sub> regional oximetry for the Root patient monitoring and connectivity platform.

O<sub>3</sub> regional oximetry is a new technology developed by Masimo and uses near-infrared spectroscopy (NIRS) in Masimo Open Connect (MOC-9) modules and up to four sensors, each with four light-emitting diodes (LEDs) and two detectors, to continuously measure both tissue oxygen saturation (rSO<sub>2</sub>) and arterial blood oxygenation (SpO<sub>2</sub>) on Root. NIRS can monitor tissue oxygenation in unstable patients, and may provide early indication of deterioration in circulatory function.<sup>1</sup> Some evidence suggests NIRS can be used to guide treatment in patients with brain injuries, severe anemia, as well as cardiac surgery patients and preterm newborns.<sup>2-9</sup>

O<sub>3</sub> will allow clinicians to detect regional hypoxemia that pulse oximetry alone can miss. In addition, the onboard pulse oximeter on the O<sub>3</sub> sensor means that clinicians can readily calculate the difference between central and regional oxygen saturation.

O<sub>3</sub> monitoring is as simple as applying two O<sub>3</sub> regional oximetry sensors to each side of the forehead and connecting the O<sub>3</sub> MOC-9 module to any Root through one of its three MOC-9 ports. Root offers unprecedented, high-impact innovations including:

- Radical-7 with Masimo's breakthrough rainbow and SET measurements
- Instantly interpretable, high visibility, intuitive navigation touchscreen display
- MOC-9 flexible measurement expansion with SedLine EEG brain function monitoring and PhaseIn capnography, in addition to O<sub>3</sub> regional, including cerebral, oximetry and future measurements
- Iris for built-in connectivity gateway for standalone devices such as IV pumps, ventilators, hospital beds, and other patient monitors
- MyView for automatic display of parameters, waveforms, and viewing configuration based on the clinician's presence

In an abstract presented at the Society for Technology in Anesthesia 2014 Annual Meeting in Orlando, Fla., Dr. Daniel Redford from the University of Arizona evaluated cerebral oxygen saturation on 23 subjects and 202 paired measurements of rSO<sub>2</sub> from O<sub>3</sub> regional oximetry and reference arterial and venous blood samples (SavO<sub>2</sub>). Reference blood samples were taken from both an arterial cannula placed in the radial artery and a catheter placed in the internal jugular bulb vein, obtained at baseline and after a series of increasingly hypoxic states induced by altering the inspired oxygen concentration while maintaining a normocapnic arterial pressure of carbon dioxide (PaCO<sub>2</sub>) level. O<sub>3</sub> regional oximetry had an absolute accuracy of 4.0% and trend accuracy of 2.1%. In addition to O<sub>3</sub>'s regional oximetry absolute accuracy, O<sub>3</sub> also provides the ability for clinicians to measure pulse oximetry simultaneously from the same sensor, which can automate the differential analysis of regional to central oxygen saturation monitoring.

The ability to connect two O<sub>3</sub> modules on the Root system offers a total of up to four sensors. Other devices' validation studies had titrated the PaCO<sub>2</sub> to 40, which is not real-world. O<sub>3</sub>'s accuracy of 4% comes despite allowing the PaCO<sub>2</sub> of the patient to be whatever it normally is. In this study, PaCO<sub>2</sub> ranged between 30 to 45, which suggests clinicians are more likely to get accurate measurements with O<sub>3</sub> than other regional oximeters.

O<sub>3</sub> regional oximetry is currently intended for use in subjects larger than 40 kg (88 lbs) and has not yet received FDA 510(k) clearance.

Joe Kiani, CEO and Founder of Masimo, said: "O<sub>3</sub> regional oximetry delivers again on Masimo's mission to improve patient outcomes and reduce cost of care by taking non-invasive monitoring to new sites and applications. We look forward to partnering with key hospitals around the world to demonstrate O<sub>3</sub>'s technical and clinical advantages."

Masimo O<sub>3</sub> regional oximetry MOC-9 module for the Root patient monitoring and connectivity platform



Masimo O<sub>3</sub> sensors enable simultaneous measurement of regional oxygen saturation (rSO<sub>2</sub>) and arterial oxygen saturation (SpO<sub>2</sub>).

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# Researchers create Embryonic Stem Cells without embryo

Since the discovery of human embryonic stem cells, scientists have had high hopes for their use in treating a wider variety of diseases because they are pluripotent, which means they are capable of differentiating into one of many cell types in the body.

However, the acquisition of human embryonic stem cells from an embryo can cause the destruction of the embryo, thus raising ethical concerns. In 2006, researchers introduced an alternative to harvesting embryonic stem cells called induced pluripotent stem (iPS) cells. They provided evidence that it was possible to send a normal adult cell back to an undifferentiated, pluripotent stem cell state by introducing genetic material (“outside” DNA) into the cell, a process that alters the original state of the cell. To avoid the use of embryonic stem cells, other researchers have focused more on the use of adult stem cells, but the use of these cells is limited because unlike embryonic stem cells that grow into any type of mature cell, adult stem cells can only grow into certain cell types.

Now, researchers from Brigham and Women’s Hospital (BWH), in collaboration with the RIKEN Center for Developmental Biology in Japan, have demonstrated that any mature adult cell (a “somatic” cell) has the potential to turn into the equivalent of an embryonic stem cell. Published in the January 30, 2014 issue of *Nature*, researchers demonstrate in a preclinical model, a novel and unique way that cells can be reprogrammed, a phenomenon they call stimulus-triggered acquisition of pluripotency (STAP). Importantly, this process does not require the introduction of new outside DNA, the process commonly used to induce adult cells back into a state of pluripotency.

“It may not be necessary to create an embryo to acquire embryonic stem cells. Our research findings demonstrate that creation of an autologous pluripotent stem cell – a stem cell from an individual that has the potential to be used for a therapeutic purpose – without an embryo, is possible. The fate of adult cells can be drastically converted by exposing mature cells to an external stress or injury.

This finding has the potential to reduce the need to utilize both embryonic stem cells and DNA-manipulated iPS cells,” said senior author Charles Vacanti, MD, chairman of the Department of Anesthesiology, Perioperative and Pain Medicine and Director of the Laboratory for Tissue Engineering and Regenerative Medicine at BWH and senior author of the study. “This study would not have been possible without the significant international collaboration between BWH and the RIKEN Center,” he added.

Researchers, drawing from the ability of a

Our findings suggest that somehow, through part of a natural repair process, mature cells turn off some of the epigenetic controls that inhibit expression of certain nuclear genes that result in differentiation.

plant callus – a node of plant cells that is created by injuring an existing plant, to grow into a new plant – hypothesized that any mature adult cell, once differentiated into a specific cell type, could be de-differentiated through a natural process that does not require inserting genetic material into the cells.

“Could simple injury cause mature, adult cells to turn into stem cells that could in turn develop into any cell type?” hypothesized the Vacanti brothers.

Beginning with mature adult cells, researchers let them multiply. After stressing the cells almost to the point of death by exposing them to various stressful environments including trauma, a low oxygen environment and an acidic environment, researchers discovered that within a period of only a few days, the cells survived and recovered from the stressful stimulus by naturally reverting into a state that is equivalent to an embryonic stem cell. The stem cells created by exposure to the external stimuli were then

able to redifferentiate and mature into any type of cell and grow into any type of tissue, depending on the environment into which they were placed.

To examine the growth potential of these cells, researchers used mature blood cells from GFP+ mice, mice that had been genetically altered with a specific mutation to light up green under a specific wavelength of light. They stressed the GFP+ cells from the blood by exposing them to an acidic environment and found that in the days following the stress, those cells reverted back to an embryonic stem cell-like state. These stem cells then began growing in spherical clusters, similar to a plant callus. The cell clusters were introduced into the developing embryo of a non-GFP mouse (whose cells do not light up green) to create a mixture of cells (a “chimera”). The implanted clusters were able to create GFP+ tissues in all organs tested, confirming that the cells are pluripotent.

Researchers hypothesize that these findings raise the possibility that unknown cellular functions that are activated through external stress, may set mature adult cells free from their current commitment and permit them to revert to their naïve cell state.

“Our findings suggest that somehow, through part of a natural repair process, mature cells turn off some of the epigenetic controls that inhibit expression of certain nuclear genes that result in differentiation,” said Vacanti.

Researchers note that the next step is to explore this process in more sophisticated mammals and ultimately in humans.

“If we can work out the mechanisms by which differentiation states are maintained and lost, it could open up a wide range of possibilities for new research and applications using living cells. But for me the most interesting questions will be the ones that let us gain a deeper understanding of the basic principles at work in these phenomena,” said first author Haruko Obokata, PhD.

● The reports are published in *Nature* doi:10.1038/nature12968 and doi:10.1038/nature12969





# Arab Paediatric Medical Congress

30–31 May 2014  
Dubai, UAE

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Promoting and Enhancing Quality and Evidence-Based Care for Our Children

## TOP 7 REASONS TO ATTEND

- Gain expert knowledge in evidence-based paediatric and neonatology topics
- Learn about vaccination update and evidence use of antibiotics
- Join interactive workshops in nutrition, cardiology, antibiotics, Ventilation and neurology
- Meet outstanding regional and international experts in Paediatrics and Neonatology
- Submit your research paper to participate in Arab Paediatric Medical Research Award
- Overcome the most important paediatric nutritional disorders
- Network with your peers in the field of paediatrics and neonatology to build relationships and exchange knowledge

The ONLY Congress to Gather Key Stakeholders Across the Entire Healthcare Community Led by:



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# Antibiotic resistance a cause for concern



By Leslie Morgan, OBE  
CEO, Durbin PLC  
Leslie Morgan is a Fellow of the Royal  
Pharmaceutical Society of Great Britain

In the UK, we are leaving behind the cold-er winter months and looking forward to a much more pleasant spring. Lower temperatures and wet weather during winter typically brings with it an increased number of people suffering from colds and influenza.

I recently read an article about the global issue of antibiotic over-reliance and resistance, and was surprised to learn that many patients still turn to antibiotics for colds and influenza despite them being ineffective against viral infections. Antibiotics revolutionised modern medicine but growing numbers of healthcare experts, including the World Health Organisation (WHO), are concerned about their diminishing effectiveness for treating bacterial infections.

There are various groups of antibiotics such as penicillin, tetracyclines, macrolides, cephalosporins and aminoglycosides, and each one is only effective against certain types of bacterial infections. Increasingly, in cases where antibiotics would normally be prescribed, they simply don't work anymore because many bacterial infections are becoming resistant to treatment.

One of the reasons attributed to a rise in resistance is that there has been an increase

in the prescribing of antibiotics even if they may not be the most effective treatment. Often, this is done to keep patients happy or simply because doctors are unsure of what is causing minor illnesses. It's incredibly difficult for doctors to diagnose whether a sore throat and cough is bacterial or viral. By the time the tests provide results, the patient could have either recovered or deteriorated.

Another cause for concern is that patients are self-treating and taking antibiotics left over from a previous prescription, assuming the antibiotic will treat their condition. If the dosage is too low, the bacterial infection is exposed to non-lethal doses of the antibiotic. The bacteria then develop immunity and mutate into a super-bug. Outbreaks of acinetobacter baumannii, a super-bug which is notoriously difficult to treat with traditional antibiotics, have been attributed to resistance of antibiotics. The Centers for Disease Control and Prevention in the USA estimates that more than two million people become sick every year with antibiotic resistant infections and 23,000 of those die as a result.

Antibiotic resistant infections now have to be treated with carbapenems, known as 'the last resort' of antibiotics used to treat severe infections. They are administered intravenously and require the patient to be hospitalised; pushing up healthcare costs.

Health authorities are trying to reduce antibiotic over-prescription by encouraging doctors to give healthcare advice and only prescribe antibiotics when necessary. Similarly, patients are urged to see their doctors to obtain proper diagnosis. The Health Authority Abu Dhabi (HAAD) has set up programmes to educate the medical industry about the proper use of antibiotics in a bid to curb the problem of resistance. Healthcare authorities in the Middle East have also set up Antibiotic Resistance Surveillance (ARS) systems to pinpoint in the community where antibiotics are being misused and tackle the problem more effectively.

Thankfully, advances are being made to improve diagnosis of infections. At Duke University in the USA, researchers are developing a simple blood test which determines if an infection is bacterial or viral. It looks at genes and immune system behaviour, which act differently depending on the type of infection the patient has. The current test is limited to testing individual strains of bacterial and viral infections. It is a costly and time consuming process which often provides little insight into what is causing the illness, making accurate treatment difficult. Outbreaks of viral infections, such as the recent MERS (Middle East Respiratory Syndrome) coronavirus, would also benefit from the new test. Patients could be tested quickly and effectively to determine if they need to stay in quarantine. In turn, this would reduce the spread of infection and prevent unnecessary or precautionary antibiotic treatment.

We can all help with the growing problem of antibiotic reliance and resistance. Good personal hygiene will increase protection against infections, particularly during cold and influenza seasons. If you're unlucky enough to get a minor cold, while remaining generally healthy with no underlying health problems, the best prescription is rest, a balanced diet and staying hydrated. 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. Web address: [www.durbin.co.uk](http://www.durbin.co.uk) Email: [L.morgan@durbin.co.uk](mailto:L.morgan@durbin.co.uk)

## World health tourism professionals to meet in Istanbul in June

Istanbul Medical Tourism Fair & Congress set to be organized between 11-13 June 2014 at Istanbul Congress Center (ICC) continues to draw high interest from sector professionals. In parallel to the development of Health Tourism sector worldwide in the recent years, IMT set to be organized by Turkel Fair Organization Inc. for the first time will bring together world health tourism industry corporations and professionals.

Istanbul Medical Tourism Fair expects more than 10,000 visitors. The “buyer delegation groups” from Turkey and other countries including the Middle East and Balkan Countries, African Countries, Russian speaking countries and Turkic Republics will meet with the exhibitors. The buyer delegations will be composed of Ministry of Health officials, medical tourism travel companies, doctors, brokers, owners of hospitals and clinics.

The main exhibitors will be composed of various public, private and university hospitals from different cities of Turkey, Thermal Centers, Spa & Wellness Centers, Tooth & Chin Surgery Centers, Health Corporations, Insurance Companies, Sectorial Associations and Media Companies. Turkey’s leading health corporations including Liv Hospital, Acibadem Hospital Group, Medipol Mega

Hospitals Complex, Medicana Health Group, Taraklı Thermal Centers, Birinci Eye Hospital and Thermal Health Centers have already signed their contracts to reserve their booths during the exhibition/congress in order to meet with international visitors.

The b2b meetings among the exhibitors and visitors taking place in conjunction with the exhibition and the conference panels with national and international speakers will enlighten the medical tourism sector.

Turkey sets as a major attraction with being 2nd in the world with the quality of patient care and organizational management with its accredited health care corporations and 7th in the world in terms of thermal sources. A private hospital in Turkey with its physical and technological background carries European standards. In addition, Turkey’s thermal waters, both with the flow and temperature as well as the various physical and chemical properties carry higher quality than the European thermal waters.

The point of Turkey in terms of health tourism, its geographic and strategic position, climate and quality of service, with its 4 hours of flight to the potential of 1.5 billion people sets Turkey in an excellent position.

**Istanbul Medical Tourism Fair & Congress**  
 11-13 June 2014  
 Istanbul Congress Center



### Why attend IMT Fair?

- The direct organization for the Professional target groups,
- Turkey being the fastest-growing country in world medical tourism sector,
- Istanbul being the capital at Turkey’s medical tourism,
- Istanbul being the most appropriate city for the transportation to thermal health and thermal spring centers,
- The opportunity to meet new and potential customers with direct interaction,
- B2B meetings,
- Panels about the subjects of Medical Tourism, Thermal Health, Thermal Spring, Spa & Wellness,
- The opportunity to be together with the key players of world health tourism sector within the same of organization
- Being up-to-date about all the developments of world health tourism.

■ For more information:  
 Website: [www.imtfair.com](http://www.imtfair.com)  
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 Phone: +90-212-284-2300

## Promoting quality care for children in the Gulf

The GCC countries have been investing heavily in the healthcare sector as a result of new government strategies focusing on enhancing and developing healthcare infrastructure and services.

Children’s health is one of the most important areas in this industry and it receives an important focus from government to enhance the quality care for children in the region. The government’s concerted dedication is manifested through establishing leading health facilities, attracting the most qualified healthcare workers and promoting awareness about recent advances in paediatrics and neonatology.

As it is important to enhance knowledge sharing, the region’s top paediatricians and the regional health authorities will be gathering at the Arab Paediatric Medical Congress.

The programme features outstand-

ing contributions from key experts such as Prof. Tawfik A. Khoja, Director General Executive Board, Health Ministries’ Council for Cooperation Council, Dr. Muna Al Kuwairi, Director of Primary Health care Dept., Ministry of Health UAE, Dr. Farida Al Hossani, Manager, Communicable Diseases Department, Health Authority Abu Dhabi, Dr. Yasser Nakhlawi, Chairman of Paediatric Institute, Sheikh Khalifa Medical City, Dr. Julian Eason, Chief of Neonatology, Corniche Hospital, along with other key regional and international speakers.

The Arab Paediatric Medical Congress will be a unique and extremely rewarding opportunity for gaining knowledge in evidence-based paediatric and neonatology topics, overcoming key challenges related to diagnosis and management of paediatric

**Arab Paediatric Medical Congress**  
 Amwaj Rotana Hotel, Dubai  
 30-31 May 2014

and neonatology disorders. Different areas will be covered such as Nutrition, Gastroenterology, Transplantation, Cardiology, Infectious diseases, Vaccination, Adolescent medicine and many more.

The event will feature the Arab Paediatric Medical Research Award to foster excellence in paediatric research. The two-day congress will feature a variety of interactive workshops and sessions in different areas such as Nutrition, Evidence-based use of Antibiotics, Neurology, Ventilation and Cardiology.

- For more information email: [info@ArabPaediatricCongress.com](mailto:info@ArabPaediatricCongress.com)



# Hill-Rom's Progressa Bed enables optimal therapeutic positioning

Hill-Rom's 'Progressa Bed System' is more than just a bed, with the help of the Progressa Bed System's integrated functionality and lift system, caregivers can maintain optimal therapeutic positioning, deliver evidence-based therapies and help restore mobility to minimize the risk of cardiovascular, respiratory, metabolic and muscular disorders, as well as delirium.

'StayInPlace' is a ground-breaking technology that is only available with the Progressa Bed System which prevents patient migration; hence, minimizing the need for

patient repositioning.

The Progressa Bed System is the only ICU bed platform on the market that meets the needs of Critical Care patients in different ICU disciplines through upgradability and configurability.

The Progressa Bed System can be configured and upgraded to meet a wide range of requirements within a hospital, while providing a consistently superior user experience. You can decrease total-cost-of-ownership by using ONE supplier to reduce maintenance, spare parts and training costs.

Clinical efficiency provided by the Progressa Bed System:

- Eases the individual steps of Progressive Mobility at every level of patient acuity and tolerance
  - Significantly contributes to shortening ICU length of stay
  - Enables Progressive Mobility while reducing the risk of adverse events such as line displacement
  - Shortens time to first out of bed
- For more information, contact: [eemea@Hill-Rom.com](mailto:eemea@Hill-Rom.com)

# Medtronic releases world's smallest implantable cardiac monitoring device

Medtronic have received US FDA 510(k) clearance, CE (*Conformité Européenne*) Mark, and the global launch of its Reveal LINQ Insertable Cardiac Monitor (ICM) System, the smallest implantable cardiac monitoring device available for patients.

The Reveal LINQ ICM is approximately one-third the size of a AAA battery (~1 cc), making it more than 80% smaller than other ICMs. While significantly smaller, the device is part of a powerful system that allows physicians to continuously and wirelessly monitor a patient's heart for up to three years, with 20% more data memory than its larger predecessor, Reveal XT.

In addition to its continuous and wireless monitoring capabilities, the system provides remote monitoring through the Carelink Network. Through the Carelink Network, physicians can request notifications to alert them if their patients have had cardiac events. The Reveal LINQ ICM is indicated for patients who experience symptoms such as dizziness, palpitation, syncope (fainting) and chest pain that may suggest a cardiac arrhythmia, and for patients at increased risk for cardiac arrhythmias.

"The Reveal LINQ ICM monitor can

help patients find answers to problems that may be heart-related without interrupting their lifestyle," said Rod Passman, M.D., professor and associate director of cardiac electrophysiology at the Northwestern University Feinberg School of Medicine in Chicago. "The simplified procedure and insertion tools make the device faster and easier for physicians to implant, which may expand access to more patients needing long-term monitoring."

Placed just beneath the skin through a small incision of less than 1 cm in the upper left side of the chest, the Reveal LINQ ICM is often nearly invisible to the naked eye once inserted. The device is placed using a minimally invasive insertion procedure, which simplifies the experience for both physicians and their patients. The Reveal LINQ ICM is MR-Conditional, allowing patients to undergo magnetic resonance imaging (MRI) if needed.

"This miniaturized monitoring system is the result of many years of product development work from engineers focused on shrinking the size of medical devices while maintaining their power and improving benefits for patients," said Pat



Mackin, president of the Cardiac Rhythm Disease Management business and senior vice president at Medtronic. "This is game-changing technology for patients who need cardiac monitoring, and we look forward to providing them with the most technologically advanced and minimally invasive approach possible."

The Reveal LINQ system also includes the new MyCareLink Patient Monitor, a simplified remote monitoring system with global cellular technology that transmits patients' cardiac device diagnostic data to their clinicians from nearly any location in the world.

"This is a technology that is going to help us reach more patients at risk for cardiac arrhythmias and help healthcare systems more efficiently manage difficult patient populations," said Randy Lieberman, MD, director of electrophysiology at Detroit Medical Center.

● For more information, visit [www.RevealLINQ.com](http://www.RevealLINQ.com)

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## Intersurgical OroCare range extension

Oral hygiene has become a standard procedure in the fight against Ventilator associated pneumonia (VAP) in today's hospitals. Intersurgical is introducing an extended range of oral care products to meet the increasing diversified needs of the practitioners.

**OroCare Aspire** is a new toothbrush with suction-only properties. This brush closes the gap between simple brushes and high suction-and-irrigation brushes. OroCare Aspire features a user-friendly design and the usual Intersurgical quality.

**OroCare Sensitive** completes our exten-

sive range.

It is designed for use on patients without teeth or with extremely sensitive gums. This oral suction wand has many advantages over conventional suction swabs and features a uniquely designed head.

The **OroCare suction line splitter** allows the use of two suction lines on a single vacuum canister. This is necessary, when a closed suction system is in use on



the patient and simultaneously a suction toothbrush is used for oral hygiene.

● For more information on this new range, visit: [www.Intersurgical.com/info/oralcare](http://www.Intersurgical.com/info/oralcare)

## Masimo's award-winning iSpO2 pulse oximeter now available for Android

Masimo's award-winning iSpO2 pulse oximeter is now available for Android, along with the companion iSpO2 app downloaded from the Google Play Store. With the release of iSpO2 in the popular Android operating system, more consumers now have access to Masimo SET Measure-through Motion and Low Perfusion pulse oximetry – the same technology used in leading hospitals worldwide.

SpO2 provides accurate, real-time oxygen saturation (SpO2), pulse rate (PR), and perfusion index (PI) readings – ideal for anyone who desires access to accurate health data through their mobile devices.

Dr. Mark Hom, MD, co-author of forthcoming exercise books with three-time Tour de France champion Greg LeMond, and Dr Glenn A. Gaesser, PhD, said: "Although we advocate intense training, we don't recommend that healthy athletes train to the point of oxygen desaturation (i.e., cyanosis). However, our preliminary testing with the iSpO2

has shown that it has the accuracy and repeatability to show subtle changes in athletic oxygenation: specifically in warm-up, steady state, super high intensity, and recovery. And as an added benefit, the iSpO2 is compact enough to be useful when training on the road or track."

Dr Kirk Shelley, MD, PhD, professor of anesthesiology at Yale University in New Haven, Connecticut, commented: "This pulse oximeter is without a doubt the best one available for the consumer market. Masimo uses impressive

digital signal processing combined with proprietary light emitting diode (LED) technology. If you need a serious pulse oximeter, this is the one to get."

iSpO2 – extremely lightweight at just 232 grams or about 0.5 pounds – also displays the pleth waveform and Signal IQ so users can visually assess where the pulse is occurring and the quality of the measurement even during motion artifact. iSpO2 can also trend, store, and email up to 12 hours of measurement history in the global standard, .CSV file format, allowing consumers to easily share data through their mobile device email application.

iSpO2 is for sports and aviation use; not intended for medical use.

● For more information, visit: [iSpO2.com](http://iSpO2.com)



## Timesco exhibits innovative LED rechargeable batteries

England-based Timesco Healthcare, exhibited with great success at Arab Health their new revolutionary, award winning, patented single-use and reusable handles for laryngoscopy and innovative LED rechargeable batteries and rechargers.

As part of Timesco's new range of energy efficient and single-use laryngoscopy products, EES and ION, the Timesco ION R batteries provide superb energy savings, LED illumination and a low cost alternative to dry cell and reusable batteries. Complimented with the new Timesco ION R rechargers, each battery has a working life of up to nine years, or 30,000 intubations.

The Timesco microprocessor controlled ION R batteries are lithium ION with LED bulbs enclosed in same battery which pro-

vide a constant 43,000 LUX of pure white LED light, a one hour charge will provide up to one year's use!

Timesco ION R batteries are multipurpose and can be used in variety of products such as diagnostic and single use and reusable laryngoscope handles.

Timesco new SUS, clear, single use skins, are new laryngoscopes handles, which prevent cross contamination and are for use with the ION R batteries. Simply insert the ION R battery into the SUS handle and use! The SUS handles are completely sealed, feature an external on/off switch, ISO fitting to accommodate all fibre laryngoscope blades and are supplied clinically clean; best of all, they are at a throw away cost.



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## IMRIS launches world's first MR-safe and CT-compatible neurosurgical horseshoe headrest

IMRIS has launched the world's first MR-safe and CT-compatible horseshoe headrest on the market for the positioning of patients ranging from neonatal to adult during neurosurgical procedures requiring intraoperative imaging in the VISIUS Surgical Theatre.

The horseshoe headrest provides non-pinned head support in prone, lateral, and supine positions during head, neck and cervical spine surgeries where use of a head fixation device (HFD) – a clamp-like device – is not desirable because the skull is too fragile for pinning. These patients may be babies whose skulls are still soft or older patients with weakened skull bones.

“The IMRIS horseshoe headrest expands the use of intraoperative imaging to patients who cannot be positioned for surgery with a head fixation device, such as neonatal and young paediatric patients. This headrest may also be useful for other applications not requiring rigid fixation, such as those that access the skull through the nose,” said Dr James Baumgartner, Surgical Director of the Comprehensive Pediatric Epilepsy Center at Florida Hospital.

“This will enhance an already sophisticated technology platform that includes intraoperative MR and the comprehensive team approach we have for paediatric tumour and epilepsy care.”

A spokesperson for the company told Middle East Health that IMRIS has an installation of a three-room intraoperative MRI hybrid operating room suite pending at Sidra Medical and Research Center in Doha.

IMRIS President and CEO Jay D. Miller said surgeons at hospitals with VISIUS systems which adopt the headrest will now have an opportunity to benefit both a patient population – including those too small for other positioning devices – and procedures not previously utilized in the surgical theatre.

“We received tremendous feedback and enthusiasm from paediatric neurosurgeons during development of this product,” he said.

“This headrest will allow surgeons to use iMR on more patients who we expect will benefit from the same outcomes, including reduced re-operation rates, which we have recently reported from hospitals.

“In addition, the headrest which is designed for patient comfort and smooth staff workflow includes disposable ele-



ments,” Miller said.

“This first release in our disposable product portfolio establishes the company's capabilities to develop tools that speed case-to-case transition and optimize patient handling.”

IMRIS also designs and manufactures proprietary head fixation devices, imaging coils, and OR tables for use in this unique and multifunctional intraoperative environment.

- For more information, visit: [www.imris.com](http://www.imris.com)



## Discovery of quantum vibrations in “microtubules” inside brain neurons corroborates controversial 20-year-old theory of consciousness

A review and update of a controversial 20-year-old theory of consciousness published in *Physics of Life Reviews* claims that consciousness derives from deeper level, finer scale activities inside brain neurons. The recent discovery of quantum vibrations in “microtubules” inside brain neurons corroborates this theory, according to review authors Stuart Hameroff and Sir Roger Penrose. They suggest that EEG rhythms (brain waves) also derive from deeper level microtubule vibrations, and that from a practical standpoint, treating brain microtubule vibrations could benefit a host of mental, neurological, and cognitive conditions.

The theory, called “orchestrated objective reduction” (‘Orch OR’), was first put forward in the mid-1990s by eminent mathematical physicist Sir Roger Penrose, FRS, Mathematical Institute and Wadham College, University of Oxford, and prominent anaesthesiologist Stuart Hameroff, MD, Anesthesiology, Psychology and Center for Consciousness Studies, The University of Arizona, Tucson. They suggested that quantum vibrational computations in microtubules were “orchestrated” (“Orch”) by synaptic inputs and memory stored in microtubules, and terminated by Penrose “objective reduction” (‘OR’), hence “Orch OR.” Microtubules are major components of the cell structural skeleton.

Orch OR was harshly criticized from its inception, as the brain was considered too “warm, wet, and noisy” for seemingly delicate quantum processes. However, evidence has now shown warm quantum coherence in plant photosynthesis, bird brain navigation, our sense of smell, and brain microtubules. The recent discovery of warm temperature quantum vibrations in microtubules inside brain neurons by the research group led by Anirban Bandyopadhyay, PhD,

at the National Institute of Material Sciences in Tsukuba, Japan (and now at MIT), corroborates the pair’s theory and suggests that EEG rhythms also derive from deeper level microtubule vibrations. In addition, work from the laboratory of Roderick G. Eickenhoff, MD, at the University of Pennsylvania, suggests that anaesthesia, which selectively erases consciousness while sparing non-conscious brain activities, acts via microtubules in brain neurons.

“The origin of consciousness reflects our place in the universe, the nature of our existence. Did consciousness evolve from complex computations among brain neurons, as most scientists assert? Or has consciousness, in some sense, been here all along, as spiritual approaches maintain?” ask Hameroff and Penrose in the current review. “This opens a potential Pandora’s Box, but our theory accommodates both these views, suggesting consciousness derives from quantum vibrations in microtubules, protein polymers inside brain neurons, which both govern neuronal and synaptic function, and connect brain processes to self-organizing processes in the fine scale, ‘proto-conscious’ quantum structure of reality.”

After 20 years of skeptical criticism, “the evidence now clearly supports Orch OR,” continue Hameroff and Penrose. “Our new paper updates the evidence, clarifies Orch OR quantum bits, or “qubits,” as helical pathways in microtubule lattices, rebuts critics, and reviews 20 testable predictions of Orch OR published in 1998 – of these, six are confirmed and none refuted.”

An important new facet of the theory is introduced. Microtubule quantum vibrations (e.g. in megahertz) appear to interfere and produce much slower EEG “beat frequencies.” Despite a century of clinical use, the underlying origins of EEG rhythms have

remained a mystery. Clinical trials of brief brain stimulation aimed at microtubule resonances with megahertz mechanical vibrations using transcranial ultrasound have shown reported improvements in mood, and may prove useful against Alzheimer’s disease and brain injury in the future.

Lead author Stuart Hameroff concludes, “Orch OR is the most rigorous, comprehensive and successfully-tested theory of consciousness ever put forth. From a practical standpoint, treating brain microtubule vibrations could benefit a host of mental, neurological, and cognitive conditions.”

The review is accompanied by eight commentaries from outside authorities, including an Australian group of Orch OR arch-skeptics. To all, Hameroff and Penrose respond robustly.

Penrose, Hameroff and Bandyopadhyay explored their theories during a session on “Microtubules and the Big Consciousness Debate” at the Brainstorm Sessions, a public three-day event at the Brakke Grond in Amsterdam, the Netherlands, in January. At the event Bandyopadhyay and his team coupled microtubule vibrations from active neurons to play Indian musical instruments.

“Consciousness depends on anharmonic vibrations of microtubules inside neurons, similar to certain kinds of Indian music, but unlike Western music which is harmonic,” Hameroff explains.

● **Reference:** “Consciousness in the universe: A review of the ‘Orch OR’ theory,” by Stuart Hameroff, MD, and Roger Penrose, FRS (<http://dx.doi.org/10.1016/j.plrev.2013.08.002>).

### Criticism:

A range of critical responses by eminent scientists and philosophers can be found here: <http://tinyurl.com/norepj8>



# Agenda

## Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
<b>■ MARCH 2014</b>		
Abilities-ME	24 – 26 March, 2014 Abu Dhabi, UAE	<a href="http://www.abilitiesme.com">www.abilitiesme.com</a>
Int'l Emergency & Catastrophe Management Conference & Exhibition (IECM 2014)	25 – 27 March, 2014 Dubai, UAE	<a href="http://www.emergency.ae">www.emergency.ae</a>
OBS-GYNE Exhibition & Congress	30 March - 01 April 2014 Dubai, UAE	<a href="http://www.obs-gyne.com">www.obs-gyne.com</a>
<b>■ APRIL 2014</b>		
Mediconex Cairo Health	1 – 3 April, 2014 Cairo, Egypt	<a href="http://www.mediconex.org/en">www.mediconex.org/en</a>
Occupational Safety and Health Middle East	1 – 3 April 2014 Abu Dhabi, UAE	<a href="mailto:andrew.macgregor@reedexpo.ae">andrew.macgregor@reedexpo.ae</a>
Annual Emirati League Against Epilepsy Congress	4 – 5 April, 2014 Dubai, UAE	<a href="http://elae.ae/">http://elae.ae/</a>
10th Emirates Critical Care Conference	3 – 5 April 2014 Dubai, UAE	<a href="http://www.eccc-dubai.com">www.eccc-dubai.com</a> <a href="mailto:ECCC@InfoPlusEvents.com">ECCC@InfoPlusEvents.com</a>
Dubai Derma 2014	8 – 10 April 2014 Dubai, UAE	<a href="http://www.dubaiderma.com">www.dubaiderma.com</a>
4th Annual Case Based Approach to Controversies in Cardiovascular Disease	10 – 12 April, 2014 Dubai, UAE	<a href="http://www.infoplusevents.com/">www.infoplusevents.com/</a> <a href="mailto:cardiovascular@infoplusevents.com">cardiovascular@infoplusevents.com</a>
1st Mental Health MENA Conference 2014	12 – 14 April, 2014 Amman, Jordan	<a href="http://www.mdb-center.com">www.mdb-center.com</a> <a href="mailto:conference@mdb-center.com">conference@mdb-center.com</a>
2nd Conference of Palliative care	13 – 15 April, 2014 Kuwait City, Kuwait	<a href="http://pcckwconference.webs.com">http://pcckwconference.webs.com</a> <a href="mailto:pcckw@hotmail.com">pcckw@hotmail.com</a>
IMTEC OMAN – 2014	15 – 17 April, 2014 Muscat, Oman	<a href="http://www.imtecoman.com">www.imtecoman.com</a> <a href="mailto:marketing@imtecoman.com">marketing@imtecoman.com</a>
Cardio Arab - Annual Arab Heart Congress	17 – 19 April 2014 Dubai, UAE	<a href="http://cardioarab.com">http://cardioarab.com</a>
15th Dubai Spine Conference & 10th Pan Arab Spine Conference	19 – 22 April, 2014 Dubai, UAE	<a href="http://www.dubaispineconference.com">www.dubaispineconference.com</a>
11th Annual Middle East Otolaryngology Conference & Exhibition: Head & Neck Surgery	20 – 22 April, 2014 Dubai, UAE	<a href="http://www.me-oto.com">http://www.me-oto.com</a>



# Agenda

## Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
2nd Middle East Forum on Quality & Safety in Healthcare	25 – 27 April, 2014 Doha, Qatar	<a href="http://hime2014.hamad.qa/en/index.aspx">http://hime2014.hamad.qa/en/index.aspx</a> <a href="mailto:ihihmc2014@mci-group.com">ihihmc2014@mci-group.com</a>
3rd Global Network on Emergency Medicine Conference	25 – 29 April, 2014 Dubai, UAE	<a href="http://www.emergencymedicineme.com">www.emergencymedicineme.com</a>
ICJR Middle East 2014	25 – 29 April, 2014 Dubai, UAE	<a href="http://www.emergencymedicineme.com">www.emergencymedicineme.com</a>
<b>■ MAY 2014</b>		
4th Biannual Meeting of Diabetes in Asia Study Group	1 – 3 May, 2014 Muscat, Oman	<a href="http://www.dasg2014.org">www.dasg2014.org</a> <a href="mailto:registration@excellenceincme.com">registration@excellenceincme.com</a>
The International Pharmaceutical Compliance Congress	5 – 7 May, 2014 Dubai, UAE	<a href="http://www.internationalpharmacongress.com">www.internationalpharmacongress.com</a>
EGYMEDICA 2014	8 – 10 May, 2014 Cairo, Egypt	<a href="http://www.egymedic.com">www.egymedic.com</a>
Saudi Health 2014	19 – 21 May, 2014 Riyadh, KSA	<a href="http://www.saudihealthexhibition.com">www.saudihealthexhibition.com</a>
m-Health Summit Middle East 2014	28 – 29 May, 2014 Abu Dhabi, UAE	<a href="http://www.mhealthsummit.me">www.mhealthsummit.me</a>
4th GCC Hospitals Conf. on Fatal and Horrific Accidents Prevention	28 – 29 May, 2014 Dubai, UAE	<a href="http://www.datamatixgroup.com/conference">www.datamatixgroup.com/conference</a>
Arab Paediatric Medical Congress	30 – 31 May, 2014 Dubai, UAE	<a href="http://arabpediatriccongress.com">http://arabpediatriccongress.com</a> <a href="mailto:info@arabpediatriccongress.com">info@arabpediatriccongress.com</a>
<b>■ JUNE 2014</b>		
Hospital Build Middle East	2 – 4 June, 2014 Dubai, UAE	<a href="http://www.hospitalbuild-me.com">www.hospitalbuild-me.com</a>
Istanbul Medical Tourism Fair & Congress	11-13 June, 2014 Istanbul Congress Centre	<a href="http://www.imtfair.com">http://www.imtfair.com</a>
International Breast Ultrasound Course	15-17 June, 2014 Marmara University Hospital, Istanbul	<a href="http://www.ibus.org">http://www.ibus.org</a>



### 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](mailto:editor@MiddleEastHealthMag.com)

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