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Middle East HEALTH

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March - April 2018

Cancer

Survival rates up globally but trends vary widely

Researchers develop single blood test for 8 cancers

Scientists propose 5 distinct types of diabetes

WHO-supported Nursing Now campaign to raise status of nurses

In the News

- New research adds to evidence linking gut bacteria and obesity
- MERS antibodies shown to be safe in Phase 1 trial
- Chemical from cactus shows promise as new analgesic
- Philips spearheads Circular Economy – will take back old medical equipment

Bahrain BD3, **Egypt** £E40, **Iran** IRR75, **Iraq** IQD9,400, **Jordan** JD5, **Kuwait** KD3, **Lebanon** LBP12,000, **Oman** RO3, **Qatar** QR30, **Saudi Arabia** SR30, **Syria** £S400, **UAE** Dh30, **Yemen** YR1,600


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Prognosis

Increasing access to health care

The show halls at the Dubai International Exhibition Center were filled to capacity again as thousands of medical companies from around the world descended on the city to show off their latest innovations. It is always a good place to gauge the state of healthcare development globally. What is pleasing to note is the number of large healthcare companies who are putting time and money into developing more affordable hi-tech devices which in turn help increase access to quality health care, particularly in the less advanced economies. We spoke to several companies – too many to cover in this issue unfortunately, although we do provide a few highlights.

There have been several interesting developments in oncology research. A notable highlight is the development of a single blood test that can be used for eight cancer types. The test, called CancerSEEK, is a unique noninvasive, multianalyte test that simultaneously evaluates levels of eight cancer proteins and the presence of cancer gene mutations from circulating DNA in the blood. Read about this in The Laboratory news section of this issue.

Also of interest, particularly as it affects the region, is the Phase 1 trial of a MERS antibody – SAB-301 – by the US NIH. The results are promising as the antibody was shown to be safe and well tolerated by a small group of healthy volunteers. The next step is a larger study of SAB-301 in patients infected with MERS coronavirus.

Mecomed – the medical devices, imaging and diagnostics trade association for the Middle East and North Africa – recently issued a statement saying it has teamed up with AdvaMed, APACMed and MedTech Europe, which represent manufacturers of medical devices and diagnostics around the world, to institute policy changes that affect how MedTech companies support the training and education of healthcare professionals in the region and globally. One of the key revisions in the codes is the elimination of "direct sponsorship" of HCP attendance at third-party educational events, such as conferences. Read more about this important development in this issue.

It has long been known that nurses often don't get the recognition they deserve. In an effort to correct this, the WHO and the International Council of Nurses have thrown their weight behind the Nursing Now campaign, a three-year global health initiative of the Burdett Trust for Nursing. The initiative, launched in February, aims to raise the status and profile of nursing and give nurses a more prominent role in global health policy development and planning. It also aims to promote greater investment in developing nursing and midwifery education, practice and regulation. There is more on this initiative in this issue.

Callan Emery
Editor
editor@MiddleEastHealthMag.com

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Publisher
Michael Hurst
michael@middleeasthealthmag.com

Editor
Callan Emery
editor@middleeasthealthmag.com

Editorial and Production
Trident Communications
www.TridentComms.media

Editorial Consultants
Dr Gamal Hammad, Dr Peter Moore, Harry Brewer

Middle East Editorial Office
PO Box 72280, Dubai, UAE
Telephone: (+9714) 391 4775
editor@middleeasthealthmag.com

Marketing Manager
Foehn Sarkar
Telephone: (+9714) 391 4775 ▮ Fax: (+9714) 391 4888
marketing@middleeasthealthmag.com

Subscription & Admin Manager
Savita Kapoor
Telephone: (+9714) 391 4775 ▮ Fax: (+9714) 391 4888
savita@middleeasthealthmag.com

Advertising Sales
PO Box 72280, Dubai, UAE
marketing@middleeasthealthmag.com

Americas, France
Joy Sarkar
P O Box 72280, Building No.2
2nd Floor, Dubai Media City
Dubai, United Arab Emirates
Tel: +971 4 391 4775 Fax: +971 4 391 4888
joy@middleeasthealthmag.com

Japan
Mr Katsuhiro Ishii
Ace Media Service Inc
12-6, 4-chome, Adachi-ku, Tokyo 121-0824, Japan
Tel: +81-3-5691-3335 ▮ Fax:+81-3-5691-3336
Email: *amskatsu@dream.com*

China
Miss Li Ying
Medic Time Development Ltd,
Flat 1907, Tower A, Haisong Building, Tairan 9th Road,
Futian District, Shenzhen, China 518048
Tel: +86-755-239 812 21 ▮ Fax: +86-755-239 812 33
Email: *medic8@medictime.com*

Taiwan
Larry Wang
Olympia Global Co Ltd
7F, No.35, Sec 3, Shenyang Rd, Taichung
Taiwan 40651 ▮ P O Box: 46-283 Taichung Taiwan 40799
Tel: +886- (4)-22429845 ▮ Fax:+886- (4)-23587689
Email: *media.news@msa.hinet.net*

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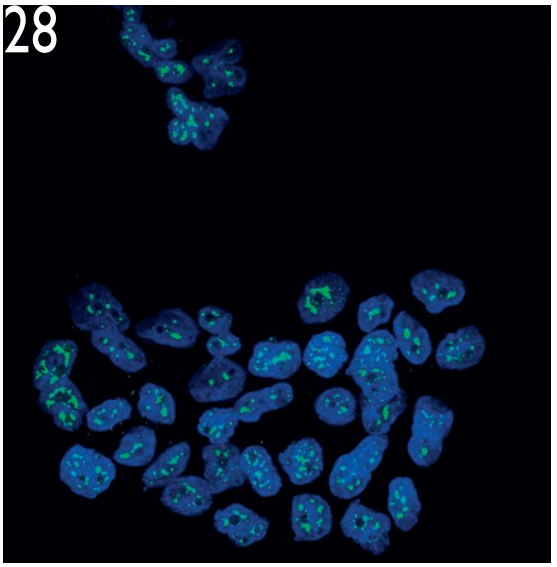

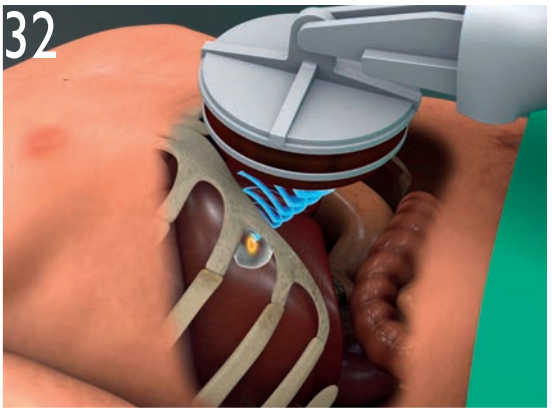

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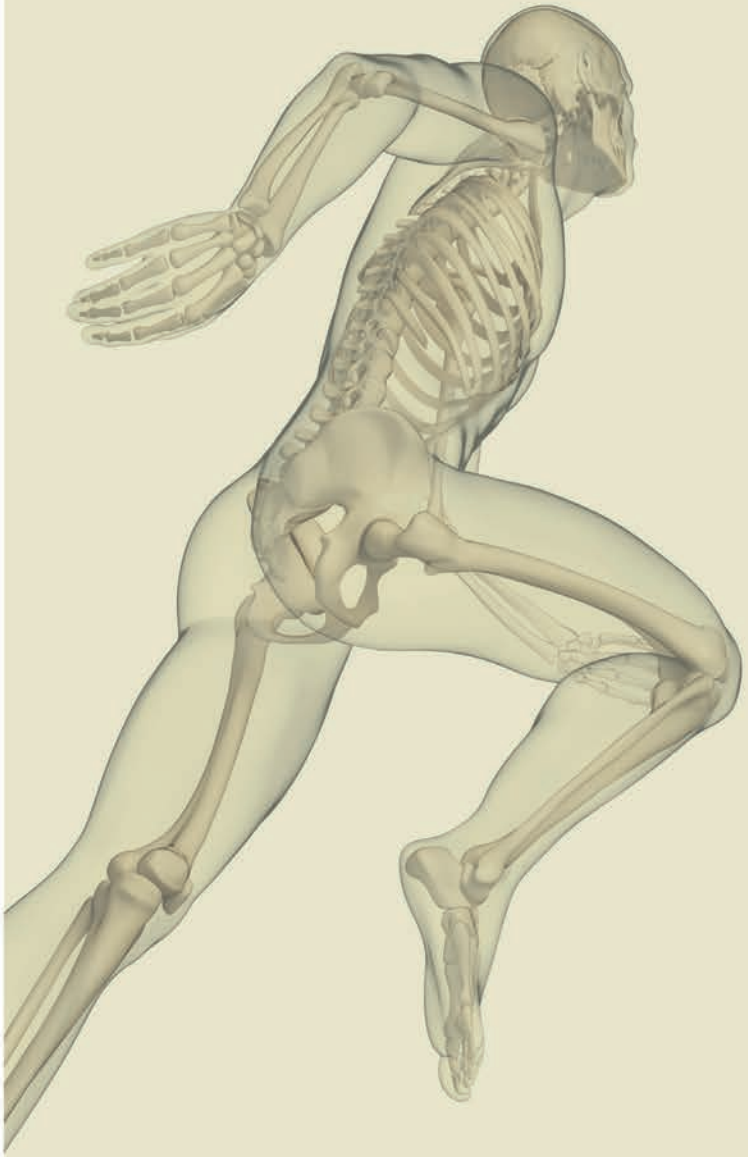

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middle east monitor

Update from around the region

Left to Right: David Mezher, General Manager - Middle East, GE Healthcare, Neil Buckley, CEO of King's College Hospital London in the UAE, Kieran Murphy, President & CEO, GE Healthcare, and Maher Abouzeid, President & CEO, GE Healthcare - Eastern Growth Markets, announce GE's appointment as technology provider for King's College Hospital London in the UAE.

GE Healthcare to deliver advanced diagnostic solutions to King's College Hospital London, UAE

GE Healthcare announced they will deliver advanced technology to fully equip the Radiology Department of King's College Hospital London in the UAE, the $200 million joint venture initiative by Al Tayer Group, Dubai Investments and the UK-based Ashmore Group.

Located in Dubai Hills Estate, the 100-bed super-specialty facility is set to open in Q1 2019. GE Healthcare will supply the hospital with an extensive suite of diagnostic equipment designed to improve patient experience and clinical outcomes.

GE Healthcare's technology deployed at the hospital includes radiology systems, including the Revolution HD, a computed tomography solution that delivers high quality images at low dose; the SIGNA Artist, GE's most advanced 1.5T MR technology; Connexity, a 90/90 remote tilting table system with single end support and variable height tabletop that allows for uncompromised access and automatic patient positioning with X-ray-free centering; the DiscveryXR656 Plus, for advanced digital imaging and that helps address complex clinical needs; the mobile x-ray system OptimaTM XR220amx, which takes digital x-ray to the point of care; and the Senographe Pristina, a major advancement in breast cancer screening, designed to help reduce the discomfort, pain and anxiety of a mammogram.

Speaking about the partnership, David Mezher, General Manager - Middle East, GE Healthcare, said: "The future of healthcare is fast, simple and about affordable solutions that drive tangible outcomes for patients and providers alike. GE Healthcare has an established heritage of equipping the leading public and private sector hospitals in the region with the advanced technology physicians need to be able to focus on what matters most: delivering high quality care to their patients. We are proud to partner with King's College Hospital London in the UAE."

Neil Buckley, CEO of King's College Hospital London in the UAE, said: "King's uses evidence-based, transparent healthcare practices to increase the likelihood of successful outcomes for patients, whilst minimising the likelihood of complications or the need for corrective procedures. Equipping the facility with the most advanced diagnostic technologies available is critical to delivering accurate, evidence-based care."

GE Healthcare's technology will support King's College Hospital London in its mission to offer-leading expertise and the best evidence-based care delivered by leading experts. Some of these experts will be part of a visiting doctors' program, the 'London Faculty', which will bring cutting-edge medical treatment to the UAE, including several firsts. In addition to specialist practices in pediatrics, diabetes, endocrinology, and obstetrics & gynecology, the hospital is set to bring its world leading expertise in liver transplant medicine.

GCC healthcare market forecast to reach $94bn by 2021

Private healthcare in the GCC, estimated at US$62 billion in 2016, is forecast to expand 8.7% annually, to reach $94 billion in 2021, according to MENA Research Partners (MRP), a leading research company in the region. KSA and UAE together represent more than two thirds of the market, where the latter is witnessing the fastest growth in the region.

Anthony Hobeika, Chief Executive Officer at MENA Research Partners, said: "Healthcare services account for the lion's share of the healthcare industry, at 79%, and is the fastest growing segment in UAE. On the other hand, medical devices segment, the smallest, is witnessing double digit growth in Oman, Qatar and Kuwait."

The healthcare services market is undergoing structural shifts to adapt to the demands of health-conscious and digital savvy population. Although still at a nascent stage, telemedicine, home healthcare and long-term care are outperforming traditional health service providers such as hospitals and clinics.

Hobeika said: "The fundamental change in market dynamics from curative to preventive care, and the digital wave transforming the sector, are creating investment opportunities in the niche segments of specialised and customised healthcare in the region.

"Despite the last years' turmoil amid oil price slump, which led to budget adjustments in many GCC countries, healthcare remained the major government expenditure and the private sector is considered a key partner in the long-term development of the sector, in particular in terms of

quality care. In fact, economic diversification plans and national healthcare strategies to decrease the capacity shortage and improve the quality standards of the medical services, are leading states to open the sector to full foreign ownership and share the healthcare burden with the private sector."

FreeStyle Libre eliminates the need for finger pricking

The UAE Ministry of Health and Prevention (MOHAP) has launched the LibreLink app from Abbott Laboratories, allowing diabetic patients to monitor blood glucose using smartphones. This is in line with its vision to provide personalized healthcare and self-management solutions using smart monitoring devices to test blood glucose levels, while also reducing possible complications related to diabetes.

The LibreLink app from Abbott reads glucose levels via the FreeStyle Libre sensor placed on the back of the upper arm, eliminating the need for routine finger pricking while delivering instant results. The sensor should be replaced every 14 days, and patients can swim or take showers while wearing it.

Dr Yousif Mohammed Al Serkal, Assistant Undersecretary for the Hospitals Sector, noted that the Ministry of Health and Prevention is committed to improving community health, and providing innovative and comprehensive healthcare services, that meet international standards, such as using mobile apps and wearable technologies.

Al Serkal highlighted the importance of using advanced methods to treat diabetes, noting that regular testing for patients, treatment management, self-care, accurate monitoring of blood glucose, and continuous data management through this app, would help reduce the negative health, social and economic effects diabetes has on the community. He noted that the quality of the services provided by the ministry have helped reduce the prevalence of diabetes.

Dr Kalthoom Mohammed AlBalooshi, director of the ministry's Hospitals Department added that the app can transfer up to eight hours of data on glucose levels from the FreeStyle Libre sensor developed by Abbott, and features a trend arrow that indicates whether glucose levels are steady, rising or dropping.

The app is very useful for families and healthcare providers, as one LibreLink account can show results for up to 20 individuals. The LibreLink app is compatible with Android OS 4.0 or higher.

Usually, diabetics use finger pricking to get a blood sample, test glucose levels and be able to make informed therapeutic decisions. However, FreeStyle Libre eliminates the need for finger pricking allowing patients to be treated and reduces the risks of cardiac disease, strokes, blindness, kidney failure, and diabetic foot damage that come with high glucose levels.

Small UAE study shows infertility rising in age group 20-30

Maternal age is the one of the most important factors to help identify a woman's odds of having a baby. According to IVI Middle East Fertility Clinic, a recent analysis of the patient demographics reveals that of every 1000 patients that come to the clinic, the age group of 20 to 30 is witnessing a surge in both male and female infertility factors.

This age group accounts for almost 15% of the total patient count which is the second highest, according to the analysis. The clinic also notes that there has been a steady increase in female infertility cases amongst Emirati couples from this age group.

Their research shows that the largest number of infertility cases in the region are from the age group of 35-40; They note that most cases of female infertility are triggered by causes that are specific to the population of the region.

"While lifestyle and eating habits are two critical factors that have led to an increase in infertility with the age group 20-30, consanguinity is another very important reason for the increase in such cases amongst the Emirati population," said Professor Dr Human Fatemi, Subspecialist Reproductive Medicine and Reproductive Surgery, Medical Director, IVI Middle East Fertility Clinic.

"Emirati families appear to be facing an increased incidence of infertility. In females, parental consanguinity leads to a low ovarian

reserve and due to rare sun exposure of the skin, Vitamin D deficiency is very common. Other factors are unhealthy diets and diabetes. Similarly, male infertility is related to obesity, excessive smoking, possible steroid consump¬tion for bodybuilding and largely consanguinity," said Dr Barbara Lawrenz, Consultant Obstetrics & Gynaecology, IVF, IVI Abu Dhabi.

Philips, VPS Healthcare sign 10-year agreement for Philips' enterprise-wide EMR solution

Royal Philips and VPS Healthcare, one of the Middle East's largest healthcare groups, have signed a multi-year partnership agreement to install Philips Tasy EMR in VPS Healthcare hospitals and clinics throughout the United Arab Emirates, Oman and India. Tasy EMR is Philips' next generation Electronic Medical Record (EMR) and care management solution, which addresses the shortcomings of conventional EMRs.

"With Philips Tasy EMR, we will move from multiple IT platforms to a single integrated solution that allows us to manage all clinical and logistical processes," said Dr Shamsheer Vayalil, Chairman and Managing Director of VPS Healthcare. "We need our data to be available wherever and whenever it's needed. Tasy EMR's ability to move patient and administrative data around the entire VPS network is critical to the high quality seamless care that VPS Healthcare wants to deliver in the region."

Frans van Houten, CEO of Royal Philips, said: "The agreement with VPS Healthcare underlines the fact that we have a very strong portfolio of health informatics solutions to support the needs of clinicians and health systems in improving patient care while also optimizing processes and the use of resources throughout their organizations. I am convinced that Tasy EMR will help VPS Healthcare to improve both the quality of care and the patient and staff experience at lower cost."

Conventional EMRs typically contain standard medical and clinical data about a patient and were originally designed to use this information primarily for administrative tasks such as billing. According to Philips, Tasy EMR takes a different approach and is developed to streamline workflows and optimize patient care. It offers a single integrated platform and database to enable centralized management of medical, organizational and administrative processes. These range from patient care to inventory and supply management, revenue cycle management and financial reporting. Other processes covered by Tasy EMR include bed management, and the scheduling of rooms and staff for appointments and medical procedures. By managing both clinical and administrative workflows, Tasy EMR connects the dots between different aspects of patient care. Designed to be highly flexible through traceable user roles and profiles, it keeps pace with a hospital's workflows, standards and key performance indicators.

VPS Healthcare is one of the largest integrated healthcare groups in the Middle East, with 22 operational hospitals, 125 health clinics, 13,000 employees, one of the largest pharmaceutical manufacturing plants in Dubai, and medical support services spread across the Middle East, Europe and India.

This partnership between Philips and VPS Healthcare represents an important step in the Tasy EMR success story beyond Latin America, where Philips already enjoys a leading position in the EMR market with approximately 1,000 installations at healthcare providers in Brazil and Mexico. The use of Tasy EMR has already helped eight Brazilian hospitals receive EMR Adoption Model Stage 6 certification and helped one hospital receive Model Stage 7 (the highest level possible) from HIMSS Analytics, meaning they are near-paperless and are driving integration, security and analytics to optimize patient care.

Philips notes that in selected markets Tasy EMR is also available as part of Philips IntelliSpace Enterprise Edition, which enables health systems to manage the growth and cost of their clinical enterprise with a managed service model. It offers a full suite of interoperable healthcare informatics applications and services for hospitals and integrated health networks that helps to further improve quality of care, while meeting the evolving challenges of budget constraints.

King Faisal Specialist Hospital ranks in world's top 10% for number of heart transplants

According to a report in *Arab News* the cardiac centre at the King Faisal Specialist Hospital and Research Center (KFSHRC) in Riyadh is now in the top 10 percent of the world's heart centres with respect to the number of annual transplants.

The list is based on statistics of the International Society for Heart and Lung Transplantation (ISHLT).

Dr Jehad Al-Buraiki, consultant and head of the KFSHRC's cardiology centre, told *Arab News* that the centre transplanted 35 hearts in 2017, including seven to children under the age of 14.

He said that the success rate was 87%, which is comparable to the averages of 250 heart centres in the US.

He noted that since the start of the program in 1989 until the end of 2017 the hospital had performed 302 heart transplants.

UAE's MOHAP is first to use AI-based smart app to help patients with multiple sclerosis

The UAE Ministry of Health and Prevention announced that it is the first institu-

tion in the world to use a smart application to help treat chronic or recurrent depression, or multiple depressive disorder, associated with multiple sclerosis (MS) for patients over 18 years old. The app was launched to provide social and psychological support to patients.

Using artificial intelligence (AI), the DePrexis MS app simulates functional interventions based on psychotherapy research. The US FDA and CE have approved the app, which according to some studies has been shown to have a similar positive effect to medication.

Dr Yousif Al Serkal, Assistant Undersecretary for Hospitals, said that the ministry's latest achievement marks another milestone in the UAE's strategy to offer AI-based medical services.

Dr Serkal said: "It is great to leverage the latest scientific technologies to alleviate the suffering of patients. This is also part of the ministry's strategy to promote community health through provision of comprehensive, innovative, and world-class health services to build a happy society."

Dr Kalthoum Al Baloushi, Director of Hospitals Administration, said: "The ministry will always provide patient-focused healthcare solutions. In this case, we seek to alleviate the suffering of MS patients by helping them smoothly integrate into society and provide social, psychological and moral support through sophisticated treatment methods. These methods include the AI-based Deprexis MS app, the latest global therapeutic approach which we are applying in the ministry-run hospitals.

HMC signs agreement with Heidelberg University Hospital to enhance collaboration

Qatar's Hamad Medical Corporation (HMC) and Heidelberg University Hospital, an internationally renowned clinical and research institution located in Heidelberg, Germany, have signed an agreement to enhance mutual collaborations in clinical, translational, and basic research. The agreement was signed by Dr Hanan Mohamed Al Kuwari, Minister of Public Health for the State of Qatar, Professor Dr Annette Grüters-Kieslich, Chief Medical Director and Chairwoman of the Board of Heidelberg University Hospital, and Irmtraut Gürkan, Administrative Director and Vice-Chairwoman of the Board, Heidelberg University Hospital.

Dr Hanan Mohamed Al Kuwari, Qatar's Minister of Public Health and Heidelberg University Hospital's Prof Dr Annette Grüters-Kieslich and Irmtraut Gürkan sign an agreement to enhance mutual collaboration in clinical, translational and basic research

Dr Al Kuwari expressed her strong support for the deepening relationship between HMC and Heidelberg University Hospital, which will see further development of collaborative programs in medicine, especially in the fields of cancer research, technology transfer, and training.

"The purpose of the agreement is to promote opportunities for clinical and basic research collaborations, and to advance healthcare delivery in Qatar," said Dr Al Kuwari. "We are very pleased to be entering into this important agreement with Heidelberg University Hospital, as we work together to explore new ways to deliver better patient care."

The signing of the agreement took place during the opening ceremony of the first Doha-Heidelberg Research Conference on 27 January, 2018.

Prof Grüters-Kieslich, who also gave the keynote address at the opening ceremony, said: "An important focus in the development strategy of Heidelberg University Hospital is strengthening international networks in clinical research and medical care. For many years Hamad Medical Corporation has been an important partner for Heidelberg University Hospital and this agreement opens the way to take our relationship to a new level in the future."

Dr Saad Al Kaabi, Conference Organizing Committee Chairman and Chairman of the International Medical Affairs Office at HMC, sadi: "Hamad already has a long-standing relationship with Heidelberg University Hosptial and this agreement will see advanced opportunities for joint collaboration, particularly for cancer research and training that will benefit a wide range of institutions in Qatar.

"The success of this first research conference between our two organizations has seen many clinicians, researchers and academics come together to share knowledge and experience which will help inspire future collaboration opportunities," he said.

Experts in the fields of Gastro-Intestinal (GI) cancer, neuro-oncology, and hematological malignancies as well as pediatric cancers and genomic medicine in newborns presented their research results during this two-day conference.

The National Center for Tumor Diseases NCT of the Heidelberg University Hospital is an international leader in cancer medicine and has a strong academic focus on improving cancer care through intensive clinical research. MEH

worldwide monitor

Update from around the globe

High levels of antibiotic resistance found worldwide, new data shows

WHO's first release of surveillance data on antibiotic resistance reveals high levels of resistance to a number of serious bacterial infections in both high- and low-income countries.

WHO's new Global Antimicrobial Surveillance System (GLASS) reveals widespread occurrence of antibiotic resistance among 500,000 people with suspected bacterial infections across 22 countries.

The most commonly reported resistant bacteria were Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus, and Streptococcus pneumoniae, followed by Salmonella spp. The system does not include data on resistance of Mycobacterium tuberculosis, which causes tuberculosis (TB), as WHO has been tracking it since 1994 and providing annual updates in the Global tuberculosis report.

Among patients with suspected bloodstream infection, the proportion that had bacteria resistant to at least one of the most commonly used antibiotics ranged tremendously between different countries – from zero to 82%. Resistance to penicillin ranged from zero to 51% among reporting countries. And between 8% to 65% of E. coli associated with urinary tract infections presented resistance to ciprofloxacin, an antibiotic commonly used to treat this condition.

"The report confirms the serious situation of antibiotic resistance worldwide," says Dr Marc Sprenger, director of WHO's Antimicrobial Resistance Secretariat.

"Some of the world's most common – and potentially most dangerous – infections are proving drug-resistant," adds Sprenger. "And most worrying of all, pathogens don't respect national borders. That's why WHO is encouraging all countries to set up good surveillance systems for detecting drug resistance that can provide data to this global system."

To date, 52 countries (25 high-income, 20 middle-income and 7 low-income countries) are enrolled in WHO's Global Antimicrobial Surveillance System. For the first report, 40 countries provided information about their national surveillance systems and 22 countries also provided data on levels of antibiotic resistance.

"The report is a vital first step towards improving our understanding of the extent of antimicrobial resistance. Surveillance is in its infancy, but it is vital to develop it if we are to anticipate and tackle one of the biggest threats to global public health," says Dr Carmem Pessoa-Silva, who coordinates the new surveillance system at WHO.

Data presented in this first GLASS report vary widely in quality and completeness. Some countries face major challenges in building their national surveillance systems, including a lack of personnel, funds and infrastructure.

However, WHO is supporting more countries to set up national antimicrobial resistance surveillance systems that can produce reliable, meaningful data. GLASS is helping to standardize the way that countries collect data and enable a more complete picture about antimicrobial resistance patterns and trends.

Solid drug resistance surveillance programmes in TB, HIV and malaria have been functioning for many years and have helped estimate disease burden, plan diagnostic and treatment services, monitor the effectiveness of control interventions, and design effective treatment regimens to address and prevent future resistance. GLASS is expected to perform a similar function for common bacterial pathogens.

The rollout of GLASS is already making a difference in many countries. For example, Kenya has enhanced the development of its national antimicrobial resistance system; Tunisia started to aggregate data on antimicrobial resistance at national level; the Republic of Korea completely revised its national surveillance system to align with the GLASS methodology, providing data of very high quality and completeness; and countries such as Afghanistan or Cambodia that face major structural challenges have enrolled in the system and are using the GLASS framework as an opportunity for strengthening their AMR surveillance capacities. In general, national participation in GLASS is seen as a sign of growing political commitment to support global efforts to control antimicrobial resistance.

Any country, at any stage of the development of its national antimicrobial resistance surveillance system, can enrol in GLASS. Countries are encouraged to implement the surveillance standards and indicators gradually, based on their national priorities and available resources.

GLASS will eventually incorporate information from other surveillance systems related to antimicrobial resistance in humans, such as in the food chain, monitoring of antimicrobial consumption, targeted surveillance projects, and other related data.

All data produced by GLASS is available free online and will be updated regularly.

Philips spearheads Circular Economy – will take back old medical equipment

At this year's World Economic Forum Annual Meeting in Davos, Switzerland, Frans van Houten, CEO Philips, cemented the company's 2020 commitment to the Circular Economy by pledging to take back and repurpose all the large medical systems that its customers are prepared to return to it. This means that Philips will actively pursue the trade-in of equipment such as MRI, CT and Interventional X-ray systems and take full control to ensure that

Clinical Mobility Solutions

Quick HIS Access on the Move

Advantech's AIM-55 is an industrial-grade tablet that features a stylish appearance and advanced computing technologies to provide a superior device for mobile computing in healthcare environments. Designed to streamline hospital workflows and improve patient care, AIM-55 also integrates value-added solutions that support maintenance of the "five rights" of medication administration - right patient, right time, right medication, right dosage, and right route.

AIM-55 functionalities can be easily expanded with the addition of diverse extension modules, such as a barcode scanner, magnetic stripe reader, smart card reader, and RJ45 connector, according to specific application requirements.

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all traded-in materials are repurposed in a responsible way.

Such actions are necessary because the United Nations Resource Panel predicts that globally the manufacturing sector will need to extract 180 billion tons of the Earth's natural resources every year by 2050, almost double what it does today, which is not sustainable.

The challenge, which was highlighted at Davos in the Circle Economy 'Circularity Gap Report', is to shift from today's linear 'take-make-dispose' model, in which less than 10% of the raw material is recycled, to a circular 'make-use-return' paradigm – the so-called Circular Economy. Widely regarded as essential to meeting the United Nations Sustainable Development Goals, the Circular Economy aims to keep products, components and materials at their highest utility and value at all times throughout the make-use-return and repurposing cycle.

Through his co-chairmanship of the PACE (Platform for Accelerating the Circular Economy) initiative, van Houten is championing the necessary change, spearheading its implementation, and assembling a coalition of like-minded companies to make similar capital equipment pledges. Philips will continue to expand its own pledge until it includes all its professional equipment.

"We firmly expect the circular economy to replace the traditional 'take-make-dispose' scheme," said van Houten. "So, at Philips we aim to take back all capital equipment from our hospital clients. What's more, we expect this to become a win-win business model, because there is much residual value to recover. We continuously endeavour to 'disrupt ourselves' by rethinking and redesigning the way we do business to contribute to a better world."

Innovative service models, smart upgrade paths, and product take-back and remanufacturing programs are not only good for the planet and improving people's lives, they also make good business sense. As part of its 'Healthy people, Sustainable planet' strategy, Philips aims to deliver 15% of total revenues from circular solutions by 2020. Over the last decade, it has returned some 7000 tons of refurbished medical imaging equipment to the market and incorporated 6000 tons of recycled plastics into its new consumer products.

Van Houten's commitment to promoting sustainability and the Circular Economy has won him a Fortune Award for Circular Economy leadership, which was presented to him at WEF 2018.

Working towards zero tolerance for female genital mutilation

Nine years ago, one community in Sudan decided to follow WHO recommendations and abandon the practice of female genital mutilation (FGM).

Since then, Tuti Island, a community of 21,000 residents located at the juncture where the White Nile and Blue Nile rivers merge, has been held up as a trailblazer in a growing movement to end FGM.

To date, more than 1000 communities in Sudan have abandoned the practice which has no health benefits and continues to violate the human rights of 200 million women and girls in Africa, the Middle East and Asia.

"Tuti Island is a shining example of how a community can initiate and sustain an effort to end FGM," said Dr Wisal Ahmed, team leader in WHO Sudan's Women's Health Unit. "We hope the other communities who have declared abandonment in the past four years can also sustain progress."

Sudan has one of the highest rates of FGM in the world, with most girls undergoing the practice between 5–9 years of age. Eighty-seven percent of women aged 15-49 years have been cut, and the majority have undergone the severest form – infibulation – where the genitals are stitched up after cutting, leaving only a small opening for urine to pass.

However, there are indications that the practice is decreasing among younger girls, explained Dr Ahmed. "Only a third of girls aged 0-14 years undergo FGM compared to 9 out of 10 girls aged 15-49 years."

Five years ago, WHO, joined the UNICEF and UNFPA programme supporting the Government of Sudan, called "Sudan Free From Female Genital Cutting". As part of the programme, WHO has been working to strengthen the health sector's response to FGM by halting "medicalization" – the practice of FGM performed by midwives and other healthcare providers.

"FGM is a human rights violation breaching the health profession's code of ethics to 'do no harm'. WHO and partner UN agencies are opposed to the medicalization of FGM," said Dr Naeema Al-Gaseer, WHO Country Representative for Sudan.

Working with the Sudan Ministry of Health, midwifery schools, and health professional associations and regulatory bodies, WHO is ensuring health professionals adhere to the recommendations laid out in its Global strategy to stop healthcare providers from performing female genital mutilation.

As part of pre-licence training, all paramedical and midwives in the country now receive information about the harms of FGM. To date, nearly 1000 health professionals have undergone the training. And, more than 2700 medical professionals in Sudan have pledged to abandon FGM and its medicalization.

Using WHO recommendations on the management of health complications from FGM, the country is also working to ensure women who have undergone FGM receive the care, treatment and counselling they need, and are not repeatedly harmed when seeking care, especially after childbirth.

Educating young girls about the dangers of FGM is another component of the multisector programme. Since more than 70% of girls in Sudan attend primary school, WHO, in partnership with the Ministry of Education and Ministry of Health, developed and integrated FGM content within the school curriculum. Now girls learn that FGM is not a religious rite and has significant short- and long-term negative health consequences.

Rapid spread of multidrug-resistant malaria in southeast Asia demands urgent action

The current spread of multidrug-resistant malaria in southeast Asia is likely to be the result of two mutations combining in 2008, according to a retrospective genetic study published in *The Lancet Infectious Diseases* journal. The study shows how the multidrug-resistant parasite gained in-

creased biological fitness, spreading rapidly through the region unnoticed for 5 years until the outbreak became apparent in 2013. The authors warn that malaria programmes should closely monitor genetic mutations to mitigate the possibility of the parasite becoming untreatable.

Malaria is caused by Plasmodium parasites, which are transmitted by mosquitoes. Typically, treatment for malaria involves a combination of drugs including artemisinin – a potent and fast-acting antimalarial drug – and a longer-acting partner drug to ensure that all parasites are killed and to prevent the emergence of resistance.

In 2008, Plasmodium falciparum started to become resistant to artemisinin in western Cambodia. Since then, resistance has been observed in other parts of Cambodia, Thailand, Vietnam, Myanmar, and Laos.

From 2013, the frequency of complete treatment failure in patients receiving a drug combination of dihydroartemisinin and piperaquine increased rapidly in Cambodia, northeast Thailand, and Vietnam.

"Malaria policy makers now face a dilemma. On one hand, malaria remains treatable and its prevalence has been reduced to low enough levels to aim to eliminate the disease in Cambodia and neighbouring countries. However, the situation is fragile, and it is unclear how the parasite population will evolve in response to new interventions," says Roberto Amato, Wellcome Sanger Institute, UK. "While it would be catastrophic if resistance developed in the same way for the last remaining anti-malarial drugs, it is now possible to conduct genetic surveillance of malaria cases, allowing researchers to respond as soon as possible to changes in the parasite population. It is important that we embrace these technologies so that major outbreaks of resistance do not go unnoticed in the future, and to reduce the risk of a global health emergency."

In the study, the authors analysed the genomes of 1492 P falciparum samples from 11 locations across southeast Asia between 2007-2013, including 464 samples collected in western Cambodia, to determine how resistance developed.

Resistance to artemisinin is caused by mutations in a gene called kelch13, while amplifications of the genes plasmepsin 2 and plasmepsin 3 are linked to resistance to piperaquine.

The rapid spread of the mutation pair suggests that artemisinin-resistant parasites are acquiring increased biological fitness, and it is unclear how much this increases the risk of resistance to other drugs and trans-continental spread.

The authors also note that the mutation pair seems to have displaced other artemisinin-resistant parasite lineages, including those that cause resistance to the anti-malarial drug mefloquine.

Writing in a linked Comment, Dr Didier Ménard, Pasteur Institute, France, says: "The results of this study are reminiscent of the evolution of chloroquine resistance, wherein multiple P falciparum chloroquine resistance transporter (Pfcrt) alleles emerged in southeast Asia before one allele (the CVIET allele) eventually spread to Africa, leading to millions of deaths. Obviously, this scenario should be avoided for artemisinin combination therapy. For chloroquine, the molecular signatures of resistance were only detected in early 2000, long after resistant parasites had spread outside their original focus. The spread of strains resistant to artemisinin combination therapy in western Cambodia is underway; however, it is reassuring to learn from this study that genomic tools are available to monitor the onset of this spread and, by contrast with chloroquine resistance, to track resistant parasites in real time. We must take advantage of this situation. One way is to improve understanding of the causes of emergence and selection of resistance to artemisinin combination therapy by progressing analyses of parasite population genetics."

GE, Roche partner to develop digital diagnostics platform

GE Healthcare has entered into a strategic, long-term partnership with Roche to jointly develop and co-market digital clinical decision support solutions. The partnership will initially focus on products that accelerate and improve individualized treatment options for cancer and critical care patients.

The two companies aim to develop an industry-first digital platform, using advanced analytics to provide workflow solutions and apps that support clinical decisions. This will allow the seamless integration and analysis of *in-vivo* and *in-vitro* data, patient records, medical best practice, real time monitoring and the latest research outcomes. Clinicians will then have the comprehensive decision support for providing the right treatment and quality of care for their patients.

"This is the first time that two major players in healthcare have combined advanced analytics with in-vivo and in-vitro diagnostics to this degree. We believe this alliance will help accelerate the delivery of data-driven precision health for customers, patients and the healthcare industry," said Kieran Murphy, President & CEO of GE Healthcare.

For example, oncology care teams with multiple specialists will have a comprehensive data dashboard to review, collaborate and align on treatment decisions for cancer patients at each stage of their disease. In the critical care setting, data from a patient's hospital monitoring equipment will be integrated with their biomarker, tissue pathology, genomic and sequencing data, helping physicians to identify, or even predict severe complications before they strike.

US NIH to launch genome editing research programme

The US National Institutes of Health will launch an effort aimed at removing barriers that slow the adoption of genome editing for treating patients. This program, Somatic Cell Genome Editing, plans to award researchers approximately US$190 million over six years beginning this year, pending availability of funds. These researchers will

collaborate to improve the delivery mechanisms for targeting gene editing tools in patients, develop new and improved genome editors, develop assays for testing the safety and efficacy of the genome editing tools in animal and human cells, and assemble a genome editing toolkit containing the resulting knowledge, methods, and tools to be shared with the scientific community.

"Genome editing technologies such as CRISPR/Cas9 are revolutionizing biomedical research," said NIH Director Francis S. Collins, M.D., Ph.D. "The focus of the Somatic Cell Genome Editing program is to dramatically accelerate the translation of these technologies to the clinic for treatment of as many genetic diseases as possible."

Advances in genome editing made over the past decade now make it possible to precisely change the DNA code inside living cells. Despite widespread interest and investment in this field, many challenges remain preventing broad adoption of this technology in the clinic.

Somatic cells are any of the non-reproductive cells of the body, i.e. the cells that do not pass DNA down to the next generation. By focusing on somatic cells, any changes to the DNA introduced by the genome editing therapeutics will not be inherited.

WHO prequalifies breakthrough vaccine for typhoid

At the end of December last year, WHO prequalified the first conjugate vaccine for typhoid, Bharat Biotech's Typbar-TCV. Typhoid conjugate vaccines (TCVs) are innovative products that have longer-lasting immunity than older vaccines, require fewer doses, and can be given to young children through routine childhood immunization programmes. The fact that the vaccine has been prequalified by WHO means that it meets acceptable standards of quality, safety and efficacy. This makes the vaccine eligible for procurement by UN agencies, such as UNICEF, and Gavi, the Vaccine Alliance.

In October last year, the Strategic Advisory Group of Experts (SAGE) on immunization, which advises WHO, recommended TCV for routine use in children over 6 months of age in typhoid endemic countries. SAGE also called for the introduction of TCV to be prioritized for countries with the highest burden of typhoid disease or of antibiotic resistance to Salmonella Typhi, the bacterium that causes the disease. Use of the vaccine should also help to curb the frequent use of antibiotics for treatment of presumed typhoid fever, and thereby help to slow the alarming increase in antibiotic resistance in Salmonella Typhi.

Shortly after SAGE's recommendation, Gavi Board approved US$85 million in funding for TCVs starting in 2019. Prequalification is therefore a crucial next step needed to make TCVs available to low-income countries where they are needed most. And even in non-Gavi-supported countries, prequalification can help expedite licensure.

UN Environment, WHO set up major collaboration on environmental health

UN Environment and WHO have agreed a new, wide-ranging collaboration to accelerate action to curb environmental health risks that cause an estimated 12.6 million deaths a year.

The new collaboration creates a more systematic framework for joint research, development of tools and guidance, capacity building, monitoring of Sustainable Development Goals, global and regional partnerships, and support to regional health and environment fora.

Mr Erik Solheim, head of UN Environment, and Dr Tedros Adhanom Ghebreyesus, Director-General of WHO, signed an agreement in Nairobi to step up joint actions to combat air pollution, climate change and antimicrobial resistance, as well as improve coordination on waste and chemicals management, water quality, and food and nutrition issues. The collaboration also includes joint management of the BreatheLife advocacy campaign to reduce air pollution for multiple climate, environment and health benefits.

This represents the most significant formal agreement on joint action across the spectrum of environment and health issues in over 15 years.

"There is an urgent need for our two agencies to work more closely together to address the critical threats to environmental sustainability and climate – which are the foundations for life on this planet. This new agreement recognizes that sober reality," said Solheim.

Tedros commented: "Our health is directly related to the health of the environment we live in. Together, air, water and chemical hazards kill more than 12.6 million people a year. This must not continue."

He added: "Most of these deaths occur in developing countries in Asia, Africa and Latin America where environmental pollution takes its biggest health toll."

The two agencies will develop a joint work programme and hold an annual high-level meeting to evaluate progress and make recommendations for continued collaboration.

Priority areas of cooperation between WHO and UN Environment

- Air Quality - More effective air quality monitoring including guidance to countries on standard operating procedures; more accurate environment and health assessments, including economic assessment; and advocacy, including the BreatheLife campaign promoting air pollution reductions for climate and health benefits.
- Climate - Tackling vector-borne disease and other climate-related health risks, including through improved assessment of health benefits from climate mitigation and adaptation strategies.
- Water – Ensuring effective monitoring of data on water quality, including through data sharing and collaborative analysis of pollution risks to health.
- Waste and chemicals – Promotion of more sustainable waste and chemicals management, particularly in the area of pesticides, fertilizers, use of antimicrobials . The collaboration aims to advance the goal of sound lifecycle chemicals management by 2020, a target set out at the 2012 United Nations Conference on Sustainable Development.

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Medical research news from around the world

Researchers develop single blood test for 8 cancers

Researchers at Johns Hopkins Kimmel Cancer Center have developed a single blood test that screens for eight common cancer types and helps identify the location of the cancer. Five of the cancers covered by the test currently have no screening test.

The test, called CancerSEEK, is a unique noninvasive, multianalyte test that simultaneously evaluates levels of eight cancer proteins and the presence of cancer gene mutations from circulating DNA in the blood.

"The use of a combination of selected biomarkers for early detection has the potential to change the way we screen for cancer, and it is based on the same rationale for using combinations of drugs to treat cancers," says Nickolas Papadopoulos, Ph.D., senior author and professor of oncology and pathology.

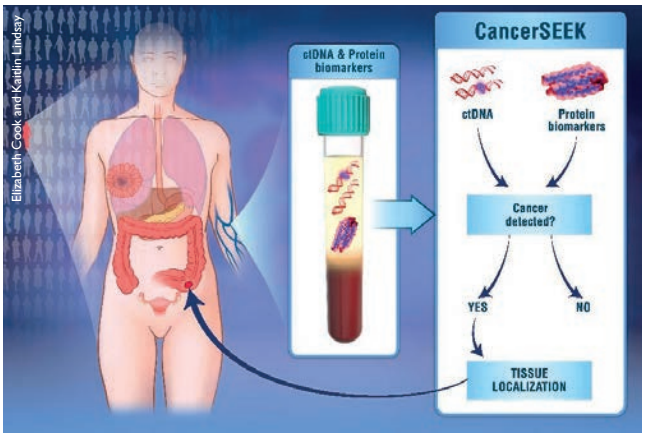
The findings were published online by *Science* on 18 January 2018.

"Circulating tumour DNA mutations can be highly specific markers for cancer. To capitalize on this inherent specificity, we sought to develop a small yet robust panel that could detect at least one mutation in the vast majority of cancers," says Joshua Cohen, an M.D.-Ph.D. student at the Johns Hopkins University School of Medicine and the paper's first author. "In fact, keeping the mutation panel small is essential to minimize false-positive results and keep such screening tests affordable."

The investigators initially explored several hundred genes and 40 protein markers, whittling the number down to segments of 16 genes and eight proteins. They point out that this molecular test is solely aimed at cancer screening and, therefore, is different from other molecular tests, which rely on analyzing large numbers of cancer-driving genes to identify therapeutically actionable targets.

In this study, the test had greater than 99% specificity for cancer. "Very high specificity was essential because false-positive results can subject patients to unnecessary invasive follow-up tests and procedures to confirm the presence of cancer," says Kenneth Kinzler, Ph.D., professor of oncology and co-director of the Ludwig Center. The test was used on 812 healthy controls and produced only seven false-positive results.

The test was evaluated on 1,005 patients with nonmetastatic, stages I to III cancers of the ovary, liver, stomach, pancreas, oesophagus, colorectum, lung or breast. The median overall sensitivity, or the ability to find cancer, was 70% and ranged from a high of 98% for ovarian cancer to a low of 33% for breast cancer. For the five cancers that have no screening tests – ovarian, liver, stomach, pancreatic and oesophageal cancers – sensitivity ranged from 69% to 98%.



"A novelty of our classification method is that it combines the probability of observing various DNA mutations together with the levels of several proteins in order to make the final call," says Cristian Tomasetti, Ph.D., associate professor of oncology and biostatistics, who developed the algorithm. "Another new aspect of our approach is that it uses machine learning to enable the test to accurately determine the location of a tumour down to a small number of anatomic sites in 83% of patients."

Although the current test does not pick up every cancer, it identifies many cancers that would likely otherwise go undetected.

"Many of the most promising cancer treatments we have today only benefit a small minority of cancer patients, and we consider them major breakthroughs. If we are going to make progress in early cancer detection, we have to begin looking at it in a more realistic way, recognizing that no test will detect all cancers," says Bert Vogelstein, M.D., co-director of the Ludwig Center, Clayton Professor of Oncology and Howard Hughes Medical Institute investigator.

To zero in on the analytes they included in their CancerSEEK test, the research team pulled data from more than three decades of cancer genetics research generated at their Ludwig Center at Johns Hopkins, where the first genetic blueprints for cancer were created, as well as data from many other institutions.

To precisely determine the optimal number of DNA bases to assess in the CancerSEEK test, the researchers used a method based on diminishing returns.

"The more DNA bases you assay, the more mutations you are capable of finding, but eventually you reach a point of diminishing returns," explains Cohen. "We designed our test to reflect this point of diminishing returns, including the DNA markers that were useful to detecting the cancers and eliminating those that did not add benefit." The result was a relatively small panel of highly selective DNA markers.

"This test represents the next step in changing the focus of cancer research from late-stage disease to early disease, which I believe will be critical to reducing cancer deaths in the long term," says Vogelstein.

CancerSEEK is noninvasive and can, in principle, be administered by primary care providers at the time of other routine blood work. "This has the potential to substantially impact patients. Earlier detection provides many ways to improve outcomes for patients. Optimally, cancers would be detected early enough that they could be cured by surgery alone, but even cancers that are not curable by surgery alone will respond better to systemic therapies when there is less advanced disease," says Anne Marie Lennon, M.D., Ph.D., associate professor of medicine, surgery and radiology, clinical director of gastroenterology and

director of the Multidisciplinary Pancreatic Cyst Program.

The investigators feel that a test that will be used routinely for cancer screening must have a cost in line with or less than other currently available screening tests for single cancers, such as colonoscopy. They envision that the CancerSEEK test will eventually cost less than $500.

Larger studies of the test are currently under way.

New research adds to evidence linking gut bacteria and obesity

A new Johns Hopkins study of mice with the rodent equivalent of metabolic syndrome has added to evidence that the intestinal microbiome – a "garden" of bacterial, viral and fungal genes – plays a substantial role in the development of obesity and insulin resistance in mammals, including humans.

A report of the findings, published 24 January 2018 in *Mucosal Immunology*, highlights the potential to prevent obesity and diabetes by manipulating levels and ratios of gut bacteria, and/or modifying the chemical and biological pathways for metabolism-activating genes.

"This study adds to our understanding of how bacteria may cause obesity, and we found particular types of bacteria in mice that were strongly linked to metabolic syndrome," says David Hackam, M.D., Ph.D., surgeon-in-chief and co-director of Johns Hopkins Children's Center and the study's senior author. "With this new knowledge we can look for ways to control the responsible bacteria or related genes and hopefully prevent obesity in children and adults."

Metabolic syndrome, a cluster of conditions including obesity around the waist, high blood sugar and increased blood pressure, is a risk factor for heart disease, stroke and diabetes. While no precise cause for metabolic syndrome is known, previous studies of Toll-like receptor 4 (TLR4), a protein that receives chemical signals to activate inflammation, have suggested that TLR4 may be responsible in part for its development.

How and why TLR4 may be responsible for metabolic syndrome, however, has been unclear, says Hackam. Perhaps, the research team thought, TLR4 signalling in different cells and their association with the bacterial environment could result in different effects on the development of metabolic syndrome.

To first determine whether TLR4 specifically in the intestinal epithelium (layer of cells that line the small and large intestines) would cause the development of metabolic syndrome, the research team ran a series of experiments on both normal mice and mice genetically modified to lack TLR4 in their intestinal epithelium.

The researchers fed both groups of mice "standard chow," or food with 22% fat calories, for 21 weeks.

Compared to normal mice, those lacking TLR4 showed a series of symptoms consistent with metabolic syndrome, such as significant weight gain, increased body and liver fat, and insulin resistance.

The researchers then fed both groups of mice a high-fat diet comprised of 60% fat calories for 21 weeks to find out whether diet would affect the development of metabolic syndrome. Again, the genetically modified mice gained significantly more in weight and had greater body and liver fat than the normal mice.

To confirm the role of TLR4 expression in the intestinal epithelium, the researchers genetically modified three more groups of mice: one group expressed TLR4 only in the intestinal epithelium, another group lacked TLR4 in all body cells and the third group lacked TLR4 only in white blood cells.

All groups ate standard chow, and all groups had similar body weight, body and liver fat, and glucose tolerance compared to normal mice. Compared with normal mice, belly and small intestine fat was higher in mice lacking TLR4 only in the intestinal epithelium. This, the researchers say, provides further evidence that deleting TLR4 specifically from the intestinal epithelium is required for developing metabolic syndrome.

To investigate the role the bacterial makeup of the gut had on the mice, Hackam and his team then administered antibiotics to the normal and TLR4 intestinal epithelium-deficient mice. Antibiotics significantly reduced the amount of bacteria in the intestinal tract and prevented all symptoms of metabolic syndrome in the mice that lacked TLR4 in their intestinal epitheliums.

This demonstrates, the researchers say, that bacterial levels can be manipulated to prevent the development of metabolic syndrome.

To further explore the role of intestinal epithelial TLR4 on the development of metabolic syndrome, the research team analysed faecal samples from the TLR4 intestinal epithelium-deficient and normal mice. The team found that specific clusters of bacteria that contribute to the development of metabolic syndrome were expressed differently in the deficient mice than in normal mice. They also determined that the bacteria expressed genes that made them "less hungry" and thus less able to digest the nutrients present in the mouse chow. This resulted in a greater abundance of food for the mouse to absorb, which contributed to obesity.

The researchers then analysed the genes expressed in the lining of the intestinal mucosa – the site at which food absorption occurs – in normal and TLR4 intestinal epithelium-deficient mice. Of note, the team determined that important genes in the perixisome proliferator-activated receptor (PPAR) metabolic pathway were significantly suppressed in the deficient mice. Administering antibiotics prevented the differences in gene regulation between the two groups of mice, as did administering drugs to activate the PPAR signalling pathway, further explaining the reasons for which obesity developed.

"All of our experiments imply that the bacterial sensor TLR4 regulates both host and bacterial genes that play previously unrecognized roles in energy metabolism leading to the development of metabolic syndrome in mice," says Hackam.

- **doi**: 10.1038/mi.2017.114

MERS antibodies shown to be safe in Phase 1 trial

An experimental treatment developed from cattle plasma for Middle East Respiratory Syndrome (MERS) coronavirus infection

shows broad potential, according to a small clinical trial led by US National Institutes of Health (NIH) scientists and their colleagues. The treatment, SAB-301, was safe and well tolerated by healthy volunteers, with only minor reactions documented.

The first confirmed case of MERS was reported in Saudi Arabia in 2012. Since then, the MERS coronavirus has spread to 27 countries and sickened more than 2,000 people, of whom about 35% have died, according to the World Health Organization. There are no licensed treatments for MERS.

SAB-301 was developed by SAB Biotherapeutics of Sioux Falls, South Dakota, and has been successfully tested in mice. The treatment comes from so-called "transchromosomic cattle". These cattle have genes that have been slightly altered to enable them to produce fully human antibodies instead of cow antibodies against killed microbes with which they have been vaccinated – in this case the MERS virus. The clinical trial, conducted by the NIH's National Institute of Allergy and Infectious Diseases, took place at the NIH Clinical Center.

In the study, 28 healthy volunteers were treated with SAB-301 and 10 received a placebo. Six groups of volunteers given different intravenous doses were assessed six times over 90 days. Complaints among the treatment and placebo groups – such as headache and common cold symptoms – were similar and generally mild.

The researchers believe they may be able to use transchromosomic cattle to rapidly produce human antibodies against other human pathogens as well, in as few as three months. This means they could conceivably develop antibody treatments against a variety of infectious diseases in a much faster timeframe and in much greater volume than currently possible.

SAB Biotherapeutics is planning a larger study of SAB-301 in patients infected with MERS coronavirus.

- **doi**: 10.1016/S1473-3099(18)30002-1 (2018).

Brain-scan guided emergency stroke treatment breakthrough

Advances in brain imaging can identify a greater number of stroke patients who can receive therapy later than previously believed, according to a new study. The results of the Endovascular Therapy Following Imaging Evaluation for the Ischemic Stroke (DEFUSE 3) trial, presented at the International Stroke Conference 2018 in Los Angeles and published on January 24 in the *New England Journal of Medicine*, demonstrated that physically removing brain clots up to 16 hours after symptom onset in selected patients led to improved outcomes compared to standard medical therapy. The study was funded by the National Institute of Neurological Disorders and Stroke (NINDS), part of the US National Institutes of Health.

"These striking results will have an immediate impact and save people from life-long disability or death," said Walter Koroshetz, M.D., director NINDS. "I really cannot overstate the size of this effect. The study shows that one out of three stroke patients who present with at-risk brain tissue on their scans improve and some may walk out of the hospital saved from what would otherwise have been a devastating brain injury."

DEFUSE 3 was a large, multi-site study supported by NINDS' StrokeNet, which is a network of hospitals providing research infrastructure for multi-site clinical trials. This study was conducted at 38 centres across the United States and was led by Gregory W. Albers, M.D., professor of neurology and neurological sciences at Stanford University School of Medicine, in California, and director of the Stanford Stroke Center. The study was ended early by the NIH on recommendation of the independent Data and Safety and Monitoring Board because of overwhelming evidence of benefit from the clot removal procedure.

Ischemic stroke occurs when a cerebral blood vessel becomes blocked, cutting off the delivery of oxygen and nutrients to brain tissue. Brain tissue in the immediate area of the blockage, known as the core, cannot typically be saved from dying, and it can enlarge over time. However, it has long been thought that the area surrounding the core (known as the ischemic penumbra) has the potential to be saved based on how quickly the blood flow can be restored. Over the past two decades, scientists have been working to develop brain scanning methods, called perfusion imaging, that could identify patients with brain tissue that can still be salvaged by removing the blockage. In perfusion imaging, a standard dye is injected and scanned for a few minutes as it passes through the brain.

Using an automated software known as RAPID to analyze perfusion MRI or CT scans, the DEFUSE 3 researchers identified patients thought to have salvageable tissue up to 16 hours after stroke onset. The participants were randomized to either receive endovascular thrombectomy plus standard medical therapy or medical therapy alone.

Endovascular thrombectomy, or the physical removal of the blockage, is currently approved for use up to six hours following onset of stroke symptoms. Dr Albers and the DEFUSE 3 researchers discovered that this intervention can be effective up to 16 hours after symptoms begin in this select group of patients. The findings showed that patients in the thrombectomy group had substantially better outcomes 90 days after treatment compared to those in the control group. For example, 45% of the patients treated with the clot removal procedure achieved functional independence compared to 17% in the control group. In addition, thrombectomy was associated with improved survival. According to the results 14% of the treated group had died within 90 days of the study, compared to 26% in the control group.

"Although stroke is a medical emergency that should be treated as soon as possible, DEFUSE 3 opens the door to treatment even for some patients who wake up with a stroke or arrive at the hospital many hours after their initial symptoms," said Dr Albers.

DEFUSE 3 builds on results from the two earlier DEFUSE studies as well as the industry-sponsored DAWN trial, which used perfusion imaging technology to identify patients most likely to benefit from interventions such as thrombectomy. Those studies suggested that the advanced brain imaging could identify which patients could benefit from restoring blood flow in an extended treatment window.

- **doi**: 10.1056/NEJMoa1713973

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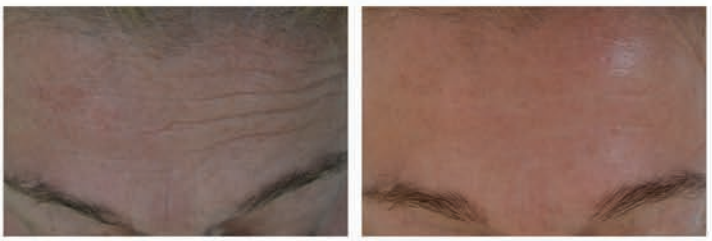

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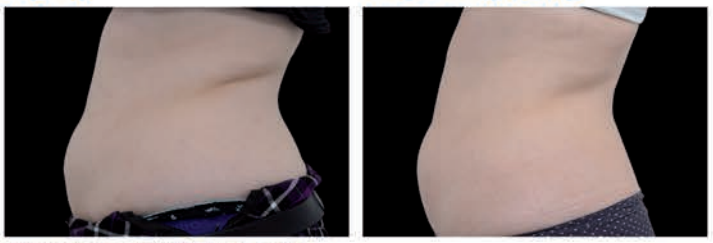
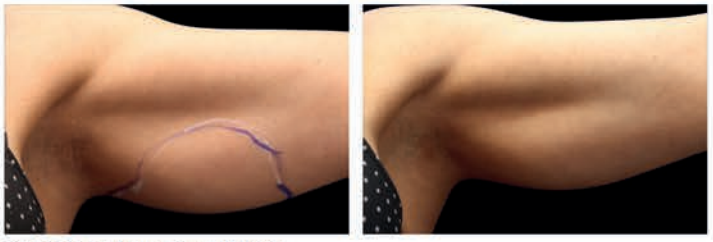
BEFORE **AFTER 4 TREATMENTS**



COURTESY OF: DOMINIQUE DENJEAN, M.D.

BEFORE **AFTER 4 TREATMENTS**



COURTESY OF: SUNEEL CHILUKURI, M.D.

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3D model of molecules in yeast linked to enzyme that lengthens telomeres

Through the haze of a sonogram screen, an expectant mother catches a glimpse of the growing baby within her. The outline of a nose, chin and head, instantly recognizable as a tiny human, brings to life what parents, until then, could only imagine. Biologists, too, aim to bring their scientific discoveries to life by creating three-dimensional models – at the atomic level – of the inner workings of cells.

"We need atomic-resolution 3-D images of molecular structures for many reasons. For example, these images can show us precisely how interacting molecules bind to each other in order to carry out critical cellular functions. This helps us develop therapeutic drugs that control the interactions, and therefore also the biochemical processes that they perform in cells," says David Zappulla, Ph.D., a researcher in the department of molecular biology and genetics at the Johns Hopkins University School of Medicine.

Zappulla's research focuses on an enzyme found in cells, called telomerase, which lengthens repetitive bits of DNA at the end of chromosomes. These endcaps, called telomeres, erode each time a cell divides, and without these protective tips, this erosion would chip away at the chromosomes – including crucial genetic information – and kill the cell.

Telomerase is present in foetal cells to keep DNA from getting too clipped as cells multiply rapidly during early development, but then the enzyme is turned off, and telomeres erode over time, as part of the natural aging process of cells. It's well-known that older people tend to have shorter telomeres than younger people.

Cancer cells, on the other hand, hijack telomerase and re-express it to maintain telomere length, making them impervious to aging-related death. To kill cancer cells, scientists have long sought drugs that target telomerase's ability to keep cells alive.

But to develop such drugs, scientists need a better understanding of how telomerase gets to and extends the chromosomes' ends.

"There appear to be multiple regulatory steps that precisely control telomerase and recruit it to the shortest chromosome ends where and when it's needed," says Zappulla, who has worked to reveal these processes. He published research in 2015 showing how two proteins, Ku and Sir4, interact to lure telomerase near the tips of yeast chromosomes.

In experiments looking at telomerase in baker's yeast, his lab showed that the Ku protein helps telomerase sense when a telomere is short. They showed that Ku binds to another protein, Sir4, and this connection is important for telomere lengthening. He believes that Sir4 acts as a landing pad to attract telomerase preferentially to short chromosome tips that need an extension.

To visualize these concepts in 3-D, Zappulla teamed up with Ming Lei, Ph.D., an expert in creating crystal structures, at the Shanghai Jiao Tong University. The two met during their postdoctoral training at the University of Colorado Boulder.

For the current research, published 11 January 2018 in Cell, Lei's team crystallized the baker's yeast versions of key telomerase-recruiting proteins, as well as a piece of the telomerase enzyme's RNA. Then they shot X-rays through the crystals and inferred the 3-D shape of each molecule based on how the X-rays' paths are redirected. Then several co-teams collaborated to validate the structures by introducing mutations in the genes encoding the proteins and testing the altered molecules' functions in live yeast cells. These experiments led to new insights into how telomerase-recruiting proteins work and interrelate in time and space.

"It's amazing how much precise detail you can get from crystallography studies," says Zappulla.

When Zappulla first saw the results, he says that they immediately answered one of his questions about how telomerase interacted with Ku and Sir4 to attach to the chromosome end. "The crystal structures show how Ku binds to both the RNA in telomerase and the Sir4 protein on the chromosomes, as we had proposed in our 2015 study."

Zappulla says that yeast telomerase and the way it works will certainly be different than the human version; however, insights from yeast should help scientists understand fundamental molecular and cellular features that are similar or even have been conserved over evolution.

Zappulla works in the department of molecular biology and genetics at Johns Hopkins, which is led by Carol Greider, Ph.D., who discovered telomerase in 1984 and shares the 2009 Nobel Prize for Physiology or Medicine with Elizabeth Blackburn and Jack W. Szostak for the finding.

Global study highlights problem of surgical site infections

Globally, approximately 12% of patients develop a surgical site infection within 30 days of gastrointestinal surgery, according to a prospective cohort study of more than 12,500 people in 66 countries, published in *The Lancet Infectious Diseases* journal.

The incidence of surgical site infection varied between countries depending on their development level, with patients in high-income countries being least at risk, and patients in low-income countries being most at risk.

The results also suggest that globally more than one in five (22%) surgical site infections were resistant to antibiotics given before surgery to prevent infections.

"These findings begin to characterise the relationship between surgical site infections and global antimicrobial resistance," says Dr Ewen Harrison, NIHR Unit on Global Surgery at the University of Edinburgh, UK. "Worldwide, large amounts of antibiotics were consumed to prevent and treat surgical site infections, yet in a fifth of cases the causative micro-

organism was resistant to the pre-surgery antibiotics given, and this increased to one of three cases in low-income countries. This high prevalence illustrates a potentially important area for improvement worldwide, and reducing surgical site infections will help to ensure safe and essential surgery around the world."

The study tracked 12,539 patients from 343 hospitals in 66 countries who were undergoing elective or emergency gastrointestinal surgery to see whether they developed a surgical site infection within 30 days.

Overall, 59% of patients (7339 people) were from 30 high-income countries, 31% (3918) of patients were from 18 middle-income countries, and 10% (1282) of patients were from 18 low-income countries. 1.9% (235/12,539) of all surgery patients died within 30 days of their operation, with the highest incidence in low-income countries (4.8%, 61/1282 patients died).

The most common types of surgery were the removal of the gall bladder or appendix, and half of the patients (49%) had emergency surgery.

Of all patients in the study, 12% (1538/12539) developed a surgical site infection within 30 days of surgery. However, incidence varied depending on a country's income level – with 9% (691/7339) of patients in high-income countries, 14% (549/3918) of patients in middle-income countries, and 23% (298/1282) patients in low-income countries developing surgical site infections.

The pattern remained even when taking into account the different patient characteristics, diseases, contamination levels, procedures, and hospitals in low-income countries.

Patients with a surgical site infection were more likely to die than patients without an infection (1.5% [162/11,001] of patients with no infection died, compared with 4.7% [73/1538] of patients with a surgical site infection), and were more likely to have another infection and further surgery. In addition, hospital stays for patients with surgical site infections were three times longer on average than people without infections (7 days vs 2 days).

The authors also analysed how common antibiotic-resistant infections were. Microbiology results were available for 610 patients with a surgical site infection, and 22% (132 people) of cases were resistant to the antibiotics given before surgery to prevent infections. Again, incidence varied depending on a country's income level – with patients in low-income countries most at risk of antibiotic-resistant surgical site infections (36%, 46/128), and high income countries least at risk (17%, 49/295).

Looking into the causes of this difference, the authors found signs of overuse of antibiotics in low-income countries. Patients in low-income countries were more likely to receive antibiotics before and after surgery than patients in middle- and high-income countries (before surgery antibiotic use occurred in 96% of patients in low-income countries, 87% of patients in middle-income countries, and 88% of patients in high-income countries, after surgery these figures were 86%, 80% and 46%, respectively). This trend remained even when the higher levels of surgery contamination in low-income countries were controlled for.

The authors note some limitations, including that it was not possible to follow up all patients to 30 days after surgery, particularly in resource-limited settings. It is therefore possible that some cases were missed; however, they note that the size of the study limits the likelihood of bias.

Writing in a linked Comment, Dr Robert Sawyer, Western Michigan University Homer Stryker M D School of Medicine, USA, says: "To document surgical site infections in 343 centres across 66 countries in Africa, Asia, Europe, North America, Oceania, and South America is an impressive undertaking that substantially adds to our understanding of the global problem of post-operative infections and their associated morbidity and mortality… The GlobalSurg Collaborative clearly describe the magnitude of the problem of surgical site infections in all care settings but particularly in resource-stressed environments. Although the idea that a surgical site infection is just a surgical site infection is prevalent, it is now well known that the cost of a surgical site infection in terms of mortality, morbidity, healthcare costs, and loss of productivity is enormous."

- **doi**: 10.1016/S1473-3099(18)30101-4

Chemical from cactus shows promise as new analgesic

A promising approach to post-operative incision-site pain control uses a naturally occurring plant molecule called resiniferatoxin (RTX). RTX is found in Euphorbia resinifera, a cactus-like plant native to Morocco, which is 500 times more potent than the chemical that produces heat in hot peppers, and may help limit the use of opioid medication while in the hospital and during home recovery.

In a paper published online in *Anesthesiology*, the peer-reviewed medical journal of the American Society of Anesthesiologists, researchers found that RTX could be used to block postoperative incisional pain in an animal model. Many medical providers turn to opioids, such as morphine or fentanyl, for moderate to severe postoperative pain relief, but these often come with side effects that can interfere with recovery, including respiratory depression, inhibition of gut motility and constipation, nausea and vomiting. Prolonged use of opioids can produce tolerance and introduces the risk of misuse. RTX is not an opioid and does not act in the brain but rather on the nerve endings in the skin. Scientists found that it can be used to block pain from the surgical incision selectively for approximately 10 days.

In the study, researchers pre-treated the skin incision site with RTX to render the nerve endings in the skin and subcutaneous tissue along the incision path selectively insensitive to pain. Unlike local anaesthetics, which block all nerve activity including motor axons, RTX allows many sensations, like touch and vibration, as well as muscle function, to be preserved. Long after the surgery, and towards the end of healing of an incision wound, the nerve endings eventually grow back. Thus, pain from the skin incision is reduced during the recovery period.

RTX has been found to be a highly effective blocker of pain in multiple other preclinical animal models and is in a Phase I clinical trial at the National Institutes of Health Clinical Center for patients with severe pain associated with advanced cancer.

- **doi**: 10.1097/ALN.000 000 000 000 2006

Global MedTech industry collaborates to enhance compliance

The fast-growth Medical Technology (MedTech) industry is driving the introduction of new, live-saving healthcare devices, processes and procedures, and with the development and increased use of these emerging technologies comes a need for industry regulation to ensure their safe and effective use.

Mecomed – the medical devices, imaging and diagnostics trade association for the Middle East and North Africa (MENA) – announced in January that it is working with *AdvaMed, APACMed*, and *MedTech Europe*, which represent manufacturers of medical devices and diagnostics around the world, to institute policy changes that affect how MedTech companies support the training and education of Healthcare Professionals (HCPs), in the region and globally.

"Our industry's support for HCP training and education is critical for the continued development of advanced medical technologies, and their safe and effective use for the benefit of patients. Such support is essential due to the rapid innovation of medical technologies and diagnostics, and their typically complex electronic, mechanical and physiological properties," said Rami Rajab, Chairman of Mecomed.

Effective from January 1, 2018; the new policy will ensure that companies no longer select or influence the selection of specific doctors or healthcare sector attendees at third-party educational events; directly arrange or pay for HCP attendees' travel, accommodation and/or registration; or reimburse the expenses of specific HCP attendees at third-party educational events.

"We also maintain a deep commitment to supporting the highest ethical standards. Collaboration and interactions with medical professionals and healthcare organizations must be transparent and must be balanced against the need for those working in healthcare to make independent decisions regarding patient care and treatment," Rajab added.

The regional MedTech trade associations work together towards promoting high ethical standards in interactions between member companies and healthcare professionals and healthcare organizations and strive to achieve timely patient access to safe and effective products to that help them live longer, healthier lives.

For these reasons, the trade bodies are instituting these policy changes that affect how medical technology companies support HCP training and education around the world:

- The industry has revised its codes of ethics in the Middle East and North Africa (the Mecomed Code), in China (the AdvaMed China Code), in Europe (the MedTech Europe Code), and in the Asia-Pacific region (the APACMed Code) to strengthen their collective commitment to HCP training and education, and to ethics and integrity.
- One of the key revisions in the codes is the elimination of "direct sponsorship" of HCP attendance at third-party educational events, such as medical conferences and congresses, effective January 1, 2018. "Direct sponsorship" means those situations in which a company selects and pays for an individual HCP's registration fee, travel, lodging, and meals/hospitality to attend a third-party educational event.

Commenting on the new policy, Rajab said: "These changes do not diminish companies' commitment to HCP training and education; rather, what will change is how companies support third-party educational events. Companies may offer educational grants and sponsorship to third-party conference organizers, healthcare institutions, or professional associations to enable them to select HCPs to attend third-party educational events. Companies will also continue to host and support robust technical product and procedure training, and educational meetings, which instruct those working in the healthcare sector on how to safely and effectively use our companies' complex, life-saving products. With the end of direct sponsorships, we anticipate that companies will have more resources to devote to high-impact HCP training and education opportunities based on companies' individual educational strategies".

We also maintain a deep commitment to supporting the highest ethical standards. Collaboration and interactions with medical professionals and healthcare organizations must be transparent and must be balanced against the need for those working in healthcare.

MENA MedTech market

The MENA MedTech market is valued at US$7 billion, and is expected to grow to $11 billion by 2021. With 140,000 people currently employed in the region's MedTech industry – a number that is also expected to increase – Mecomed is increasing its efforts towards healthcare education, training and sharing of global best practices through partner collaborations, to set credible healthcare standards for the region.

The policy change is the result of extensive industry discussions and dialogue with key stakeholders over the years and follows a global trend that began to move away from direct sponsorship, as in the US, Australia, and other countries such as Sweden and Russia. AdvaMed, APACMed, Mecomed and MedTech Europe continue to engage with HCPs, hospitals, and clinician organizations as they face the challenge of development and safe introduction of the diagnostics, medical treatments and cures of tomorrow.

"The MedTech industry will keep working towards continued advancement of HCP training and education, for the development of life-saving medical technology, and for the improvement of patient care" Rajab said.

- For more information, visit: *www.mecomed.com* MEH

The Qatar Rehabilitation Institute features 7 advanced hydrotherapy pools

Healthcare expansion improves care for people of Qatar

Hamad Medical Corporation's (HMC) new Medical City complex represents the biggest healthcare facility expansion in the region and will bring new services and care options to the people of Qatar.

Once fully operational, the three new hospitals – Qatar Rehabilitation Institute, Women's Wellness and Research Center, and the Ambulatory Care Center – will house 500 new hospital beds and 3,000 highly trained clinical and support staff.

HMC is the main provider of secondary and tertiary healthcare in Qatar and one of the leading hospital providers in the Middle East. HMC manages 12 hospitals – nine specialist hospitals and three community hospitals – as well as the National Ambulance Service and home and residential care services.

Hamad Al Khalifa, HMC's Chief of Healthcare Facilities, said: "This is a project of immense size and complexity. It is a significant improvement in space, environment, and infrastructure compared to current HMC facilities – a state-of-the-art home for an increasing range of innovative services offering new models of care."

The size of 35 soccer pitches, the facilities have unique features including:

- Home to the largest rehabilitation hospital in the region; Qatar Rehabilitation Institute (QRI), at 38,000 sqm, is the size of five soccer pitches;
- The QRI houses seven indoor heated hydrotherapy pools, each with the highest water quality standards, and 11 rehabilitation gyms;
- More than 2,000 metres of pneumatic tubes crisscross the three hospitals and transport medicine and lab specimens to various units within the hospitals in minutes;
- The largest healthcare kitchen in the Middle East able to deliver up to 4,000 meals a day to patients and catering for more than 65 different diets;
- The 17,000 babies born each year at the Women's Wellness and Research Center will get the best start in life with more than 100 neonatal intensive care cots, seven operating theatres, 26 labour and delivery rooms, and 50 outpatient examination rooms;
- The Ambulatory Care Center, which is delivering outpatient and day surgery services, is equipped with state-of-the-art theatres, an extensive radiology unit, examination suites and treatment rooms, and 12 examination rooms for ENT and audiology.

"Our Medical City hospitals are delivering on a promise to expand world-class facilities for the people of Qatar," said Al Khalifa. "But this is not just about the bricks and mortar – the dedicated and highly-qualified clinical and support teams staffing these facilities will also deliver high-quality, compassionate care to every patient.

"In support of the Qatar National Vision 2030, HMC has carefully designed and developed a wide range of new facilities to meet the demands of a growing population, bringing together clinical facilities and services to create a patient-centred healing environment."

Dr Abdulla Al Ansari, Acting Chief Medical Officer at HMC said the opening of the new hospitals is the culmination of many years of careful planning and hard work. "Our new hospitals provide a state-of-the-art home for a range of innovative services and new integrated models of care. Designed with the experience of our patients and their families in mind, we are delivering on a promise to expand world-class facilities, staffed by dedicated and highly-qualified specialist clinical and support teams who continuously strive to deliver the best possible compassionate and patient-centred care."

Since opening, Qatar Rehabilitation Institute, the Ambulatory Care Center, and the Women's Wellness and Research Center have been delivering a number of inpatient and outpatient services, with thousands benefitting from the care provided. Mahmoud Al Raisi, Chief of HMC's Continuing Care Group, said the new hospitals not only expand HMC's capacity and the range of services it is able to offer to patients, but they also improve and build upon the organization's ability to deliver expert care across a wide range of specialist areas.

"Each of these three new hospitals provides truly world-class healthcare facilities and environments in which our dedicated clinical teams can deliver the best possible care to patients. I am excited about the positive impact that Qatar Rehabilitation Institute can have for patients on their journey to recovery. The opening of the QRI is just one of many additions to our continuing care group in recent years, adding to the Enaya Specialized Care Center and Enaya Continuing Care Center, which provide long-term care for specific population groups," said Al Raisi.

Fatima Haider, Chief Human Resources Officer at HMC, said the opening of the three Medical City Hospitals is not only a significant expansion of the healthcare provider's facilities and services but also its human capital.

"There will be more than 3000 clinical and support staff working at the new hospitals, all bringing their unique skills and experiences to our teams. This is our biggest period of workforce growth in the history of HMC and will ensure we can continue to deliver the highest standards of healthcare to the people of Qatar," said Haider. MEH

WHO-supported Nursing Now campaign aims to raise status of nurses

As part of efforts to improve global health, the World Health Organization (WHO) and International Council of Nurses are supporting the Nursing Now campaign – a three-year global health initiative of the Burdett Trust for Nursing that will be launched in February 2018. The campaign, which continues until the end of 2020, aims to raise the status and profile of nursing to improve health and enable nurses to maximize their contribution to achieving universal health coverage.

The campaign was launched on 27 February in Geneva, Switzerland, hosted by Hôpitaux Universitaires de Genève (Geneva University Hospitals), in the presence of WHO Director-General Dr Tedros Adhanom Ghebreyesus and Her Royal Highness Princess Muna Al-Hussein of Jordan, Patron for Nursing and Midwifery in the Eastern Mediterranean Region.

The campaign aims to ensure that by the end of 2020 the health workforce generally, and nursing and midwifery in particular, have a far more prominent role in global health policy development and planning. It also aims to promote greater investment in developing nursing and midwifery education, practice and regulation, as well as improving standards and quality of care, and employment conditions. More nurses are needed in leadership and policy development, particularly in delivering universal health coverage and addressing current and emerging health problems. Another important aim of the campaign is ensuring evidence is made more readily available to policy- and decision-makers on the impact of nursing and ensuring greater dissemination and sharing of good practices in nursing and the ways in which these good practices can be emulated.

The vital role of nurses in supporting the health sector and the importance of acknowledging their role is highlighted by HRH Muna Al-Hussain: "It's time to give nurses greater recognition, investment and influence. We must capitalize on one of our best assets, the largest group of healthcare professionals, by equipping nurses to provide high quality patient-centred care and play an integral role in leading change in the health sector."

While globalization and technological advances are creating new opportunities, disease and sociodemographic changes, in addition to natural and manmade disasters, are placing increased pressure on already strained healthcare systems. Chief among these is the additional burden placed on healthcare personnel as a result of dealing with the consequences of war, emergencies and an increasing number of refugees and displaced populations in the Eastern Mediterranean Region.

Dr Jaouad Mahjour, acting WHO Regional Director for the Eastern Mediterranean commented: "Nurses and midwives are unsung heroes in responding to the health needs of communities affected by emergencies in our Region. Empowering nurses and enhancing their capacities will save lives and improve health and well-being at all times."

The Nursing Now campaign recognizes that nurses are at the heart of country efforts to improve health for all. As one of the most trusted professions, nurses provide effective and quality care for people of all ages and are central in addressing the increasing burden of noncommunicable diseases, such as cancer and heart disease. Nurses are indispensable members of health teams and as health professionals closest to the public play a crucial role in health promotion, disease prevention, treatment and care.

WHO estimates that nurses and midwives represent nearly one half of the global health workforce. However, for all countries to reach health-related Sustainable Development Goal 3 "Ensure healthy lives and promote well-being for all at all ages" WHO estimates that the world will need an additional 9 million nurses and midwives by 2030.

on the WEB Nursing Now

www.nursingnow.org MEH

Researchers propose five distinct types of adult-onset diabetes

Separating adult-onset diabetes cases into five different types, rather than just type 1 or type 2, might help to better tailor early treatment for patients, and could represent a first step towards precision medicine in the disease, according to an analysis of patients with adult-onset diabetes in Sweden and Finland published in *The Lancet Diabetes & Endocrinology* journal.

The five types of the disease found in the study had different characteristics and were associated with different complications, illustrating the varied treatment needs of patients with diabetes.

Rates of diabetes are increasing worldwide, faster than for any other disorders, representing a significant cause of ill health worldwide. However, the medical classification of diabetes has not been updated for 20 years and mainly relies on measuring blood glucose levels.

While type 1 diabetes is generally diagnosed in childhood and caused by the body not producing enough insulin, type 2 diabetes occurs when the body cannot produce enough insulin to meet the increased demands imposed by obesity and insulin resistance, and typically occurs later in life. Most diagnosed cases of diabetes are type 2 (75-85%), and while it is known that type 2 diabetes is highly variable, few attempts have been made to explore these distinctions.

"Evidence suggests that early treatment for diabetes is crucial to prevent life-shortening complications. More accurately diagnosing diabetes could give us valuable insights into how it will develop over time, allowing us to predict and treat complications before they develop," says lead author of the study Professor Leif Groop, Lund University Diabetes Centre (LUDC), Sweden, and Institute for Molecular Medicine Finland (FIMM). "Existing treatment guidelines are limited by the fact they respond to poor metabolic control when it has developed, but do not have the means to predict which patients will need intensified treatment. This study moves us towards a more clinically useful diagnosis, and represents an important step towards precision medicine in diabetes."

The study used four cohort studies including people over the age of 18 years who had been recently diagnosed with diabetes, totalling 14,775 patients across Sweden and Finland. The authors analysed six measurements used to monitor patients with diabetes that reflect key aspects of the disease (age at diagnosis, body mass index [BMI], long-term glycaemic control [HbA1c], successful functioning of the insulin-producing cells in the pancreas, insulin resistance, and presence of autoantibodies associated with autoimmune diabetes). They also did genetic analyses, and compared disease progression, treatment, and development of diabetic complications for each type of diabetes.

Five clusters

Analysing the six measures in a cohort of 8980 adults at first, the authors identified one autoimmune type of diabetes and four distinct subtypes of type 2 diabetes, which they then tested across three more cohorts of patients consisting of 5795 people. They found that the five different disease profiles were also present in these patients.

These types of diabetes were distinct, and included three severe and two mild forms of the disease.

Among the severe forms, there was one group with severe insulin resistance and a significantly higher risk of kidney disease than the other types (cluster 3/severe insulin-resistant diabetes, affecting 11-17% of patients), and a group of relatively young, insulin-deficient individuals with poor metabolic control but no auto-antibodies (cluster 2/severe insulin-deficient diabetes, affecting 9-20%).

The other severe group were insulin-deficient patients who had auto-antibodies associated with autoimmune diabetes (cluster 1/severe autoimmune diabetes, affecting around 6-15%), a form of diabetes formerly called type 1 diabetes, or latent autoimmune diabetes in adults (LADA).

The most common form of the disease was one of the more moderate forms of diabetes, which was seen in elderly people and affected 39-47% of patients (cluster 5, or mild age-related diabetes). The other mild form of diabetes (cluster 4, or mild obesity-related diabetes) was mainly seen in obese individuals and affected 18-23% of patients.

Evidence suggests that early treatment for diabetes is crucial to prevent life-shortening complications. More accurately diagnosing diabetes could give us valuable insights into how it will develop over time, allowing us to predict and treat complications before they develop.

All five types of diabetes were also genetically distinct, with no mutations associated with all types of the disease. This supports the idea that the five types of diabetes are not simply different stages of the same disease.

Appropriate treatment

Lastly, the authors looked at the types of treatments being given to each group of patients and found that many were not being given appropriate treatment. For example, a low proportion of patients in clusters 1 and 2 were being treated with insulin from disease onset (42%, 212/506 patients, and 29%, 389/1339 patients, respectively), suggesting that traditional classification of diabetes is unable to tailor treatment to the underlying characteristics of diabetes.

The authors note some limitations, including that the study cannot confirm that the five types of adult-onset diabetes have different causes, nor whether patients' type of disease changes over time. The study only involved Scandinavian patients, so will need to be confirmed in other populations.

Future research will be needed to test and refine the five types of the disease by including biomarkers, genotypes, genetic risk scores, blood pressure and blood lipids.

• **doi**: 10.1016/S2213-8587(18)30051-2 MEH

Global improvement in cancer survival but international differences are still very wide

Cancer survival is generally increasing, even for some of the more deadly cancers such as liver and lung, according to the largest and most up-to-date study of population-based survival trends (2000–2014), covering countries that are home to more than two-thirds of the world's population. But survival trends vary widely, and there are wide and persistent disparities between countries, particularly for some childhood cancers.

For example, while brain tumour survival in children has improved in many countries, 5-year survival is twice as high in Denmark and Sweden (around 80%) as in Mexico and Brazil (less than 40%) for children diagnosed as recently as 2014. This is likely to reflect the availability and quality of diagnostic and treatment services.

The CONCORD-3 study, published in *The Lancet*, analysed individual patient records from 322 cancer registries in 71 countries and territories to compare 5-year survival from diagnosis for more than 37.5 million adults (aged 15–99 years) and children (0–14 years) with one of 18 common cancers. These cancers represent three-quarters of all cancers diagnosed worldwide every year between 2000 and 2014. For the 10 cancers already included in the CONCORD-2 study, the researchers were able to examine trends over the 20-year period 1995¬–2014.

Health system performance

The Organisation for Economic Co-operation and Development (OECD) is now using the CONCORD survival estimates to compare health system performance in 48 countries worldwide. However, in some parts of the world, estimation of survival is limited both by incomplete data and by legal or administrative obstacles to updating the cancer records with each patient's date of death. For example, in Africa as many as 40% of records contained incomplete follow-up data, so survival trends could not be systematically assessed.

Lead author Dr Claudia Allemani from the Cancer Survival Group at the London School of Hygiene & Tropical Medicine explains: "Continuous monitoring of global trends in cancer survival is crucial to assess the overall effectiveness of health systems world-wide, and to help policy-makers plan better strategies for cancer control. But, inadequate or unreliable data prevent governments from understanding the true nature and magnitude of the public health problems created by the growing cancer burden. This leaves governments poorly equipped to develop national cancer plans that will translate into real improvements in survival for patients."

She adds: "Governments must recognise cancer registries as efficient public health instruments that produce a continuous stream of valuable information on both the impact of cancer prevention strategies and the effectiveness of health systems, and at very low cost. In Europe, the cost of registering one case is less than the cost of a chest x-ray, and without this kind of information, health ministries are flying blind on cancer control."

Survival rates

After taking into account international differences in the age profile of cancer patients and the risk of death from other causes, survival for most cancers has been consistently high over the last 15 years in a handful of countries –the USA, Canada, Australia, New Zealand, Finland, Norway, Iceland, and Sweden.

For example, for women diagnosed with breast cancer in the USA and Australia between 2010 and 2014, 5-year survival is 90%, compared to 66% for women diagnosed in India. Within Europe, 5-year breast cancer survival increased to 85% or more in 16 countries including the UK, compared with a low of 71% in Eastern Europe (Russia).

In the UK, overall cancer survival is improving, with several cancers showing substantial increases in 5-year survival between 2000 and 2014, including breast (80% to 86%), prostate (82% to 89%), rectum (55% to 63%) and colon (52% to 60%) – reflecting better cancer management. However, adults with cancer continue to have lower 5-year survival than in other comparable countries for several common cancers, including myeloid malignancies (such as acute myeloid leukaemia) and adult brain cancer.

Cancer survival has improved markedly in Denmark – so that, for the majority of cancers, the Danes have almost caught up with their Nordic counterparts – including prostate (64% in 2000–2004 to 86% in 2010–2014), lung (10% to 17%), oesophagus (8% to 14%), and rectum (53% to 65%). These rapid improvements over the past 15 years have been driven by better investment, accelerated patient pathways, with public monitoring of hospitals' compliance with waiting times.

The deadliest cancers

While liver and lung cancers remain rapidly lethal in high- and low-income countries alike, the past two decades have seen some important progress in 5-year survival in several nations. Liver cancer survival increased by more than 10% in Korea (11% to 27%), Sweden (5% to 17%), Portugal (8% to 19%), and Norway (6% to 19%). Similarly, lung cancer survival increased by 5-10% in 21 countries including the UK (7% to 13%) between 1995 and 2014, with most progress seen in China (8% to 20%), Japan (23% to 33%), and Korea (10% to 25%).

But not all major cancers have seen such improvements. Even in 2014, pancreatic cancer remained highly lethal in all countries, with 5-year survival typically less than 15%. "Greater international efforts are needed to understand the risk factors for this rapidly lethal cancer and to improve prevention, early diagnosis, and treatment", says co-author Professor Michel Coleman from the London School of Hygiene & Tropical Medicine.

In parts of south-east Asia, 5-year survival from stomach cancer is more than twice as high as in most other countries, including the USA (33%) and the UK (21%). Between 2000–2004 and 2010–2014, 5-year survival increased from 49% to 69% in South Korea and from 51% to 60% in Japan. These faster improvements in survival could be due to long-standing population-based endoscopic screening programmes, and the authors suggest that screening should be part of national control plans in countries like Russia, where gastrointestinal cancers are a huge public health problem.

In contrast, survival for melanoma of the skin in south-east Asia is generally lower than the rest of the world, possibly reflecting lower public awareness and a more prevalent lethal subtype (acral lentiginous melanoma).

Childhood cancers

The analysis highlights that survival differences in childhood brain cancer are particularly wide, ranging from less than 40% during 2010-2014 in Brazil and Mexico to around 80% in Sweden, Denmark, and Slovakia. Despite increases in most countries since the mid-1990s, 5-year survival for children diagnosed with the most common type of childhood cancer (acute lymphoblastic leukaemia; ALL) also varies substantially worldwide, indicating major deficiencies in the diagnosis and treatment of a disease that is generally considered as curable. 5-year survival is higher than 90% in several countries, including Canada, the USA and nine European countries (e.g., Finland, the UK, and Denmark), but it remains below 60% in China, Mexico, and Ecuador.

> Governments must recognise cancer registries as efficient public health instruments that produce a continuous stream of valuable information on both the impact of cancer prevention strategies and the effectiveness of health systems, and at very low cost.

Professor Coleman explains: "Despite improvements in awareness, services, and treatments, cancer still kills more than 100,000 children every year worldwide. If we are to ensure that more children survive cancer for longer, we need reliable data on the cost and effectiveness of health services in all countries, to compare the impact of strategies in managing childhood cancer."

Better data needed

The authors conclude by calling for cancer registries to be given adequate resources to register all patients and to link the registry data to up-to-date death records.

Writing in a linked Comment, Professor Richard Sullivan from the King's Health Partners Comprehensive Cancer Centre in London says: "Despite more than 20 years of advocacy for national and international funding to support the establishment of fully functional cancer registries, both domestic and global political support and funding remain woeful. Considering the billions of dollars poured into research each year, the fact that the one universal need for all countries – cancer intelligence from national and regional registries – cannot be properly supported reflects both political myopia and distorted priorities... National and regional governments must recognise that population-based cancer registries are key policy tools, both to monitor the impact of cancer prevention strategies, and to evaluate the effectiveness of the health system for all patients diagnosed with cancer." MEH

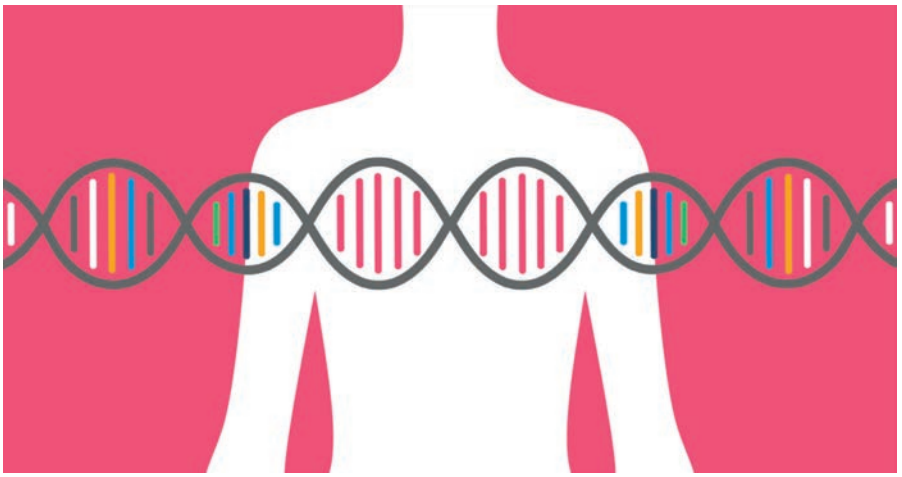
Survival for young women treated for breast cancer is the same whether or not they carry a BRCA mutation

After treatment, young women diagnosed with breast cancer who carry a BRCA mutation have the same chances of survival as women without the mutation, according to a prospective cohort study published in The Lancet Oncology journal.

BRCA mutations occur in either the BRCA1 or BRCA2 gene, and are inherited. These mutations place women at a greater risk of breast and ovarian cancers, with 45-90% of women with the mutation developing breast cancer during their lifetime, compared to roughly 12.5% of women developing breast cancer in their lifetime overall in the UK.

The study recruited young women with breast cancer between 2000 and 2008, when BRCA testing and risk-reducing surgery were not routine for early breast cancer. The paper looks at survival following treatment for the initial breast cancer diagnosed only, as previous evidence on whether carrying these types of mutation affects a woman's cancer prognosis has been mixed.

Now, after first cancer diagnosis and treatment, women with early breast cancer and BRCA mutations are often offered risk-reducing surgery (such as a double mastectomy, or surgery to remove the ovaries and fallopian tubes) to help reduce the risk of new primary breast or ovarian cancers.



Largest study of its kind

"Our study is the largest of its kind, and our findings suggest that younger women with breast cancer who have a BRCA mutation have similar survival to women who do not carry the mutation after receiving treatment," says Professor Diana Eccles, University of Southampton and University Hospital Southampton NHS Foundation Trust, UK. "Women diagnosed with early breast cancer who carry a BRCA mutation are often offered double mastectomies soon after their diagnosis or chemotherapy treatment, however, our findings suggest that this surgery does not have to be immediately undertaken along with the other treatment. In the longer term, risk-reducing surgery should be discussed as an option for BRCA1 mutation carriers in particular, to minimise their future risk of developing a new breast or ovarian cancer. Decisions about timing of additional surgery to reduce future cancer risks should take into account patient prognosis after their first cancer, and their personal preferences."

The study involved 127 hospitals across the UK and included 2733 women aged 18-40 years who had recently been diagnosed with breast cancer for the first time. The majority of women (2439/2733; 89%) underwent chemotherapy. Half had breast-conserving surgery (1337/2733; 49%), half had a mastectomy (1373/2733; 50%), and less than 1% (16/2733 women) had no breast surgery.

The women were recruited between January 2000 and January 2008, and their medical records were tracked for an average of 8.2 years to gain information about their diagnosis, treatment, whether their cancer came back, or if they died.

During this time, out of the 2733 women, there were 678 deaths, including 651 deaths from breast cancer, 18 from other cancers, and nine from other causes.

BRCA mutations

All women included in the study were tested for BRCA mutations, and 338 (12%) carried one – including 201 women with a mutation in the BRCA1 gene, and 137 with a mutation in the BRCA2 gene.

The study found that there was no difference in overall survival two, five or ten years after diagnosis for women with and without a BRCA mutation (after two years, survival was 97% for BRCA carriers vs 96.6% for non-carriers, after five years: 83.8% vs 85%, and after ten years: 73.4% vs 70.1%). These findings remained similar regardless of whether mutations were in the BRCA1 or BRCA2 gene, and when controlled for body mass index and ethnicity.

In addition, a subgroup analysis of 558 women with triple-negative breast cancer – a difficult to treat form of breast cancer, where the cells do not have receptors for the hormones oestrogen or progesterone,

or the HER2 protein – suggested that women with a BRCA mutation may initially have better overall survival than women not carrying the mutation (95% vs 91% at two years), but that survival was similar at five or ten years. In a post-hoc analysis, the researchers found that the initial survival benefit was not caused by these women having early risk-reducing surgery, and reasons for this remain unclear and require confirmation.

In light of their findings, the authors suggest that women with triple-negative breast cancer and a BRCA mutation who choose to delay additional surgery for 1-2 years to recover from their initial treatment should be reassured that this is unlikely to affect their long-term survival. However, risk-reducing surgery will still likely be beneficial for BRCA mutation carriers to prevent another new breast or ovarian cancer from developing in the longer term.

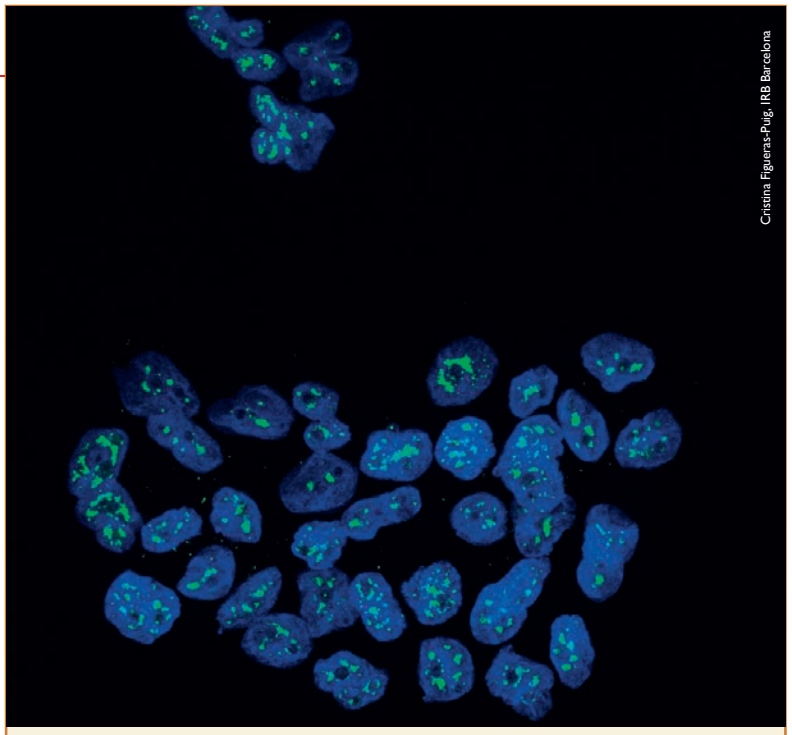
The authors note some limitations, including that treatment for women with BRCA mutations has changed substantially since the beginning of this trial in 2000, potentially increasing their survival over this time, which may affect the study results. In addition, triple-negative breast cancer was not as well understood at the beginning of the trial so was not a primary outcome for the study, meaning that the increased early survival found in this group and its reasons will need further confirmation.

They also note that the results might not translate to older women with a BRCA mutation. However, in order to include a high proportion of women with BRCA mutations, they needed to limit the group to younger women with breast cancer, where BRCA mutations are more common. The study does not look at women who have a BRCA mutation, but who have not been diagnosed with cancer, or the impact of preventative double mastectomy or surgery to remove the ovaries and fallopian tubes on survival.

Comment

Writing in a linked Comment, Professor Peter Fasching, Friedrich-Alexander University Erlangen-Nuremberg, Germany, says: "Understanding prognosis in young patients is important because patients with BRCA mutations are at increased risk of developing specific conditions, such as secondary cancers, including ovarian cancer, contralateral breast cancer, and de novo breast cancer in the same breast. These risks determine treatment, and knowing that BRCA1 or BRCA2 mutations do not result in a different prognosis might change the therapeutic approach for these risks… This important topic needs more prospective research as preventive surgical measures might have an effect on what might be a very long life after a diagnosis of breast cancer at a young age."

- doi: 10.1016/S1470-2045(17)30891-4 MEH



Nuclei of metastatic breast cancer cells showing the protein MSK1 in green

Researchers identify a protein that keeps metastatic breast cancer cells dormant

The time needed for breast cancer metastases to develop varies between patients, and little is known about the mechanisms that govern latency (the dormant state of cells that have already spread through the body). A study headed by ICREA researcher Roger Gomis at the Institute for Research in Biomedicine (IRB Barcelona) has identified the genes involved in the latent asymptomatic state of breast cancer metastases. The work sheds light on the molecular basis underlying how the expression of certain genes facilitates the spread of metastatic lesions.

The team has studied the most common kind of breast tumour – estrogen-positive (ER +) and accounting for 80% of breast cancer tumour cases – that is characterised by a long period of latency with no symptoms. The study has been published in *Nature Cell Biology*.

MSK1, the protein that keeps tumour cells dormant

The team has identified the protein kinase MSK1 as a key regulator of dormant or latent metastases. Using clinical samples from patients, the scientists have confirmed that ER + breast cancer tumours that do not express MSK1 are associated with a risk of earlier relapse, while those that express this molecule will form metastases later.

"We are interested in understanding the mechanisms underlying metastasis and the time component of this process. Until now, little was known in preclinical models about the mechanisms that allow breast cancer cells to leave the latent state and even less is known in patients," explains Gomis, head of the Growth Control and Cancer Metastasis Lab.

The researchers believe that in the future this discovery may benefit patients in two ways. Firstly, it will help to identify those with an imminent risk of relapse and to adjust the treatment for this prognosis. Secondly, attempts could be made to design a treatment to mimic the function of MSK1 kinase, with the aim to maintain metastatic lesions in a latent and asymptomatic state for as long as possible.

- ***doi***: 10.1038/s41556-017-0021-z

Light-activated cancer drugs without toxic side-effects look promising

Future cancer drugs that are activated by light and don't cause the toxic side-effects of current chemotherapy treatments are closer to becoming a reality, thanks to new research made possible by the Monash Warwick Alliance, an intercontinental collaboration between the University of Warwick (UK) and Monash University (Australia).

Led by Robbin Vernooij, a joint PhD student from the Monash Warwick Alliance and lead author, fresh insight has been gained into how a pioneering platinum-based chemotherapy drug candidate – *trans*,*trans*,*trans*-[Pt(N3)2(OH)2(py)2] – functions when activated by light.

The treatment – originally developed by Professor Peter Sadler's research group in the University of Warwick's Department of Chemistry – is an inorganic-metal compound with an unusual mechanism, which kills cancer cells in specific targeted areas, in an effort to minimize toxic side-effects on healthy tissue.

Completely inactive and non-toxic in the dark, the treatment can be inserted into cancerous areas, its functions triggered only when directed light hits it – causing the compound to degrade into active platinum and releasing ligand molecules to attack cancer cells.

Using an old spectroscopic technique – infrared spectroscopy – the researchers observed what happens to the structure of the compound by following the metal as well as molecules released from the compound.

The researchers shone infrared light on the inorganic-metal compound in the laboratory, and measured the vibrations of its molecules as it was activated.

From this, they discovered the chemical and physical properties of the compound: some of the organic ligands, which are attached to the metal atoms of the compound, become detached and are replaced with water whilst other ligands remain stable around the metal.

This fresh insight into the mechanics of the treatment offers new hope that photoactive chemotherapy drug candidates, such as *trans*,*trans*,*trans*-[Pt(N3)2(OH)2(py)2], will progress from the laboratory to future clinical trials.

Vernooij, commented: "The current short comings of most chemotherapeutic agents are unfortunately undeniable, and therefore there is ongoing effort to develop new therapies and improve our understanding of how these agents work in effort to develop not only more effective, but also more selective, therapies to reduce the burden on patients.

"This is an exciting step forward, demonstrating the power of vibrational spectroscopic techniques combined with modern computing to provide new insights on how this particular photoactive chemotherapeutic agent works, which brings us one step closer to our goal of making more selective and effective cancer treatments"

Sadler, Professor of Chemistry at the University of Warwick, commented: "About half of all chemotherapy treatments for cancer current use a platinum compound, but if we can introduce new platinum compounds that avoid side-effects and are active against resistant cancers, that would be a major advance.

"Photoactivated platinum compounds offer such possibilities. They do not kill cells until irradiated with light, and the light can be directed to the tumour so avoiding unwanted damage to normal tissue.

"It is important that we understand how these new light-activated platinum compounds kill cancer cells. We believe they attack cancer cells in totally new ways and can combat resistance. Understanding at the molecular levels requires use of all the advanced technology that we can muster. In this case, advances have been made possible by a highly talented research student working with state-of-the-art equipment on opposite sides of the globe.

Robbin Vernooij, lead author from the Monash Warwick Alliance

> This is an exciting step forward, demonstrating the power of vibrational spectroscopic techniques combined with modern computing to provide new insights on how this particular photoactive chemotherapeutic agent works

"We hope that new approaches involving the combination of light and chemotherapy can play a role in combatting the current short comings of cancer therapy and help to save lives."

Most cancer patients who undergo chemotherapy treatment currently receive a platinum-based compound, such as *cisplatin*. These therapies were developed over half a century ago, and cause toxic side-effects in patients, attacking healthy cells as well as cancerous ones.

There is also a growing resistance to more traditional cancer therapies, so new treatments are desperately required. MEH

ESMO publishes new position paper on supportive and palliative care

ESMO, the leading professional organisation for medical oncology, published a position paper on supportive and palliative care in its leading scientific journal, Annals of Oncology in December last year.

Taking stock of new evidence in the field and building on previous ESMO statements and dedicated Clinical Practice Guidelines <*www.esmo.org/Guidelines/Supportive-and-Palliative-Care*>, ESMO is calling attention to the evolving and growing gap between the needs of cancer patients and the actual provision of patient centred care, from the time of diagnosis, including supportive, palliative, end-of-life and survivorship care.

"New studies in the field of supportive and palliative care show that there may be a gap between what doctors think is important or disturbing for patients, and what patients really need. With this new position paper, we wanted to call attention to the fact that, as well as anti-tumour treatment, cancer patients need physical, psychological, social, and spiritual support, at every stage of the disease, from diagnosis. We refer to this as patient centred care," said Dr Karin Jordan, Department of Medicine V, Haematology, Oncology and Rheumatology, University of Heidelberg, Germany, ESMO Faculty Coordinator for Supportive and Palliative Care, ESMO Clinical Practice Guidelines subject editor for the supportive care section, as well as main author of the paper.

"Patients must 'set the tone' in supportive and palliative care. We need to make it easy for them to tell us how they feel, what they need and, of course, allow them to be fully involved in decision-making if we are to provide optimal patient centred care.

"The concept of patient centred cancer care is described in this paper (encompassing both supportive and palliative care), along with key requisites and areas for further work. We chose this term because we believe in a continuum of care focused on alleviating patients' physical symptoms and psychological concerns," explained Jordan.

Benefits of palliative care

Dr Matti Aapro, Cancer Centre, Clinique de Genolier, Switzerland, co-author of the position paper, ESMO Faculty member, Past-president of the Multinational Association of Supportive Care in Cancer (MASCC), said: "Recent studies show that palliative and supportive care not only improves treatment, it also contributes to better use of existing resources, avoids waste and may ultimately also reduce the cost of treatment."

The ESMO Position Paper states that individual cancer patients will express different physical, psychological, social, existential and spiritual needs at different stages of the disease, that will often evolve over time. Therefore, patient centred care cannot be standardised, even though it is provided through a standard framework. To ensure that patients can voice their needs, oncologists should incorporate detailed and routine physical and psychological assessments allowing for supportive and palliative interventions to be personalised and integrated in the continuum of care. Patient reported outcomes (PROs) should be highly encouraged as requesting them has shown to be associated with better quality of life, fewer hospitalisations and even increased survival compared with usual care.

> New studies in the field of supportive and palliative care show that there may be a gap between what doctors think is important or disturbing for patients, and what patients really need.

"A cancer diagnosis, the disease itself and the effects of anticancer treatment are major stress factors for patients. Around 14 million people are diagnosed with cancer around the world every year," explained Jordan. "Over the last decade clinicians have accepted that, while survival and disease-free survival are both fundamental factors, overall quality of life is also crucial for patients.

"Patient centred interventions should be routinely discussed and evaluated by the multidisciplinary team (supervised by the oncologist) together with tumour directed treatment," said Jordan. "Of course, patient preferences and cultural specificities should be respected."

Dr Aapro commented: "We hope that this paper will contribute to develop a generalised culture and acceptance of supportive and palliative care, worldwide. Basic patient needs such as pain relief are still not being widely met. Education is vital to make sure that essential supportive care is accessible to all cancer patients, everywhere. Quoting Dorothy Keefe, past MASCC president, I would say: 'supportive care makes excellent cancer care possible'."

Andrés Cervantes, Chair of the ESMO Educational Committee, said: "ESMO is committed to increasing awareness and education to bring patient centred care closer to all professionals; to improving collaboration between healthcare providers for the good of patients; and to promoting research, so that patient centred interventions are not only integrated, but also based on the best evidence."

Dr Jordan added: "This paper is important because it takes ESMO's long standing interest in supportive and palliative care – shown, for example in its Designated Centres of Integrated Oncology and Palliative Care accreditation programme – a step further. Developments since the last ESMO position statement in supportive and palliative care in 2003 show that, not only do these interventions improve patient's quality of life, but also overall outcomes."

The ESMO position paper includes chapters on:

- Key patient centred care interventions
- End of life care
- Need for specific training in patient centred care
- The role of multidisciplinary teams
- Integrating healthcare resources
- Research needs and resources in supportive and palliative care
- **doi**: 10.1093/annonc/mdx757 MEH

Researchers test ultrasound scalpel that can kill tumours in moving organs

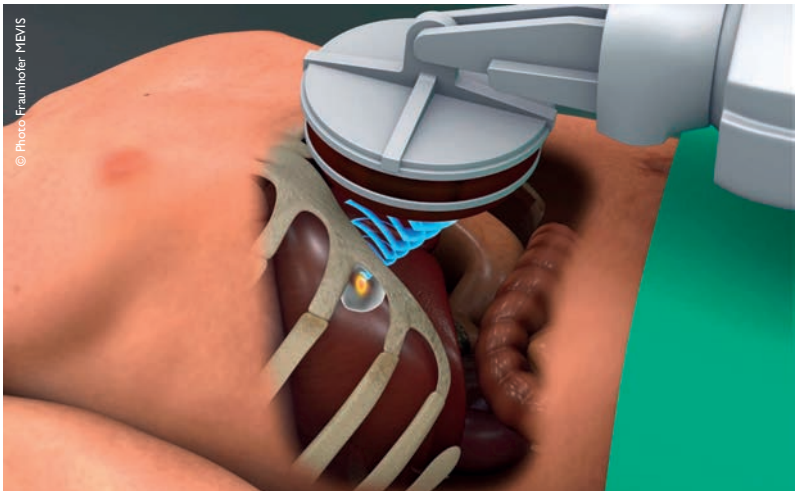
Focused ultrasound can effectively destroy tumour cells. Until now, this method has only been used for organs such as the prostate and uterus. Fraunhofer researchers have shown a method, developed as part of the TRANS-FUSIMO EU project, that enables focused ultrasound treatment of the liver, an organ that moves while breathing. In the future, this could enable treatment of certain liver tumours in a more gentle way.

Ultrasound has long served as a diagnostic method. Its application as a form of therapy treatment, however, is relatively new. In this process, ultrasound waves are highly concentrated to destroy diseased tissue, tumour cells in particular, and render them harmless. Focused ultrasound benefits patients in several ways. The therapy is completely non-invasive and can be performed without anaesthesia, and there are no operation wounds.

Until now, however, the method has only been approved for a limited number of indications, such as treatment of prostate cancer, bone metastases, and uterine myoma. To treat organs that move when patients breathe, the method can only be partially applied. Doctors have to rely on patients to hold their breath or put them under anaesthesia, so they can control the patient's breath.

The scientists working in the TRANS-FUSIMO EU project, coordinated by the Fraunhofer Institute for Medical Image Computing MEVIS in Bremen, are following another path. They refocus the ultrasound beam to the movement of the liver to reach the tumour effectively while sparing the surrounding healthy tissue.

In this therapy concept, the patient lies in an MRI scanner during the procedure. Every tenth of a second, the scanner produces an image showing the current position of the liver. The ultrasound transducer, a device equipped with more than 1000 small ultrasound transmitters, sits on the patient's stomach. These can be directed so that their waves converge precisely at a point as small as a grain of rice. There, they unleash their destructive effect – the tumour cells become completely cooked. The MRI scanner controls the process, measuring the temperature in the liver and ensuring that the correct spots are sufficiently heated.



Scientists are testing a focused ultrasound scalpel that can be used to destroy tumours in moving organs, such as the liver, shown here.

Software that sees into the future

Project manager Sabrina Haase, mathematician at Fraunhofer MEVIS, explains the problem. "Generating an image of the liver's position every tenth of a second is not fast enough to reliably direct the ultrasound beam. This is why we developed software that can see into the immediate future and calculate the next position of the treated region."

The program determines the path for the focused ultrasound waves to reach the liver tumour even when the patient moves while breathing. Developing the software was quite challenging: it must be both extremely reliable and run in real time.

Another difficulty facing the scientists was the fact that the ribs lie in front of the liver. To prevent the beams from damaging the ribs, elements in the ultrasound transducer that would have hit the ribs were deactivated, much like blocking the holes in a showerhead which spray water in an unwanted direction.

In a preliminary test, a robotic arm moved a gel model back and forth in the MR scanner to simulate the liver movement inside the body. At the same time, the gel phantom was exposed to focused ultrasound, and the MRI scanner monitored the temperature distribution. "The results matched our expectations," says Haase. "Now, we can pursue the next steps."

Tests on patients

The first TRANS-FUSIMO tests on patients are planned for mid-2018. Thereafter, in cooperation with an industry partner, medical product certification can be tackled. If the method proves itself, in the future, it would be possible to treat other organs that move with breathing, such as the kidney, pancreas, or even lungs. MEH

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GE introduces affordable colour ultrasound for general practitioners

GE has launched the Versana Essential ultrasound, a high-end image quality scanner with easy-to-use features aimed at budget conscious clinicians.

GE says it is especially suited for physicians who want to incorporate ultrasound into their practice or want to move up from standard black-and-white systems.

It is designed to be used by Ob-Gyns, family and general practice physicians, and by clinicians in a number of other specialties.

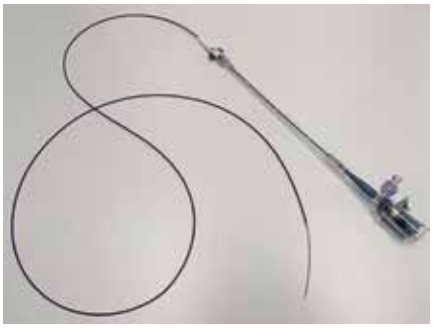
The Versana Essential has a number of semi-automated features that help to produce high resolution images and move scans forward, such as Whizz one-touch dynamic image optimization, Auto IMT measurement, and SonoBiometry for foetal measurements. It also includes colour doppler capabilities.

Ultrasound has proven to be an indispensable imaging device in diverse clinical settings, particularly in primary care settings, as it enables quicker and more definitive diagnoses – resulting in fewer referrals to more costly facilities for diagnosis and greater patient confidence in their primary care providers. Bringing an accessible ultrasound into the primary care practice, Versana Essential software is designed to simplify workflow, making the system easy to use and easy to learn.

The scanner incudes on-board training modules: Real-time reference information from Scan Coach helps locate the correct scan plane; and tips and information from our My Trainer product training modules help configure the system and maximize workflow. Clinical reference materials include abdominal, vascular, Obs-Gyn and cardiac.

Dr Tobias Albrecht, a general practitioner in Germany notes: "Ultrasound is now an essential part of the diagnostic tool kit in general practice. It's great for quickly determining whether a patient is suffering from a particular illness or a serious condition that needs to be treated immediately in the hospital. The Versana Essential ultrasound system's image quality is outstanding. The supplementary functions are very good, and the system continually produced excellent images." MEH

New catheter combines intravascular ultrasound with fluorescence lifetime imaging



Engineers at University of California, Davis have managed to combine intravascular ultrasound with fluorescence lifetime imaging (FLIm) inside a single catheter.

It is the first intravascular catheter combining intravascular ultrasound (IVUS) with multispectral fluorescence lifetime imaging (FLIm) that enables label-free simultaneous assessment of morphological and biochemical features of coronary vessels in *vivo*.

According to a post on the university's blog, the engineers designed it to help identify plaque build-up in tiny arteries.

"To win the battle against heart disease, cardiologists need better ways to identify the composition of plaque most likely to rupture and cause a heart attack. Angiography allows them to examine blood vessels for constricted regions by injecting them with a contrast agent before X-raying them. But because plaque does not always result in constricted vessels, angiography can miss dangerous build-ups of plaque. Intravascular ultrasound can penetrate the build-up to identify depth, but lacks the ability to identify some of the finer details about risk of plaque rupture," the blog author writes.

The new catheter can simultaneously retrieve structural and biochemical information about arterial plaque that could more reliably predict heart attacks.

They described the device in a paper published in *Scientific Reports* <doi:10.1038/s41598-017-08056-0>.

The engineers write: "The ability of the system to acquire robust bi-modal data in coronary arteries *in vivo* using standard percutaneous coronary intervention techniques in combination with a Dextran solution bolus flush was demonstrated in healthy swine. Imaging of a few representative diseased human samples was performed and showed that different types of lesions in diseased coronary arteries, identified via histology, are characterized by FLIm biochemical signatures consistent with findings from earlier studies."

They say the system "enables scans of a 20 mm section of vessel in 5 seconds with a rotation speed of 1800 rpm, providing 25,000 independent multispectral fluorescence lifetime point measurements of the vessel surface co-registered with IVUS data. The data analysis software allows for display of the intensity *en face* images derived from FLIm within seconds following the scan and the fast data processing based on Laguerre technique enables the computation and display of lifetime maps from all 4 spectral channels in less than 2 minutes following the end of the scan."

The catheter has the potential to improve understanding of mechanisms behind plaque rupture and the diagnosis and treatment of patients with heart disease.

The engineers are working to obtain US FDA approval to test this new intravascular technology on human patients. MEH

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Watching movies can replace general anaesthesia for children having radiotherapy

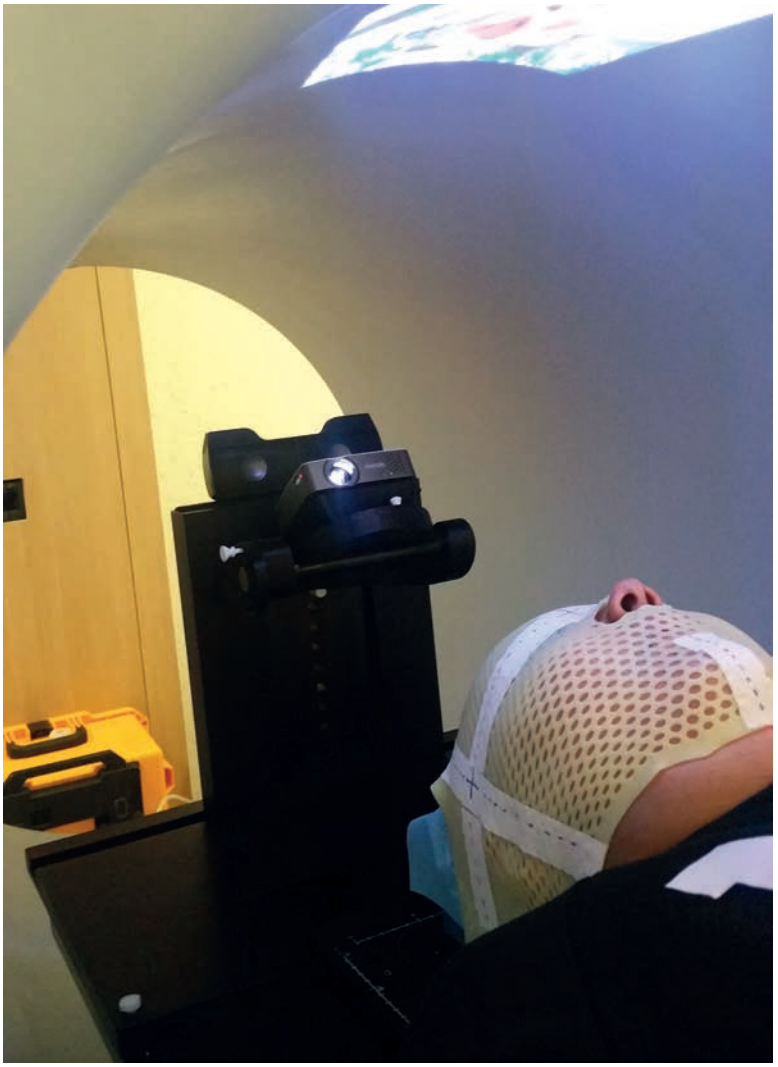
Children with cancer could be spared dozens of doses of general anaesthesia by projecting a video directly on to the inside of a radiotherapy machine during treatment, according to research presented at the ESTRO 36 conference in Vienna last year.

Although cancer is rare in children, worldwide there are approximately 215,000 new cases in the under 15s each year. Around a sixth of these children require treatment with radiotherapy, including those with brain tumours, and bone and soft tissue sarcomas such as Ewing sarcoma and rhabdomyosarcoma.

Catia Aguas, a radiation therapist and dosimetrist at the Cliniques Universitaires Saint Luc, Brussels, Belgium, told the conference that using video instead of general anaesthesia is less traumatic for children and their families, as well as making each treatment quicker and more cost effective.

She explained: "Being treated with radiotherapy means coming in for a treatment every weekday for four to six weeks. The children need to remain motionless during treatment and, on the whole, that means a general anaesthesia. That in turn means they have to keep their stomach empty for six hours before the treatment.

"We wanted to see if installing a projector and letting children watch a video of their choice would allow them to keep still enough that we would not need to give them anaesthesia."



The study included 12 children aged between one and a half and six years old who were treated with radiotherapy using a Tomotherapy treatment unit at the university hospital. Six were treated before a video projector was installed in 2014 and six were treated after.

Before the video was available, general anaesthesia was needed for 83% of children's treatments. Once the projector was installed, anaesthesia was only needed in 33% of treatments.

Aguas explained: "Radiotherapy can be very scary for children. It's a huge room full of machines and strange noises, and the worst part is that they're in the room alone during their treatment. Before their radiotherapy treatment, they have already been through a series of tests and treatments, some of them painful, so when they arrive for radiotherapy they don't really feel very safe or confident.

"Since we started using videos, children are a lot less anxious. Now they know that they're going to watch a movie of their choice, they're more relaxed and once the movie starts it's as though they travel to another world.

"Sponge Bob, Cars and Barbie have been popular movie choices with our patients."

Reduced treatment times

As well as avoiding some of the risks inherent to general anaesthesia, the research also showed that treatments that used to take one hour or more, now take around 15 to 20 minutes. This is partly because of the time saved by not having to prepare and administer anaesthesia, but also because the children who know they are going to watch videos are more cooperative.

Aguas said: "Now in our clinic, video has almost completely replaced anaesthesia, resulting in reduced treatment times and reduction of stress for the young patients and their families."

She also told the conference that the projector was inexpensive and simple to install: "In radiotherapy, everything is usually very expensive but in this case it was not. We bought a projector and, with the help of college students, we created a support to fix the device to the patient couch. Using video is saving money and resources by reducing the need for anaesthesia."

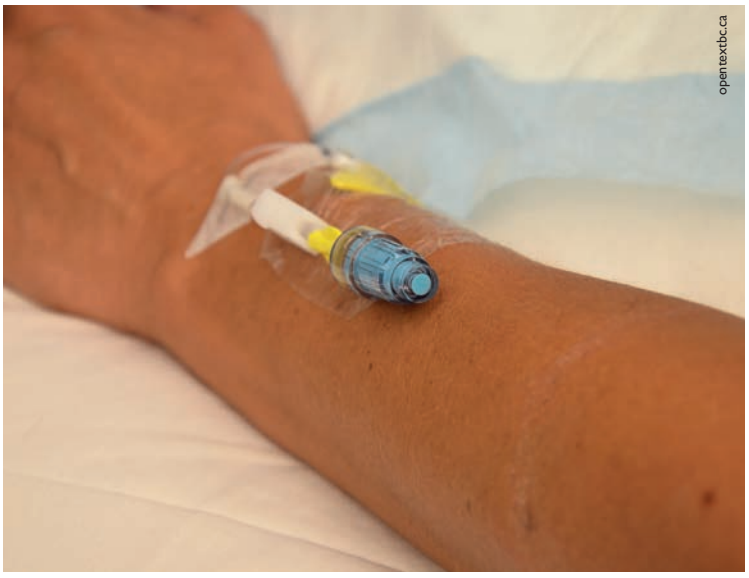
Aguas and her colleagues continue to study children who have been treated since the projector was installed and they are extending the project to include adult patients who are claustrophobic or anxious.

President of ESTRO, Professor Yolande Lievens, head of the department of radiation oncology at Ghent University Hospital, Belgium, said: "The success of this project is good news for young patients, their families and their medical teams. Simply by installing a projector and showing videos, the team have reduced the need for anaesthesia and reduced anxiety for these children. For parents this means they no longer have to watch their child going under a general anaesthetic and then in to the recovery room after treatment every day for weeks on end. In addition, the use of videos had a positive impact on the workflow in paediatric radiotherapy, which further increased the positive effect observed by the caregivers as well." MEH

Study suggests using local anaesthesia for venous cannula insertion

Patients who are given a local anaesthetic before having a venous cannula inserted have a clearly reduced sensation of pain when larger gauge cannulas are used. Compared with intradermal lidocaine infusion, the use of vapocoolant spray has the advantage that the rate of venepuncture failures is lower. This is the conclusion reached by Dirk Rüsch and coauthors from the Department of Anaesthesiology and Intensive Care Medicine, Philipps University of Marburg based on a randomized controlled trial, which they report in *Deutsches Ärzteblatt International* (Dtsch Arztebl Int 2017; 114: 605–11).

Inserting a venous cannula is a routine procedure, which nonetheless can cause discomfort and stress for patients. Existing data show that local anaesthesia to prepare the venepuncture site is standard treatment in children, but that this is handled rather less consistently in adults.



In order to determine the effectiveness of local anesthesia when inserting a cannula into a vein on the dorsum of the hand, 450 adult inpatients at the University Hospital of Marburg were allocated to different treatment and control groups. After the first attempt at venepuncture, they were asked to score their subjective ▶

pain/discomfort caused by the procedure using an 11-point numerical rating scale (NRS; 0=no discomfort, 11=unbearable discomfort).

After using vapocoolant spray, an average score of 2.4 for pain/discomfort showed a statistically significant improvement compared with the control group, with a score of 4.0. After lidocaine injection, the NRS score improved to 3.2 points, which was not considered as clinically relevant compared with the control group.

If cannulas of 17 gauge or larger were used, the benefits of local anaesthesia were even more easily measured on the pain scale: 2.6 points when vapocoolant spray was used, 3.5 for lidocaine, and 5.0 in the control group.

The authors interpret this as proof that local anaesthetic preparation of the venepuncture site on the dorsum of the hand is indicated if a cannula of 17G or larger is being used. In their view, patients' scores were significantly and to a clinically relevant degree better after lidocaine injection as well as after vapocoolant spray application. If larger gauge cannulas were used, an even greater benefit of these interventions can be assumed, in the authors' opinion, whereas in smaller gauge cannulas (e.g. 20G) the subjective pain/discomfort was comparatively low. As the rate of failed puncture attempts is notably higher after lidocaine injection because of the intradermal welt, the authors recommend cooling anaesthesia in peripheral venous cannulation as an at least equivalent alternative to lidocaine application.

• **doi**: 10.3238/arztebl.2017.0605 MEH

Why does an anaesthetic make us lose consciousness?

To date, researchers assumed that anaesthetics interrupt signal transmission between different areas of the brain and that is why we lose consciousness. Neuroscientists at Goethe University Frankfurt and the Max Planck Institute for Dynamics and Self-Organization in Göttingen have now discovered that certain areas of the brain generate less information when under anaesthesia. The drop in information transfer often measured when the brain is under anaesthesia could be a consequence of this reduced local information generation and not – as was so far assumed – a result of disrupted signal transmission between brain areas.

If only a few telephone calls are made in a city then it could be the case that several telecommunication systems have broken down – or it is nighttime and most people are asleep. The situation is similar in an anaesthetized brain: if there is remarkably little information transfer between various areas of the brain then either signal transmission in the nerve fibres is blocked or certain areas of the brain are less active as far as the generation of information is concerned.

Patricia Wollstadt, Favio Frohlich, their colleagues from the Brain Imaging Center at Goethe University Frankfurt and researchers at the MPI for Dynamics and Self-Organization have now investigated this second hypothesis. As they have announced in the current issue of "PLOS Computational Biology", they used ferrets to examine "source" brain areas from which less information was transmitted under anaesthesia than in a waking state. They found that information generation under anaesthesia was far more affected there than in the "target" brain areas to which the information was transferred. This indicates that it is the information available in the source area which determines information transfer and not a disruption in signal transmission. Were the latter the case, a far greater reduction could be expected in the target areas since less information "arrives" there.

"The relevance of this alternative explanation goes beyond anaesthesia research," says Patricia Wollstadt, "since each and every examination of neuronal information transfer should categorically take into consideration how much information is available locally and is therefore also transferable."

• **doi**: 10.1371/journal.pcbi.1005511 MEH

Eliminating opioids from anaesthesia decreases post-surgery nausea

Opioid-free general anaesthesia is safe, effective and dramatically decreases post-operative nausea, according to a single-centre study of more than 1,000 patients that was presented at the Anesthesiology 2017 annual meeting.

Using opioid alternatives during general anaesthesia is part of an effort by TEAMHealth Anesthesia at Select Physicians Surgery Center in Tampa, Florida, USA, to reduce the use of opioids during and after surgery. The study findings suggest physician anaesthesiologists are helping pave the way to promote pain management alternatives to opioids, and making headway in reducing the use of the addictive medications.

"Opioids crept into general anaesthesia over the years because they don't cause problems with the cardiovascular system, but our research suggests we can use alternatives safely and effectively," said David Samuels, M.D., lead author of the study and medical director of anaesthesia at Select Physicians Surgery Center and medical director for TEAMHealth Anesthesia. "By avoiding the use of opioids intraoperatively and helping surgeons understand the value and importance of offering patients different options for pain after surgery, physician anaesthesiologists can be agents of change in addressing the opioid dependency crisis."

Opioids – usually fentanyl, an opioid 50 times more powerful than heroin – are typically included in the combination of medications given to patients for general anaesthesia during surgery. In the study, 1,009 patients having head and neck surgery (including laryngoscopy, complex facial plastic surgery, middle ear surgery and nasal or sinus surgery) received general anaesthesia without opioids. Instead, patients received various combinations of magnesium, sub-anaesthetic ketamine, lidocaine and ketorolac, depending on the patient's age and health. Surgeons and

patients expressed a high degree of satisfaction with the new anaesthesia protocol and postoperative pain management.

After surgery, 11% of patients experienced nausea, whereas 50 to 80% of patients typically suffer from nausea after surgery. Additionally, 64% of patients did not require any pain medication in the PACU.

The traditional use of fentanyl in general anaesthesia can cause hyperalgesia, or increased sensitivity to pain, Dr Samuels said.

"Hyperalgesia leads to increased pain, so patients request more opioids in the recovery area, and then go home with an excessive number of pills," said Enrico M. Camporesi, M.D., co-author of the study and professor emeritus at the University of South Florida and director of research for TEAMHealth Anesthesia Research Institute. "We believe that not using fentanyl during surgical anaesthesia, as well as not providing patients too many pills after surgery, may help decrease the likelihood of opioid abuse. Studies show that 1 in 15 patients who has surgery is still taking prescription opioids 90 days afterwards," he said.

Three of the 19 surgeons who participated in the study now prescribe patients daily oral magnesium, gabapentin and ibuprofen for pain management after surgery. They also prescribe five hydrocodone pills for any breakthrough pain. Previously, these surgeons prescribed 50 hydrocodone pills. The change to five pills will lead to 27,000 fewer prescribed hydrocodone pills in one year's time for these surgeons at their practice.

The researchers say they plan to study whether avoiding opioids during surgery and reducing opioid prescriptions after surgery leads to reduced opioid use and abuse. MEH

HH Sheikh Mohammed bin Rashid Al Maktoum, Ruler of Dubai and Vice-President of UAE, is shown around Arab Health 2018 on the opening day.

Thousands of exhibitors showcase their innovations at Arab Health

The Arab Health exhibition and conference held at the end of January in Dubai this year attracted around 103,000 delegates and 4,200 exhibitors from more than 150 countries, according to the organizers. It is the region's most important medical event and provides a platform for the world's major medical device manufacturers to showcase their latest innovations.

We spoke to several companies about their new products. Following is a brief overview of some of them.

Philips showcases portfolio of digital platforms

Philips Healthcare showcased a broad portfolio of smart digital platforms and intelligent solutions to "help address the region's biggest healthcare challenges".

Ozlem Fidanci, Philips CEO Middle East and Turkey, explained: "The connected technologies and AI-driven solutions we are featuring at this year's Arab Health, cover diagnosis and personalized treatment, prevention and healthy living, and care at home. They help to enable seamless care, improve outcomes and patient and staff experiences."

Philips' Azurion new generation image-guided therapy platform features a state-of-the-art ergonomic design with ▶

Emitac to provide leading med-tech solutions to Fakeeh University Hospital in Dubai

Saudi Arabia's leading healthcare provider Fakeeh Care has signed an agreement with Emitac Healthcare Solutions (EHS), a leading solutions provider in the MENA region, to provide advanced turnkey healthcare solutions to its Fakeeh University Hospital [FUH], a state-of-the-art hospital and medical university project being developed at Dubai Silicon Oasis (DSO) integrated free zone Technology Park.

Fakeeh University Hospital [FUH] is the first hospital project in the DSO. It will provide patient-centred care to the growing community of residents in the area. The facility will drive academic advancement and extend the medical services of the healthcare sector.

The agreement was signed at a ceremony held at EHS pavilion at the Arab Health 2018 in the presence of Dr Mazen Fakeeh, President and Chairman of the Board of Fakeeh Care; Mr. Wafic Faraj, CEO of EHS; Dr. Hisham Hout, Hill-rom President- Middle East, Africa, Turkey & Indian subcontinent and Dr. Dr. Carla Kriwet, CEO Connected Care and Health Informatics - Royal Philips.

The hospital and medical university project will have a capacity to provide care to 700,000 patients annually with an estimated 40,000 admissions and 20,000 surgical operations. The project comprises three hospital buildings with interconnecting bridges, car park and utilities block, spanning a built-up area of around 77,375 sqm over two basements and six above-ground floors.

The FUH project have departments for imaging department, nuclear medicine, radiology, endoscopy as ell as emergency units, a surgery suite and catheterization laboratory, abd a morgue. There will also be dedicated paediatrics and gynaecology units. FUH will be equipped to offer secondary and tertiary medical services supported by comprehensive diagnostic facilities.

Emitac will provide critical care solutions from Philips, a neuro navigation system from Brainlab and a total patient room solution from Hill-Rom, including hospital beds, patient lifts and non-invasive therapeutic products.

Dr Mazen Fakeeh, President and Chairman of the Board of Fakeeh Care and Wafic Faraj, CEO of Emitac Healthcare Solutions shake hands after signing the agreement.

Commenting on the project, Dr Fakeeh said: "We are proud to partner with Emitac Healthcare Solutions (EHS) in the co-development of this project that will further expand access to quality and affordable healthcare in Dubai. The agreement with Emitac Healthcare Solutions will facilitate the provision of medical technology solutions from the world's best innovators. In this digital era, this collaboration will help us provide our patients with the most advanced secondary and tertiary care at DSO.

Commenting on the agreement, Faraj said: "This is indeed a great accomplishment for Emitac Healthcare Solutions to partner with Fakeeh University Hospital in line with their commitment to driving sustainable growth of the healthcare sector. We will provide medical technology solutions to FUH, including planning and sourcing the systems from our global partners.

"We bring the best of medical technologies, capabilities and solutions to advance healthcare in the Middle East, with our global partners in technology design and integration, implementation, training and continuous improvement initiatives. This will ensure essential healthcare services meet the growing population demands. We have strong executional and service capacities, provision and staffing through our extensive group and partner network. We partner with the most reputable names in the industry to bring timely and innovative solutions to the regional healthcare sector.

"We believe in optimizing healthcare through comprehensive solutions and products such as hospital and patient room furniture solutions, patient monitoring and critical care solutions, healthcare IT, radiology, oncology, neurosurgery solutions and neonatal solutions. Emitac Healthcare Solutions handles procurement, logistics planning, execution, installation, training and maintenance of all solutions," Faraj said.

EHS has a strong track record of executing large and full spectrum healthcare projects for the public and private sectors in the UAE and the region. EHS was appointed by Dubai Healthcare City as one of their design consultants. EHS has completed major projects for Mubadala's Cleveland Clinic Abu Dhabi, Al Qassimi Hospital Sharjah for the Ministry of Health and Prevention and Al Amal Psychiatric Hospital in Dubai. EHS also has an ongoing project at King Hussein Cancer Center in Amman, Jordan. MEH

Philips' Azurion tavi

Philips intellivue X3

an easy-to-use intuitive user interface, enabling clinicians to swiftly and confidently perform a wide range of routine and complex procedures in the interventional lab. Azurion is part of Philips' leading portfolio of integrated solutions comprising interventional imaging technologies and planning and navigation software combined with interventional devices – including catheters for diagnosis and therapy – plus a broad range of services.

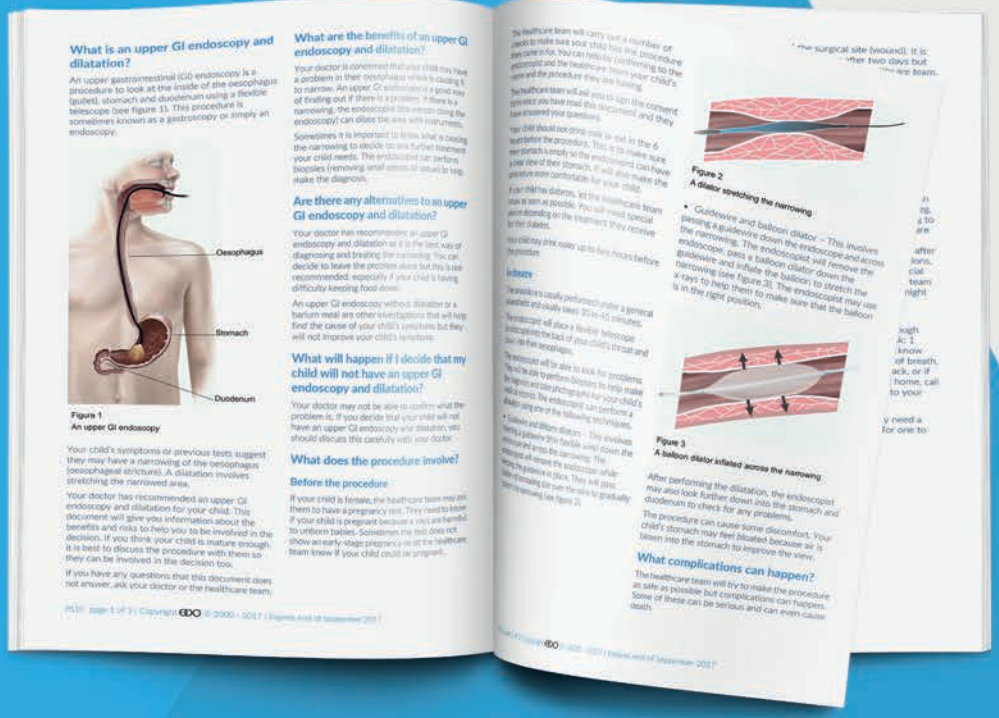
MR Prodiva 1.5T

Philips unveiled their new MR Prodiva 1.5T. They say it improves clinical performance, workflow and patient experience. Philips also unveiled new solutions to drastically reduce exam times and elevate neuro-oncology.

IntelliVue X3

The company showcased their IntelliVue X3 – a compact, dual-purpose, transport

EIDO Healthcare at Arab Health



Patient testimonials

"Set out very well with excellent diagrams and was very easy to understand."

"Clear, concise, right on the button. Clinically comforting."

"Good to have answers to all questions I probably would have asked."

"A great supplement to what the doctor had told me."

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patient monitor featuring intuitive smartphone-style operation and offering a scalable set of clinical measurements.

"Gaps in medical information during patient transport can lead to delayed treatment, inefficient workflows, and negative impact on quality of care. IntelliVue X3 is designed for uninterrupted patient monitoring – at the bedside and during transport. It can connect wirelessly to IntelliVue central stations, and on to EMR systems across all levels of hospital care," a spokesperson explained.

The WIZARD mattress

IntelliSpace Cardiovascular

Also on show was Philips's IntelliSpace Cardiovascular – a multi-modality image and information management solution designed to help streamline workflows and improve operational performance throughout the cardiovascular care continuum. It features a built-in cardiology timeline that provides a graphical, panoramic, and chronological overview of a patient's cardiovascular care continuum.

Philips exhibited their Tasy EMR, a comprehensive healthcare informatics solution that touches all areas of the healthcare environment, connecting all points across clinical and non-clinical domains along the healthcare continuum to help clinicians and managers keep up to date with changes and address challenges in patient care and safety, hospital management, supply and financials.

WIZARD mattress prevents pressure ulcers

Rober introduced a pioneering 'zero pressure' mattress that prevents pressure sores from occurring in intensive care patients.

The 'WIZARD' is an innovative mattress that offers protection to bedridden and critically ill immobile patients. It combines Rober's signature alternating pressure cell design with an impressive tilt facility. This action gently turns the patient onto their side, comfortably and correctly, thus reducing the requirement for manual handling.

Research shows that patients admitted to intensive care units are the most at risk of developing pressure ulcers. Critically ill patients are often confined to their bed for long periods, either sedated or receiving mechanical ventilation.

The technology used in the WIZARD mimics the body's natural movements to prevent pressure ulcers from forming. Moving up and down in a wave-like motion, it provides regular and complete pressure relief to all potential contact points. The dynamic system also offers therapeutic properties to promote the healing of established ulcers.

The mattress is easy to use and operate and has been designed with patient and carer safety in mind. It also includes a range of additional nursing support and includes patient safety measures, such as integrated sides and an in-built Cardio Pulmonary Resuscitation (CPR) valve to provide quick deflation in the case of an emergency.

Integrated solutions for infection control

British company, GV Health, launched a range of integrated solutions for end-to-end infection control, waste management and patient safety.

Integration of infection control, waste management and safety systems with end-to-end solutions directly contributes to improved performance standards and better patient outcomes. Reduced levels of HCAIs (healthcare acquired infections), lower emissions, more efficient management of healthcare waste and improved practitioner and patient safety are the main benefits experienced by healthcare providers.

GV Health has worked with the UK's National Health Service for more than 20 years and has a presence in more than 30 other countries. The company is now one of the world's leading suppliers of infection control, waste management and patient safety solutions.

Key elements of end-to-end infection control, waste and patient safety include: healthcare disinfectants and sterilisers; emergency sanitation and water purification systems; specialist waste bags to facilitate more efficient sorting of waste, handling, tracking and disposal; and spill kits. The company also showcased safety consumables, such as aprons, tabards, PPE (personal protective equipment) and emergency kits for patient and provider safety.

Siemens showcases new diagnostic imaging solutions

Siemens showed off their new range diagnostic imaging and therapy solutions.

"The healthcare industry in the UAE is undergoing a drastic change, with a rapidly growing population, and an increase in lifestyle diseases – quality and cost-effective medical care has become more important than ever before. By 2020 the Middle East and North Africa (MENA) region's spend is forecast to grow significantly when it comes to healthcare, with the UAE and Saudi contributing the highest percentage, making the need for precise medical care vital," said a Siemens spokesperson.

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Capsa Healthcare is a leading developer of point-of-care computing workstations that improve the efficiency of clinical providers in hospitals throughout the world. We understand the delivery of healthcare cannot wait. Caregivers need assurance that the right products, the right technology, and the right support they need will always be there. That's why Capsa Healthcare products are designed with caregivers in mind, to help them meet the demands of care seamlessly and efficiently.

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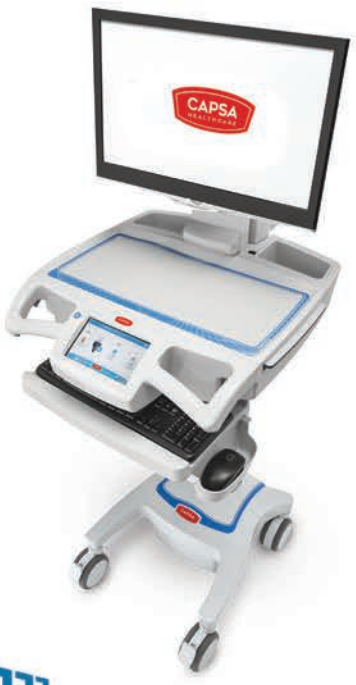

CAPSAHEALTHCARE

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Their latest innovations use Artificial Intelligence (AI) and 3D camera technology to expand precision medicine and improve patient experience, reducing unwanted variations and repeat procedures.

Cios Spin

These include the Cios Spin, an intraoperative 3D imaging device set to reduce revision surgery; the Mammomat Revelation, a premium mammography system featuring 3D HD Breast Biopsy, providing automated breast density measurements and improving patient access to functional breast imaging; and nexaris Therapy Suites, a solution to better integrate multi-modal imaging in surgery and interventional radiology.

Siemens also exhibited their new computed tomography scanner portfolio. The Somatom Edge Plus incorporates Siemens's FAST (fully assisting scanner technologies) Integrated Workflow with the brand new FAST 3D Camera. Using artificial intelligence and deep learning technology, the camera automatically facilitates precise and consistent isocentric positioning of patients. By reducing unwarranted variations and avoiding scan repeats, diagnostics is more precise and involves lower costs.

Ole Per Maloy, the company's newly appointed Managing Director of Siemens Healthineers Middle East and South-East Africa, said: "We understand the challenges clinicians face and have focused on providing empowering solutions. For example, during CT scans, clinicians face the challenge of incorrect patient positioning which poses as an obstacle in achieving optimal imaging results. Our new CT scanner, the Somatom Edge Plus, is fitted with a 3D camera above the patient table which uses artificial intelligence and deep learning technologies to recognize the patient's anatomical landmarks. This helps clinicians to position the patient for scans."

The Cios Spin, a mobile flat detector C-arm, provides anatomically precise 3D views of the target bone or implant. If, for example, screws need to be repositioned, the surgeons can see this while the operation is still in progress and can make the adjustments directly. This way the system assists orthopedic and trauma surgeons by providing intraoperative quality control and helps reducing the need for revision surgery.

nexaris Angio MR-CT

The new OR solution nexaris Angio-MR-CT seamlessly combines Artis Angiography, Magnetom MRI, and Somatom CT in one environment for image information during any stage of the procedure. Thanks to the Pilot patient transfer system, developed with Getinge, switching between the surgical table and imaging modalities requires no patient repositioning. The nexaris Angio-CT is the first hybrid interventional suite with Instant Fusion that seamlessly integrates angio and CT images. Wireless ultrasound images can also be displayed side-by-side on the large display. Angio, CT, and ultrasound images are available at a single glance. This enables challenging, multi-modality procedures, streamline workflows, and advance therapy outcomes.

Omnicell exhibits medication and supply management solutions

Omnicell, a leading provider of medication and supply management solutions and adherence tools for healthcare systems and pharmacies, featured its medication management automation platform and product portfolio.

Their portfolio included Omnicell SupplyX – an innovative cloud-enabled supply management system that provides real-time inventory monitoring, remote supply management, and comprehensive patient cost capture; and the Omnicell VBM 200F –the only available small footprint automated pharmacy solution that efficiently and accurately packages and verifies medication in SureMed by Omnicell medication packaging.

Omnicell SupplyX software gives the flexibility to manage supplies anywhere in the hospital either in an open shelf environment or through supporting automated dispensing cabinets or RFID systems. Additional benefits include better implant tracking through lot and serial tracking, and usage capture and visibility to the actions needed to reduce stockouts or over-ordering inventory.

The Omnicell VBM 200F – an automated multimed packing solution – reduces manual labour, cuts operational costs, and diminishes the probability of human error. The VBM 200F, in conjunction with Omnicell's SureMed blister cards, helps pharmacists improve medication adherence, which can result in better patient outcomes.

The company showcased a range of other related products including the Omnicell Robotic Dispensing Solution, which provides accurate and efficient simultaneous loading and dispensing of medications. This modular system consists of Omnicell's Medimat storage and dispensing unit, a highspeed channel dispensing system, and an automated filling system. MEH

Advantech shows off their digital solutions designed to make hospitals smart

Middle East Health spoke to Jason Wang, sales director, Advantech about their innovative digital solutions on show at Arab Health.

Wang explained that Advantech, a Taiwanese company, is focused on "transforming traditional hospitals into digital hospitals". He added that they will also work with 'new-build' hospitals to make them state-of-the-art digital facilities.

"By doing so we increase the hospital's efficiency and minimise the administration work, which is important for nurses as this gives them more time to interact with the patients," he explained.

The company offers a wide range of 'smart-hospital' solutions that can be integrated with PACS and HIS from other vendors. We look briefly at a few of these.

"Our products are solution-based. We have outpatient solutions, clinical solutions, integrated OR solutions and patient ward solutions," Wang said.

He pointed out that in 2017 Advantech acquired a Korean company called Kostec that specialises in medical monitors, "which now enables us to provide a more complete solution".

Closed-loop medication administration solution

Wang showed us Advantech's electronic medication dispensing cart with monitor attached to it. The cart is part of a complete closed-loop electronic medication workflow process that starts with the prescribing doctor, through to the pharmacy, nursing station and patient ward, where the prescribed medication is given to the patient. The entire process is digitally recorded. The electronic medication dispensing cart ensures the correct medication is given to the patient.

Each box in the trolley has medication for a specific patient. "The nurse will scan the bar code on the wristband of the patient and the medication box in the trolley, which has been filled in the pharmacy with medication specifically for that patient, will open. The nurse can then medicate the patient and be sure to avoid any medication errors," Wang explained. "This increases hospital efficiency and patient safety."

Video Archiving and Streaming Solution

Wang pointed out the video archiving and streaming solution designed for use in the OR.

"Our decoder records and streams the surgical videos. The videos are high-definition and are not compressed at all, so viewers can see clearly all the finer details of the surgery."

On the 4K monitor, which provides a super sharp image, you can select the video source and choose how many different videos you want to stream simultaneously on a single monitor. This fully integrated video streaming and archiving solution runs on fibre optic cable to enable maximum video data transfer rates. The solution is for use internally in the hospital and can be used for telemedicine purposes as well.

Advantech also provides a recording device for archiving this high def video onto DVD.

"We're finding a lot of demand for this product in the Middle East," Wang said.

"The attraction of our 4K video streaming and archiving solution is our price point, which is significantly lower than our competitors," he pointed out.

Patient Infotainment Solution

Advantech's patient infotainment system is situated inside the ward and is accessible to the patient in their bed. On the touch screen the patient can select options for video entertainment, internet, food requests, nurse communication and access other relevant information. The solution is available in several languages including Arabic.

Jason Wang

Patient Information Solution

The Patient Information Solution comprises a small bedhead display which provides all relevant information about the patient. This is used by the nurses and the doctors to stay informed about the condition of the patient, their medication and any other relevant information. It can also be used by the patient for simple requests, like if they want to go to the bathroom.

Outpatient Waiting-room Solution

This is a digital solution for outpatient waiting rooms where patients can see on the wall-mounted monitor when they are due for their appointment with the doctor. This enhances patient flow, improves efficiency in the outpatient sector and enhances patient satisfaction. Alongside the public broadcasting information on the display, select videos can also be shown to provide more pertinent information to the waiting patients. This system also uses a 4K display to provide crisp, clear images.

Flexible integration

All these solutions are flexible and can be configured to suit the client's preferred information requirements. The preferred configuration will be put in place during the software integration with the core PACS and HIS in the hospital.

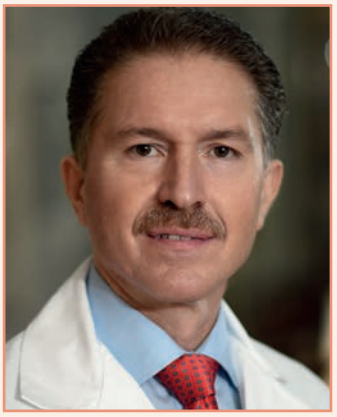
Advantech is active in the Middle East with several smart hospital integration projects currently underway in the region.

- For more information visit: *www2.advantech.com/digital-healthcare* MEH

Interview

Leading the charge in minimally invasive cardiac surgery

Middle East Health speaks to Joseph Lamelas, MD, an internationally recognised expert in minimally invasive heart surgery at Baylor St. Luke's Medical Center in Houston, Texas. He joined Baylor St Luke's in January this year. He was previously Chief of Cardiac Surgery for eight years at Mount Sinai Medical Center in Miami, Florida.



Joseph Lamelas, MD

***Middle East Health*: Can you tell us what lead you into the field of cardiac surgery and specifically into minimally invasive heart surgery?**

Joseph Lamelas: I have always enjoyed cardiac surgery since it is such a dynamic specialty and one of the few in which you can perform a significant procedure and see almost immediate results, both from a cardiac standpoint as well as a patient recovery standpoint.

My interest in minimally invasive surgery came from a desire to perform a less invasive operation that would provide even more benefit for my patients. As I began to operate on higher risk patients and noticed such a significant difference as far as benefit is concerned, I truly realised that this was the future and I needed to be involved. The rest is history.

MEH: How long have you been performing minimally invasive heart surgery?

JL: I have been in practice for the past 27 years and have been super-specialising in minimally invasive surgery for the past 14 years.

MEH: I understand that you have played a significant role in advancing the field of minimally invasive cardiac surgery and have developed a number of new instruments in this field. Can you please give us some detail about what advances you have facilitated and what instruments you have helped develop?

JL: I have further advanced the techniques in minimally invasive valvular cardiac surgery to make them safer and more reproducible. In addition, I have expanded the realm of the surgery to include double and triple valve surgery as well as surgery of the ascending aorta through small 5cm incisions on the right lateral aspect of the chest, working between the ribs without fracturing or breaking the ribs. New instruments were needed to work through limited access and improve both visualisation as well as technical ease. These instruments were crucial to the success of this surgery.

MEH: What simultaneous advances in medicine in general, such as imaging, have assisted you in developing your own unique advances? How have they helped?

JL: Imaging is important in identifying the external anatomy as it correlates with the internal anatomy. This improves more precision in identifying the entry point in the chest as well as any anatomical cardiac variants. In the future, we hope to have imaging that can be used on the operating table to facilitate this.

MEH: For which cardiac surgery procedures can you use minimally invasive techniques?

JL: This can be applied to single valve disease (aortic or mitral valve surgery), which includes any type of valve repair, double valve surgery, triple valve surgery as well as resection of cardiac tumours and repairing simple congenital cardiac defects. I have also applied this to replacement of the ascending aorta and the entire aortic root.

MEH: What are the benefits of minimally invasive surgery compared to traditional surgery? Has there been a notable decrease in mortality, for example?

JL: The benefits include: less trauma to the tissues, less cardiac manipulation, less bleeding in surgery, less transfusions, quicker intensive care and hospital stay as well as a speedy recovery back to normal lifestyle. Overall complication rates have decreased and with experience, mortality rates have improved compared to the traditional surgery.

MEH: Are there currently certain cardiac surgery procedures where minimally invasive surgery is not an option? Do you think this is likely to change in the near future with technical advances?

JL: If the patient requires 3 or 4 coronary bypasses along with valve surgery, these patients will need a traditional sternotomy operation. Additional advances may facilitate this in the future.

MEH: Looking at these advances, are you involved in any research in this field? Can you give us an indication of what this research is about and how you think it will improve this specialty?

JL: Research and technical advances are always part if any academic centre's culture. With the development of new instrumentation and exposure devices as well as training courses, we will see wider use of minimally invasive surgery.

MEH: What does the future hold for us in this field of minimally invasive cardiac surgery?

JL: I believe that minimally invasive surgery will ultimately be the standard of care and will be the benchmark upon what we will need to compare any technology and technique. MEH

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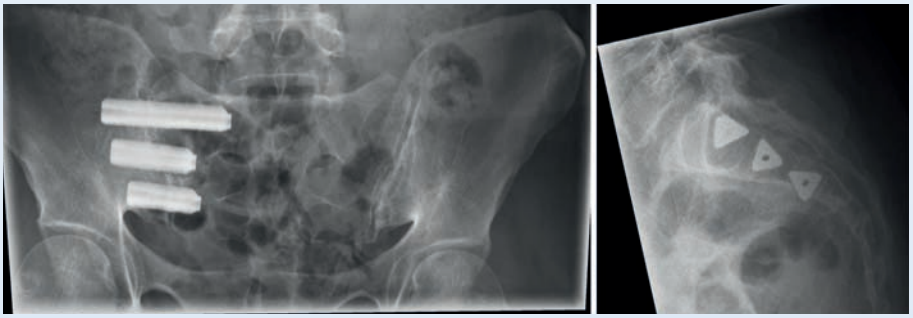
Lower back pain and sacroiliac joint fusion surgery

Mr Robert Lee, Spinal Consultant (right) in theatre.

By **Robert Lee**
Consultant Spinal Surgeon
Royal National Orthopaedic Hospital



Lower back pain affects up to 90 percent of adults at some point in their life. Most of the time, this is simply a muscle strain that improves with rest and painkillers. Sometimes the symptoms are bad enough to warrant treatment by a physiotherapist, chiropractor or osteopath. When back pain persists for a long period of time despite all these alternative treatments, then advice is sought from a specialist such as a spine surgeon. This is because there is often a structural problem with the spine which may be giving rise to these symptoms.

One of the first investigations performed is an MRI scan – basically a big magnet that produces a three-dimensional picture of the spine which allows the surgeon to visualise the bones (vertebral bodies) and soft tissues (intervertebral discs, ligaments and nerves). This can show problems with degeneration of the discs (beyond what you would expect with old age) as well as wear and tear in the joints and nerve compression (which can give pain down the leg known as sciatica). One of the common misconceptions is that an abnormal MRI scan must mean you should suffer with back pain. In fact, there are many people walking around with very abnormal scans with lots of degenerative changes who have very little back pain. The reverse is also true and there are people with minimal abnormalities who suffer badly with back pain. This is because we compensate for problems in our back by activating our back muscles – this is why core strengthening exercises are important; some people with back pain simply have weak back muscles.

Moreover, there are about 30 percent of people who think they have back pain coming from their spine when in fact it is coming from lower down.

The lumbar spine connects to the pelvis via a structure called the sacroiliac joint (SI joint). The brim of the pelvis is the structure your belt rests on and if you run your hands backwards towards your buttocks, the point on either side of your spine that meets the pelvis is the SI joint. This joint has hardly any movement. It's not like your hip or knee joint that has a large range of movement, the SI joint only moves a few millimetres, if at all. The problem is when it moves too much or becomes inflamed. This can lead to quite severe back pain. Typically, people with SI joint problems have pain that emanates from a point either side of the spine around the buttock area. Some people can even put a finger on the spot that is painful. The pain can worsen on twisting and with activity. Sitting for a long time can also lead to severe pain. There is also a nerve very close to the SI joint that becomes irritated and causes pain down the leg, which can imitate sciatica. Some patients who have had previous lower lumbar fusions get SI joint pain too.

Diagnosing back pain as SI joint pain is based on checks of a patient's clinical history and the examination findings. Where the diagnosis is suspected, an injection of local anaesthetic and steroids can be tried to see if this eliminates the pain. Even if it takes away the pain for a short period of time, then at least a definitive diagnosis can be made.

The treatment of SI joint pain begins with rehabilitation involving physiotherapy, chiropractor or osteopathy. If this fails and an injection has proven the diagnosis, then pain management specialists can attempt to numb the nerves to the joint via a process called radiofrequency denervation. If all else fails and the patient's back pain is bad enough, then fusion of the SI joint can be considered. In the right patient this is an extremely successful operation, but the key here is getting the right diagnosis. The operation is performed via a minimally invasive technique where screws or titanium cages are driven across the joint. Usually two to three cages are inserted and over time, bone grows onto or through the cages to stop movement. Recovery usually takes two to three months and involves using crutches to prevent putting the whole-body weight through the fused joint. This surgery is approved by NICE (National Institute for Health and Clinical Excellence). MEH

Royal National Orthopaedic Hospital

At the Royal National Orthopaedic Hospital (RNOH) in Stanmore this surgery is offered to patients who fulfil the diagnostic criteria. Computer navigation technology is used to prevent cage malposition – the SI joint has a small cross-sectional area and missing the joint can lead to permanent nerve damage if the operation is not done correctly. Given the expertise of the surgeons with this technology at the RNOH, patients who need this type of surgery are often referred there for surgical management.

- Private Patient enquiries can be made via our website: *www.rnohppu.com*

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- Visit *www.aueltd.co.uk* MEH

Researchers crack code to restoring memory creation in older brains

Ageing or impaired brains can once again form lasting memories if an enzyme that applies the brakes too hard on a key gene is lifted, according to University of California, Irvine neurobiologists.

"What we've discovered is that if we free up that DNA again, now the ageing brain can form long-term memories normally," said senior author Marcelo Wood, UCI's Francisco J. Ayala Chair in Neurobiology & Behavior, who presented the findings at the American Association for the Advancement of Science's annual meeting, in Austin, Texas, in February. "In order to form a long-term memory, you have to turn specific genes on. In most young brains, that happens easily, but as we get older and our brain gets older, we have trouble with that."

That's because the six feet of DNA spooled tightly into every cell in our bodies has a harder time releasing itself as needed, he explained. Like many body parts, "it's no longer as flexible as it used to be". The stiffness in this case is due to a molecular brake pad called histone deacetylase 3, or HDAC3, that has become "overeager" in the aged brain and is compacting the material too hard, blocking the release of a gene called Period1. Removing HDAC3 restores flexibility and allows internal cell machinery to access Period1 to begin forming new memories.

Researchers had previously theorized that the loss of transcription and encoding functions in older brains was due to deteriorating core circadian clocks. But Wood and his team, notably postdoctoral fellow Janine Kwapis, found that the ability to create lasting memories was linked to a different process – the overly aggressive enzyme blocking the release of Period1 – in the same hippocampus region of the brain.

That's potentially good news for developing treatments. "New drugs targeting HDAC3 could provide an exciting avenue to allow older people to improve memory formation," Wood said. MEH

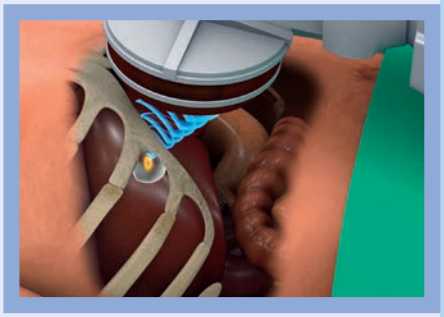
Courtesy of UCI's Francisco J. Ayala School of Biological Sciences

Marcelo Wood, senior author of the study and UCI's Francisco J. Ayala Chair in Neurobiology & Behavior. Wood has discovered an enzyme that if lifted can free up DNA to help form memories in ageing brains.

Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
March 2018		
2nd Annual Dubai International Musculoskeletal Medicine Congress	9-10 March 2018 Dubai, UAE	*www.dimmc.com*
Abu Dhabi Annual Intl Conference on Vitamin D Deficiency & Human Health	15-16 March 2018 Abu Dhabi, UAE	*www.UAEVitaminDCongress.com*
IGDC (International Growth & Development)	15-17 March 2018 Dubai, UAE	*www.igdconference.com*
5th Evolving Practice of Ophthalmology Middle East Conference (EPOMEC 2018)	15-17 March 2018 Dubai, UAE	*www.epomec.ae*
GCC eHealth Workforce Development Conference	27-29 March 2018 Abu Dhabi	*www.gccehealth.org*
April 2018		
3rd Masterclass Gastroenterology, Hepatology & Related Diseases Conference	5-6 April 2018 Abu Dhabi, UAE	*http://menaconference.com/events/3mcga*
Arab International Men's Health Congress	12-14 April 2018 Dubai, UAE	*www.arabinternationalmenshealth.com*
3rd International Conference on Molecular Medicine and Diagnostics	19-20 April 2018 Dubai, UAE	*https://molecularmedicine.conferenceseries.com*
24th World Nurse Practitioners & Healthcare Congress	23-25 April 2018 Dubai, UAE	*https://nursepractitioner.nursingconference.com/middleeast*
Advanced Diabetes Conference	27 -28 April, 2018 Abu Dhabi, UAE	*www.icldc.ae/event/advanced-diabetes-conference-2017*
June 2018		
Middle East Obesity, Bariatric Surgery and Endocrinology Congress	25-26 June 2018 Dubai, UAE	*https://obesity-middleeast.conferenceseries.com/*
24th World Nurse Practitioners & Healthcare Congress	25-27 June 2018 Dubai, UAE	*https://nursepractitioner.nursingconference.com/middleeast*



Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
July 2018		
29th International Conference on Public Mental Health & Neurosciences	16-18 July 2018 Dubai, UAE	*https://mental-health.neurologyconference.com*
22nd World Nutrition and Pediatrics Healthcare Conference	16-18 July 2018 Dubai, UAE	*https://nutrition.pediatricsconferences.com*
August 2018		
Middle East Obesity, Bariatric Surgery and Endocrinology Congress	6-7 August 2017 Abu Dhabi, UAE	*https://obesity-middleeast.conferenceseries.com*
28th International Conference on Cardiology and Healthcare	9-11 August 2017 Abu Dhabi, UAE	*https://healthcare.cardiologymeeting.com*
9th International Conference on Food Safety and Health	30-31 August 2018. Dubai, UAE	*https://foodsafety.nutritionalconference.com*
September 2018		
20th World Conference on Pharmaceutical Chemistry and Drug Design	3-5 September 2018 Dubai, UAE	*https://drug-chemistry.pharmaceuticalconferences.com*
4th International Anesthesia and Pain Medicine Conference	17-18 September 2018 Dubai, UAE	*https://anesthesiology.conferenceseries.com*
3rd Conference on Breast and Cervical Cancer	27-28 September 2018 Abu Dhabi, UAE	*https://breast-cervical.cancersummit.org*

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*

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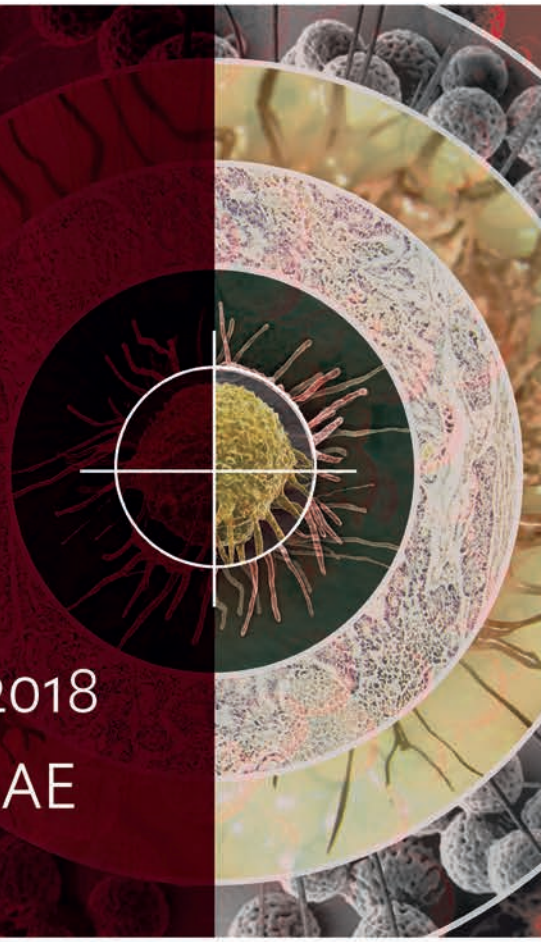

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