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Attacks on Hospitals

Healthcare increasingly out of reach for 250,000 Syrians in Aleppo city

Paracetamol in pregnancy
Study warns of association with autism spectrum, hyper-activity

Multitom Rax
Siemens launches twin robotic X-ray system

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- Saudi MoH to employ 100,000 Saudis in health sector

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Prognosis

War on hospitals

The ongoing attacks on healthcare facilities in Yemen and Syria is a tragic consequence of these devastating conflicts. In July 2016 alone, there were at least 10 confirmed attacks on health facilities in Aleppo city. Dr Ala Alwan, WHO Regional Director for the Eastern Mediterranean, issued a strongly worded statement calling on political leaders to exercise their political will and bring an end to the 'war on hospitals'. The doctors practising in these conflict zones deserve supreme praise. We report on the conditions and circumstances in which the few remaining doctors in Syria are operating and the heart-wrenching decisions with which they are confronted on a daily basis.

An important study recently published in *The Lancet Global Health* shows that life expectancy in the region has been significantly reduced due to conflict. The Global Burden of Disease Study 2013 shows that between 2010 and 2013, Yemen, Tunisia, and Egypt lost about three months of life expectancy, whilst the war in Syria has cut six years off average life expectancy. As Ali Mokdad, Professor of Global Health at the Institute for Health Metrics and Evaluation at the University of Washington, comments: "Life expectancy decline is traditionally regarded as a sign that the health and social systems are failing. The fact that this is happening in several countries indicates there is an immediate need to invest in these healthcare systems." Read a summary of the report and its key finding in this issue.

In every issue we cover a lot of important newly published healthcare research from medical scientists around the world. In this issue, one of these reports deserves to be highlighted. A study published recently in the *International Journal of Epidemiology* sounds a warning bell about the use of paracetamol during pregnancy. The study found that the extensive use of paracetamol during pregnancy is associated with an increase in autism spectrum symptoms in boys and for both genders an association with attention-related and hyperactivity symptoms.

In our focus on X-ray imaging, we look at Siemens Healthcare's new Multitom Rax – the world's first twin robotic X-ray system which is being referred to as radiology's answer to the Swiss army knife because of its wide array of applications and ease of use. We also look at a smartphone App released by The Ottawa Hospital and the University of Ottawa, which is designed to help health professionals decide when to order X-rays and CT scans.

Also in this issue, you'll find more news from the region, the world and research developments.

Stay informed.

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

Middle East Editorial Office
PO Box 117943, Dubai, UAE
Telephone: (+9714) 334 6609
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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Cover image

File image from the Medics Under Fire rally in London last year. In July alone this year more than 10 healthcare facilities were attacked in Aleppo city.

PHOTO: Ms Jane Campbell / Shutterstock.com

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The Importance of the Breakfast Meal

By: Farah Hillou, MSc, RD

Breakfast is often regarded as the "most important meal of the day". The importance of consuming breakfast has been researched extensively, and has been shown to be strongly associated with improved diet quality, feelings of wellbeing, enhanced cognitive performance, and weight control [1,2,3,4]. Furthermore, some studies have reported reduced risk of cardiovascular disease as well as Type 2 diabetes among regular breakfast consumers [3,5].

PATTERNS OF BREAKFAST CONSUMPTION AND NUTRIENT INTAKE

Despite the well documented benefits of the breakfast meal, it is often skipped. In Saudi Arabia, a study indicated that more than half of adolescents did not eat breakfast [6]. Similarly, a study in Bahrain reported that almost half of adolescent boys and two thirds of adolescent girls skipped breakfast [7]. There is currently little data on the incidence of breakfast skipping among adults. Reasons commonly reported by children and adults for skipping breakfast include absence of hunger, time limitations, lack of prior planning, and lack of available easy breakfast options [6,8].

Several studies conducted in the Gulf region indicate low intakes of vital nutrients. One UAE study found that almost 90% of children (6-10 years) and 95% of adolescents did not meet current recommendations for calcium intake [9]. Furthermore, 95% of adolescents did not meet recommendations for dietary fiber [9]. Similarly, a study conducted in Saudi Arabia indicated that the majority of adolescents consumed less than the recommended intakes for calcium, iron, vitamin C and fiber [6]. In Kuwait, more than 90% of adults and children fail to meet the estimated average requirement (EAR) for vitamin D; two thirds did not meet the EAR for calcium, folate and fiber; and half did not meet the EAR for vitamins A and C [10]. These results suggest a need to increase intake of essential nutrients. Breakfast is a prime opportunity to boost intake of these nutrients, as they are found in many commonly consumed breakfast items.

BENEFITS OF EATING BREAKFAST

Breakfast consists of up to 20% of total daily energy intake, and can provide a variety of key micronutrients, particularly those of public health concern such as calcium, iron, potassium, vitamin D, folate and dietary fiber [11]. Children who consumed breakfast had higher intakes of calcium, potassium, magnesium, phosphorous, vitamin D and fiber compared to those that did not [2,4,12].

Similarly, adults who consumed breakfast had greater intakes of vitamin C, folate, niacin, phosphorus, potassium, magnesium and fiber [13]. When breakfast is skipped, intake of these nutrients is often not compensated for in other meals [12].

Furthermore, children, adolescent and adult breakfast skippers were more likely to be overweight or obese, and have a higher waist circumference than breakfast eaters [3,4,14,15,16]. When tracking adolescents into early adulthood, those that ate breakfast at a younger age were more likely to carry on this habit as they grew older [14]. In addition to improved diet quality and weight control, eating breakfast is also strongly linked to improved cognitive function and academic performance [1,17].

WHAT DEFINES A HEALTHY BREAKFAST?

The positive contribution of breakfast to nutrient intake and diet quality largely depends on the types of foods consumed [18]. Current recommendations state that individuals consume a **"nutrient dense"** breakfast [18]. Proposed guidelines to build a quality breakfast meal suggest that breakfast provides 15-25% of total daily calories [18]. Thus for a Reference Intake of 2000kcal per day for an average adult, calories from breakfast range from 300-500kcal. The proposed criteria for an ideal breakfast also emphasize including foods from at least three of the food groups, with special focus on fiber-rich grains, lean proteins (legumes, eggs, lean meat), non-fat or low-fat dairy, fruits, and vegetables [19].

Grains are a source of dietary fiber, and emphasis should be on whole-grain and bran-based grains which provide at least 3g/100g fiber [18]. For instance, consuming fortified ready to eat breakfast cereals have been shown to significantly improve average daily intakes of iron, vitamin D, folate and vitamins B1, B2 and B3 [20]. Dairy products are important sources of calcium and vitamin D. Fruits and vegetables are rich in vitamins A and C, folate and fiber [18]. Food and beverages high in added sugars and sodium must be limited due to their negative consequences on health if consumed in excess.

IN CONCLUSION, eating breakfast regularly is associated with improved overall health and wellbeing, healthier body weight, better cognitive function, improved diet quality, and reduced risk of chronic diseases [18]. A quality breakfast provides a balance of energy in proportion to an individual's needs depending on age, gender, and activity levels [18]. Moreover, it includes a variety of nutrient-dense foods tailored to an individual's personal preferences and cultural traditions.

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middle east monitor

Update from around the region

Children make up 35% of casualties in Aleppo

In a statement issued by Save the Children on 29 July 2016, aid workers in Aleppo have reported horrific conditions for casualties and health workers, with limb amputations and head trauma the most prevalent injuries after weeks of heavy bombardment in the now besieged eastern part of the city.

The field coordinator for Shafak, an NGO which runs a network of ambulances around the city, estimated that children comprise about 35 percent of all casualties. He also reported that the death rate, particularly among child casualties, is rising because they can no longer evacuate patients with head injuries to Turkey as they would have done previously due to the siege.

According to the Save the Children partner, hospitals are completely overwhelmed and ambulances are running out of fuel, so they can now only attend the scenes of major airstrikes. They also report that it's too dangerous to attempt to leave the city and there is bombing and violence along the supposed safe routes out, although we cannot independently verify these reports at this stage.

Rami, whose name has been changed to protect his identity, said: "Life in Aleppo city is becoming more like living next to an active volcano... you don't know when you'll be killed. It's the first time in the last four years where we see this kind of bombardment and destruction. Especially when they [children] hear the sound of an explosion or the jetfighter, they start screaming, hugging you and crying.

"Imagine the emergency room in any of the field hospitals doesn't have more than five or six beds, and when responding to a massacre they receive up to 30-40 injured at the same time. So most of the patients are treated on the floor of the hospital... and of course all this is getting worse because of the intense bombardment with the lack of the staff and equipment."

Rami reported previously attending the scene of an airstrike, and finding children buried beneath the rubble. "A child less than ten years old ran to me shouting 'sir please put my arm back.' His left arm was amputated and he held it with his right hand. He was begging me to put it back, and this is only one of so many tragedies that we see."

Sonia Khush, Syria Director for Save the Children, said: "The situation for an estimated 100,000 children trapped under siege and bombardment in Aleppo is desperate and needs our urgent help. The world cannot turn its back while children are bombed and then denied medical treatment – we need an end to the indiscriminate attacks on civilians and immediate and unfettered access for humanitarian aid.

"A permanent ceasefire and an end to the siege must be the first priority. 'Humanitarian corridors' are not humanitarian if they are enforced against the population's will and are used as an excuse to continue a siege against civilians, which deprives children of food, water, electricity and medical care."

AUBMC to install Epic electronic health record system

The Lebanese National News Agency reports that the American University of Beirut Medical Center (AUBMC) will transition to the Epic electronic health record system (EHR). The announcement was made, during a signing ceremony held on August 1, 2016 at AUB-New York Office.

AUBMC will become the first Medical Center to adopt the newest generation and most advanced Electronic Health Record System in Lebanon. This will be a major leap forward to AUBMC in achieving its 2020 Vision and delivering the most advanced patient care to its patients.

The integrated health information system will allow seamless sharing of information among all health units, patients and partner hospitals, setting new standards of care delivery.

In addition to streamlining work flow, reducing the risk of errors, while maintaining the patient's security and confidentiality, the platform will provide a number of benefits to patients travelling to multiple medical offices and hospital locations. Care Everywhere, Epic's EHR-based interoperability network supports the secure exchange of patient information between sites and EpicLink allows approved affiliates to view the record online to enhance consistency and accuracy. Other benefits involve best practice alerts, the ability to identify health trends or issues with a particular medication, and early detection of a disease outbreak in the community.

Government to offer full medical cover for retirees in Lebanon

Wael Abou Faour, Lebanon's Public Health Minister announced on July 19 that the government plans to offer comprehensive medical coverage for persons above 65 years old, according to a report issued by Lebanon's National News Agency.

The minister said the project of full medical coverage for people over 65 years old, "does not need miracles, as we are talking about a budget of 17 billion Lebanese Pounds to raise those elderly people's medical coverage from 85% to 100%".

He added that "no Lebanese citizen would be banned from being admitted to hospital if in need, and no Lebanese citizen will be admitted if not in need", adding that they will start implementing this step at all the hospitals immediately.

He said that the ministry was working on setting a mechanism to control the transfer process from the private insurance companies to the Public Health Ministry.

Abou Faour noted that the Public Health Ministry supports the hospitals Syndicate request to raise the hospitals current tariff; however, he said the ministry had decided to cover people who do not have medical coverage instead of raising the current tariff of the hospitals, thus making it up for all hospitals.

Ali Hassan Khalil, Lebanese Finance Minister, in turn warned that when the medical coverage is free, consumers will be tempted to abuse it and that they should be very attentive of this.

HMC's Smoking Cessation Clinic receives hundreds of smokers during Ramadan

Hundreds of visitors who are willing to quit tobacco smoking visited the Smoking Cessation Clinic at the Hamad Medical Corporation (HMC), Qatar, during this year's Ramadan, said Dr Ahmad Al Mulla, Senior Consultant Public Health and Head of the Clinic.

"We have received around 200 new patients seeking to quit their habits of tobacco use at our clinic during Ramadan. Usually, the number of people who are motivated to quit smoking increases in Ramadan because fasting requires abstinence from smoking in addition to refraining from food and drink during the day. So the figure we have recorded for this year is almost similar to previous years in Ramadan," said Dr Al Mulla.

Fasting in the holy month of Ramadan presents a great opportunity for smokers to quit their habits.

Dr Al Mulla explained that nicotine, which is the addictive substance in tobacco products, is as addictive as any other hard drug such as cocaine and heroin. He stressed further that carbon monoxide – another component of tobacco products is a poisonous gas emitted from tobacco smoking. "This gas replaces oxygen in the blood and as such causes shortness of breath and in severe cases can cause dizziness. These components pose a major threat on the health of a smoker and people around them who are exposed to second-hand smoke (SHS)," he said.

According to the American Cancer Society, SHS is also called environmental tobacco smoke. It's a mixture of two forms of smoke that come from burning tobacco: mainstream smoke (the smoke exhaled by a smoker); and side stream smoke (smoke from the lighted end of a cigarette, pipe, or cigar, or tobacco burning in a hookah).

Acknowledging that it is difficult for many people to quit smoking, Dr Al Mulla encouraged seeking professional help, through HMC's Smoking Cessation Clinic or primary healthcare centers, where patients can obtain advice, treatment and support from specialists to enable them to quit smoking permanently. The Smoking Cessation Clinic at HMC provides patients with ways to replace their nicotine consumption and cope with withdrawal symptoms, and supports patients throughout the process of quitting.

"Quitting smoking has various health benefits for a healthy individual and also for those with chronic conditions such as diabetes. For the diabetic, quitting smoking can result in improved blood sugar levels and blood circulation, increased insulin reception, decreased cholesterol levels, and decreased complications," said Dr Al Mulla.

Exercising, drinking plenty of water and staying away from smokers are some steps that people can take to decrease the urge to smoke, according to Dr Al Mulla. Avoiding places such as shisha cafes and other areas frequented by smokers will also help prevent inhaling SHS.

Tar inhaled during smoking constitutes the main agent of causing several types of cancers. "Cigarette smoke contains more than 45 poisonous chemicals that can cause cancer," said Dr Al Mulla.

The Smoking Cessation Clinic has held a number of interventional programs and introduced initiatives aimed at encouraging smokers to quit. "In addition to one-on-one counseling that we usually hold for persons willing to stop smoking, we also prescribe suitable medications that will help them cope and remain committed to quitting. We have also organized public awareness campaigns and lectures to highlight the dangers of smoking and advised on methods to quit," he said adding: "We are planning more awareness campaigns in order to reach a much wider community as well as extend our clinical services to more HMC hospitals within the coming year."

Islamic Advisory Group for Polio Eradication reaffirms commitment to work with Global Polio Eradication Initiative

A meeting to discuss polio eradication was hosted by the Islamic Development Bank (IsDB) in Jeddah, Kingdom of Saudi Arabia, 27 July 2016, under the co-sponsorship of the International Islamic Fiqh Academy (IIFA), Al Azhar Al Sharif and the Organization of Islamic Cooperation (OIC), The Islamic Advisory Group for Polio Eradication (IAG). Following the meeting the Group issued the following statement.

The Group:

1. Reaffirms its commitment to the global eradication of polio and reiterates its trust in the safety and effectiveness of all routine childhood vaccinations as a life-saving tool which protects children; and acknowledges that it fully conforms to Islamic rulings,

2. Reiterates that parents are under religious obligation to seek immunization for their children against all vaccine preventable diseases, to protect both individual and community health,

3. Welcomes the role of NIAGs in Pakistan, Afghanistan, and Somalia, acknowledging the need and opportunity for a unified voice which will benefit the health and well-being of children and families,

4. Congratulates specifically the thousands of social and Islamic religious leaders, especially in Pakistan, Afghanistan and Somalia who have helped bring the world to the brink of polio eradication and in doing so have protected thousands of vulnerable children who may otherwise have been paralyzed or died, and encourages these leaders to support any future activities in dealing with any outbreak from the disease,

5. Commends the Governments of Pakistan and Afghanistan, who have embraced polio eradication as a national humanitarian duty and imperative, for their enhanced oversight and commitment to protect children from polio; and asks that this commitment is sustained further until polio eradication is achieved, and routine immunization coverage reaches globally recognized standards;

6. Recognizes the excellent contribution of the media in informing public opinion to continue building public acceptance, trust, and support for polio eradication;

7. Appreciates the great humanitarian


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Aasim I. Padela, MD, MSc
Emergency Medicine

SHARING OUR EXPERIENCE WITH THE WORLD

When an international academic center approached the University of Chicago Medicine (UCM) for guidance, we sent a multidisciplinary team of experts to advise the hospital on how to improve its health care service delivery, operations and training programs. Katherine Pakieser-Reed, PhD, RN, executive director of the Center for Nursing Professional Practice and Research, reviewed the institution's nursing practices and provided a set of recommendations that included operational improvements as well as customized training programs in areas such as preventing pressure ulcers. Gary Lennon, UCM's director of Supply Chain Performance and Analytics, brought to the project his business savvy on how to contain costs and improve efficiency in the management of materials and supplies. And Dr. Aasim Padela, an Emergency Medicine faculty member, reviewed the hospital's Emergency Department operations and educational programs and suggested improvements in clinical care processes and residency and fellowship training.

These are just three of the many experts from the University of Chicago Medicine who are now supporting new and existing hospitals around the globe. They are the same men and woman who work every day in our "hospital of the future," the Center for Care and Discovery, a new 10-story facility at the heart of the University of Chicago medical campus. An architectural and technological tour de force, our new hospital provides a home for complex specialty care with a focus on cancer, gastrointestinal disease, neuroscience, advanced surgery and high-technology medical imaging.

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work done by vaccination teams against the disease and encourages cooperation, support, and respect for all health workers and their noble work; and appreciates the great sacrifices made by those workers for the protection of children from polio;

8. Calls on all parties to provide safe access to children living in all areas, especially high risk areas, for the delivery of health services including vaccinations,

9. Recognizes the need for this group to promote and influence better health outcomes for families, particularly mothers and children, and commits to expanding the scope of this Group to address other key mother and child health interventions,

10. Acknowledges the significant financial support provided by countries, philanthropists, financial institutions, and the international community, and in particular the strong commitment of the Islamic Development Bank, and calls on these donors to continue their support for the programs that the Group has adopted,

11. Re-affirms previous declarations and statements made by the IAG, and reiterates its willingness to work closely with the Global Polio Eradication Initiative and other partners to reach every child wherever they are,

12. Expresses its gratitude to the Government of the Kingdom of Saudi Arabia for its generous support to polio programs in the targeted countries, and for hosting the third meeting of the IAG

The Group recognizes the progress it has made and the impact it has left on polio affected and at-risk countries. It also points to the success it has achieved in implementing the work-plan of 2015-2016, and commits to the adoption and full implementation of the 2016-2017 work-plan, including the maintenance of the excellent coordination of the IAG Secretariat, enhancing the strategic communication of IAG goals, activities and impact, as well as supporting religious leaders in priority countries through visits and interactions.

LIFEPharma to build oncology formulation plant in Abu Dhabi

LIFEPharma, one of the region's leading pharmaceutical manufacturing companies is set to strengthen the UAE's profile as a leading pharmaceutical manufacturing hub. The company recently launched its first oncology formulation plant in the GCC region. The company's new state-of-the art plant will be part of four facilities the company is setting up in the Khalifa Industrial Zone Abu Dhabi (KIZAD). LIFEPharma already has a large manufacturing facility in Jebel Al Free Zone in Dubai which caters to both local and overseas markets.

The manufacturing facility, which is scheduled for completion by the end of the first quarter next year, is the first oncology-based unit of its kind in the UAE and GCC. This plant will produce a range of medication for the treatment of cancer such as tablets, capsules, liquid and lyophilized injections and pre-filled syringe production lines for global consumption, with the approval of international agencies such as UK Medicines and Healthcare Products Regulatory Agency (UKNHRA) and the United States Food and Drug Administration (USFDA).

Commenting on the launch of the oncology formulation plant, Dev Kumar Singh, President LIFEPharma, said: "According to the World Health Organization (WHO), cancer figures among the leading causes of morbidity and mortality worldwide. The international body has also predicted that annual cancer cases will rise from 14 million in 2012 to 22 million within the next two decades. These figures can see a drastic reduction with the right treatment. LIFEPharma has, therefore, decided to focus on this area and augment the global production of oncology drugs, thus ensuring that people all over the world have access to life-saving medication.

"This is the first manufacturing unit of its kind in the region and will help showcase the UAE's growing profile as a leading pharmaceutical and medical hub. We are also setting up a research and development (R&D) centre for developing new products in the pharmaceutical segment. As there are no such R&D centres in the UAE, this will further boost the country's pharmaceutical sector."

"We are also the first pharmaceutical company from the UAE to file for ANDA (Abbreviated New Drug Application) in the US. This step will help get USFDA approval for the Jebel Ali Facility and once the oncology plant in KIZAD is ready will file the ANDA from there also, which will open the US market for our oncology products. The company has already signed commercial contracts with three partners in the US. We also work with companies such as Acino, Abbott Pharma, Apotex, Strides, Arrow, Chemo, Slate Run Pharma, Leading Pharma, Waymade and Helm in various markets in addition to more than 60 other partners in different countries across the world," he added.

Saudi MoH plans to employ 100,000 Saudis in health sector

Arab News reports that the Saudi Arabian Ministry of Health has begun an initiative to employ 100,000 Saudis in the health care sector as part of the Vision 2030 plan.

The newspaper reports that the MoH aims to fill health specialties with competitive and qualified staff. It will implement a performance measurement system and define specifications for health licenses as well as provide training opportunities by increasing the number of specialized seats. The ministry has partnered with specialized educational and academic establishments to help achieve this aim.

The total number of doctors and dentists in the Kingdom in 2015 was 81,532, of whom 19,029 were Saudis; 12,785 dentists; the number of people involved in nursing was 165,324 (37.2% Saudis); 22,241 pharmacists (20.6% Saudis) and the number of workers in assisting medical categories was 94,960, with 72.6% Saudis. MEH

worldwide monitor

Update from around the globe

WHO, partners embark on largest ever emergency vaccination in Africa

One of the largest emergency vaccination campaigns ever attempted in Africa will start in Angola and the Democratic Republic of Congo in mid-August as WHO and partners work to curb a yellow fever outbreak that has killed more than 400 people and sickened thousands more.

Working with Ministries of Health in the 2 countries, WHO is coordinating 56 global partners to vaccinate more than 14 million people against yellow fever in more than 8000 locations. The yellow fever outbreak has found its way to dense, urban areas and hard-to-reach border regions, making planning for the vaccination campaign especially complex.

Emergency yellow fever vaccination campaigns have already reached more than 13 million people in Angola and more than 3 million in Democratic Republic of the Congo. These campaigns have been crucial to stopping the spread of the outbreak. Some areas are still considered at high risk and so preventive vaccination campaigns are planned for the capital city of Kinshasa in Democratic Republic of the Congo and along the country's border with Angola, which spans 2,646 km. The preventive vaccination campaign aims to build protection in the population perceived to be at high risk of getting infected and prevent potential spread and expansion of the current outbreak.

Kinshasa has more than 10 million people, with only 2 million already vaccinated against yellow fever. With local transmission of the virus and low immunity in the population, there is a potential risk that the deadly outbreak could spread to other urban areas.

With limited supplies of the vaccine, and a 6-month minimum manufacturing process, WHO has been working with the Ministries of Health to plan the mass vaccination campaign that uses one-fifth of the standard vaccine dose as a short-term emergency measure to reach as many people as possible.

This method, known as fractional dosing, was recommended by WHO's Strategic Advisory Group of Experts on Immunization (SAGE), after it reviewed existing evidence that demonstrated lower doses would protect people safely and effectively against the disease for at least 12 months, and likely much longer. The fractional dose will not entitle people to travel internationally, but it will protect them from yellow fever during this outbreak and will help stop it from spreading further.

"Protecting as many people as possible is at the heart of this strategy. With a limited supply we need to use these vaccines very carefully," says William Perea, Coordinator for the Control of Epidemic Diseases Unit at WHO.

WHO and partners including Médecins sans Frontières (MSF), International Federation of the Red Cross (IFRC) and UNICEF have been working closely together through the complex planning and logistics needed for the campaign.

Gavi, the Vaccine Alliance, has already enabled these countries to access almost 19 million doses of the vaccine since January and is providing strong support to the upcoming campaigns as well. Other partners providing expertise and support include Save the Children and the United States Centers for Disease Control (CDC).

Usually, planning a mass vaccination campaign can take anywhere between 3 to 6 months. This emergency campaign, however, must take place as soon as possible to end transmission before the rainy season starts in September.

"In order to vaccinate roughly 8 million people in Kinshasa within a short period, each team will need to vaccinate hundreds of people per day," says Perea.

Approximately 17.3 million syringes and 41,000 health workers and volunteers are needed for the campaign. More than 500 vehicles will be used to transport the teams and supplies, which will be dispersed across more than 8000 vaccination sites in Kinshasa and along the Angola-Democratic Republic of the Congo border.

From the manufacturer to the person being immunized, the vaccine must be stored and transported at the right temperature – between 2 to 8 degrees Celsius – to maintain their potency. With lack of reliable electricity supply and fuel to run generators in large parts of the country, refrigeration is a big challenge. For this campaign alone, 115,000 ice packs are needed to keep vaccines cold and usable.

Genomic Data Commons expanded with data from 18,000 cancer patients

The recently launched Genomic Data Commons (GDC) will get a dramatic increase in the power and utility of its resources with the announcement of the signing of a data sharing agreement between the National Cancer Institute (NCI) and Foundation Medicine, Inc. (FMI), a molecular information company that has generated genomic profiles of people with cancer. NCI's GDC is a unified data system that promotes the sharing of genomic and clinical data among researchers and is a core component of the Cancer Moonshot and the President's Precision Medicine Initiative. NCI is part of the US National Institutes of Health.

The expanded number of cancer cases in the GDC will allow researchers to identify genomic changes that are responsible for the cancerous growth of tumours in individual patients, and identify which drugs may block the effects of these mutations. Such targeted drugs can produce remissions in certain patients.

When the GDC was launched in June this year, it was able to immediately capitalize on the genomic data that existed in several large-scale NCI programs, such as The Cancer Genome Atlas (TCGA) and its paediatric equivalent, Therapeutically Applicable Research to Generate Effective Treatments (TARGET). Together, TCGA and TARGET represent some of the largest and most comprehensive cancer genomic datasets in the world, with information generated from about 14,500 patients.

The addition of data from 18,000 adult patients with a diverse array of cancers that underwent genomic profiling using FMI's proprietary comprehensive genomic profiling assay, called FoundationOne, will provide a major boost to the GDC. FMI

developed FoundationOne as a commercially available test that uses advanced sequencing technology to routinely analyse cancer specimens.

"This major infusion of data in the GDC will greatly enhance our ability to use this tool to explore genetic abnormalities in cancer," said Douglas Lowy, M.D., NCI Acting Director. "Through TCGA and TARGET, we had already established a strong cancer genomic foundation for the GDC at its launch, but with the addition of the genomic data from FMI, we believe that the GDC will be an even more useful resource for researchers worldwide to help us unravel the complexities of many forms of cancer."

Importantly, in both the NCI and the Foundation Medicine databases, all patient information has been de-identified, meaning that personal information, such as addresses, Social Security numbers, and other possible identifiers, are not present – only crucial genetic data and key demographic information are available.

US NIH awards $55m to build million-person Precision Medicine Initiative

The US National Institutes of Health announced US$55 million in awards in fiscal year 2016 to build the foundational partnerships and infrastructure needed to launch the Cohort Program of President Obama's Precision Medicine Initiative (PMI). The PMI Cohort Program is a landmark longitudinal research effort that aims to engage 1 million or more US participants to improve the ability to prevent and treat disease based on individual differences in lifestyle, environment and genetics.

The awards will support a Data and Research Support Center, Participant Technologies Center and a network of Healthcare Provider Organizations (HPO). An award to Mayo Clinic, Rochester, Minnesota, to build the biobank, another essential component, was announced earlier this year. All awards are for five years, pending progress reviews and availability of funds. With these awards, NIH is on course to begin initial enrolment into the PMI Cohort Program in 2016, with the aim of meeting its enrolment goal by 2020.

The PMI Cohort Program is one of the most ambitious research projects in history and will set the foundation for new ways of engaging people in research. PMI volunteers will be asked to contribute a wide range of health, environment and lifestyle information. They will also be invited to answer questions about their health history and status, share their genomic and other biological information through simple blood and urine tests and grant access to their clinical data from electronic health records. In addition, mobile health devices and apps will provide lifestyle data and environmental exposures in real time. All of this will be accomplished with essential privacy and security safeguards. As partners in the research, participants will have ongoing input into study design and implementation, as well as access to a wide range of their individual and aggregated study results.

"This range of information at the scale of 1 million people from all walks of life will be an unprecedented resource for researchers working to understand all of the factors that influence health and disease," said NIH Director Francis S. Collins, M.D., Ph.D. "Over time, data provided by participants will help us answer important health questions, such as why some people with elevated genetic and environmental risk factors for disease still manage to maintain good health, and how people suffering from a chronic illness can maintain the highest possible quality of life. The more we understand about individual differences, the better able we will be to effectively prevent and treat illness."

The knowledge gained from the PMI Cohort Program will extend successes of precision medicine in some cancers to many other diseases. Importantly, the program will focus not just on disease, but also on ways to increase an individual's chances of remaining healthy throughout life.

"As someone who has personally benefited from precision medicine, I am excited for this study to intersect with other fundamental changes in medicine and research to empower people to live healthier lives," added PMI Cohort Program Director Eric Dishman. "What potential participants need to know is that we are equally interested in learning how we can prevent illness in the first place, but when we do get ill, which treatment options are going to work best for each of us individually."

These initial awards bring together the major elements through a variety of new partnerships that are needed to launch the PMI Cohort Program later this year. "This is an incredibly complex study requiring new kinds of strategic and operational partnerships - this can't be business as usual," said Kathy L. Hudson, Ph.D., NIH Deputy Director for Science, Outreach, and Policy who helped orchestrate the PMI Cohort Program. "We are excited to break new ground in engaging people in research and building a study of this scale and scope."

on the WEB The NIH's PMI Cohort Program *www.nih.gov/precision-medicine-initiative-cohort-program*

Polio returns to Nigeria after two-years free of the disease

After more than two years without wild poliovirus in Nigeria, the Government reported on 11 August that two children have been paralyzed by the disease in the northern Borno state.

As an immediate priority, the Government of Nigeria is collaborating with the WHO and other partners of the Global Polio Eradication Initiative to respond urgently and prevent more children from being paralyzed. These steps include conducting large-scale immunization campaigns and strengthening surveillance systems that help catch the virus early. These activities are also being strengthened in neighbouring countries.

"We are deeply saddened by the news that two Nigerian children have been paralyzed by polio. The Government has made significant strides to stop this paralyzing disease in recent years. The overriding priority now is to rapidly immunize all children around the affected area and ensure that no other children succumb to

this terrible disease", said Dr Matshidiso Moeti, WHO Regional Director for Africa.

Genetic sequencing of the viruses suggests that the new cases are most closely linked to a wild poliovirus strain last detected in Borno in 2011. Low-level transmission of the poliovirus is not unexpected, particularly in areas where it is difficult to reach children with the vaccine. Subnational surveillance gaps persist in some areas of Borno, as well as in areas of neighbouring countries.

"We are confident that with a swift response and strong collaboration with the Nigerian Government, we can soon rid the country of polio once and for all. This is an important reminder that the world cannot afford to be complacent as we are on the brink of polio eradication – we will only be done when the entire world has been certified polio-free," said Dr Michel Zaffran, Director of polio eradication at WHO Headquarters.

As recently as 2012, Nigeria accounted for more than half of all polio cases worldwide, but the country has made significant strides, recently marking two years without a case on 24 July 2016. This progress has been the result of a concerted effort by all levels of government, civil society, religious leaders and tens of thousands of dedicated health workers.

The two cases in Nigeria particularly highlight the need to prioritize immunization of children in hard-to-reach areas such as the Lake Chad region, which spans several countries and is often affected by conflict and large population movements. Reaching these children requires vaccinating populations as they move in and out of inaccessible areas and using local-level groups and organizations, such as religious institutions and community based organizations, to negotiate access for vaccination teams.

Globally, the world is very close to reaching the goal of polio eradication. Only 21 wild polio cases have been reported so far in 2016, compared to 34 cases at the same point last year. Only two other countries are reporting polio: Pakistan and Afghanistan. Four out of the six WHO Regions of the world have been certified polio-free, and only one of the three types of wild poliovirus is still circulating in the world (type 1).

WHO encourages countries to reduce deaths from viral hepatitis

To mark World Hepatitis Day on 28 July 2016, WHO urged countries to take rapid action to improve knowledge about the disease, and to increase access to testing and treatment services. Only 1 in 20 people with viral hepatitis know they have it. And just 1 in 100 with the disease is being treated.

"The world has ignored hepatitis at its peril," said Dr Margaret Chan, WHO Director-General. "It is time to mobilize a global response to hepatitis on the scale similar to that generated to fight other communicable diseases like HIV/AIDS and tuberculosis."

Around the world 400 million people are infected with hepatitis B and C, more than 10 times the number of people living with HIV. An estimated 1.45 million people died of the disease in 2013 – up from less than a million in 1990.

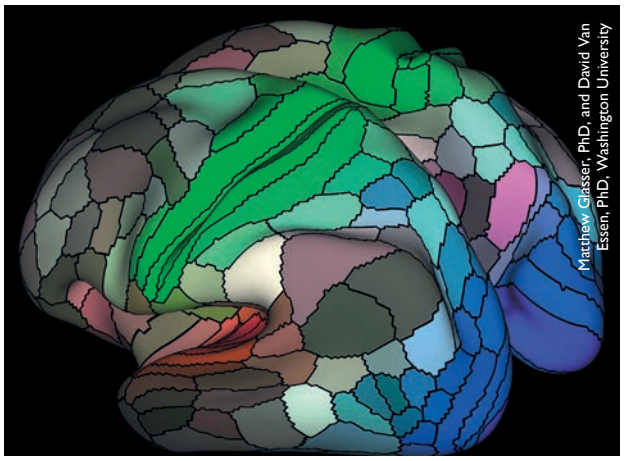
In May 2016, at the World Health Assembly, 194 governments adopted the first-ever Global Health Sector Strategy on viral hepatitis and agreed to the first-ever global targets. The strategy includes a target to treat 8 million people for hepatitis B or C by 2020. The longer term aim is to reduce new viral hepatitis infections by 90% and to reduce the number of deaths due to viral hepatitis by 65% by 2030 from 2016 figures.

The strategy is ambitious, but the tools to achieve the targets are already in hand. An effective vaccine and treatment for hepatitis B exists. There is no vaccine for hepatitis C but there has been dramatic progress on treatment for the disease in the past few years. The introduction of oral medicines, called direct-acting antivirals, has made it possible to potentially cure more than 90% of patients within 2–3 months. But in many countries, current policies, regulations and medicine prices put the cure out of most people's reach.

"We need to act now to stop people from dying needlessly from hepatitis," said Dr Gottfried Hirnschall, WHO's Director of the HIV/AIDS Department and Global Hepatitis Programme. "This requires a rapid acceleration of access to services and medicines for all people in need." MEH

the laboratory

Medical research news from around the world



The researchers discovered that our brain's cortex, or outer mantle, is composed of 180 distinct areas per hemisphere. For example, the image above shows areas connected to the three main senses - hearing (red), touch (green) vision (blue) and opposing cognitive systems (light and dark). The map is based on data from resting state fMRI scans performed as part of the Human Connectome Project.

Connectome map more than doubles human cortex's known regions

Researchers have mapped 180 distinct areas in our brain's outer mantle, or cortex - more than twice the number previously known. They have also developed software that automatically detects the "fingerprint" of each of these areas in an individual's brain scans.

Funded by the US National Institutes of Health through its Human Connectome Project (HCP) <*www.neuroscienceblueprint.nih.gov/connectome*>, this software correctly mapped the areas by incorporating data from multiple non-invasive brain imaging measures that corroborated each other.

"These new insights and tools should help to explain how our cortex evolved and the roles of its specialized areas in health and disease, and could eventually hold promise for unprecedented precision in brain surgery and clinical work-ups," said Bruce Cuthbert, PhD, acting director of NIH's National Institute of Mental Health (NIMH), which co-funded the research as part of the HCP.

The new study identified – with a nearly 97% detection rate – 97 new cortex areas per hemisphere, in addition to confirming 83 that were previously known.

The findings are reported in the July 20, 2016 issue of *Nature*.

Earlier studies of cortex organization often used just one measure, such as examining post-mortem tissue with a microscope. Uncertain delineation of cortex areas has sometimes led to shaky comparability of brain imaging findings.

"The situation is analogous to astronomy where ground-based telescopes produced relatively blurry images of the sky before the advent of adaptive optics and space telescopes," noted Glasser, lead author of the study.

The HCP team set out to banish this blurriness by using multiple, precisely aligned, magnetic resonance imaging (MRI) modalities to measure cortical architecture, activity, connectivity, and topography in a group of 210 healthy participants. These measures – including cortex thickness, cortex myelin content, task and resting-state functional MRI (fMRI) – cross-validated each other. The findings were, in turn, confirmed in an additional independent sample of 210 healthy participants.

Even though some cortex areas turned out to be atypically located in a small minority of subjects, the data-derived algorithms incorporated into the software were able to successfully map them. While the study included fMRI scans of subjects performing tasks, the researchers determined that resting-state MRI techniques should suffice to map the areas in future studies using the tools they developed. Some areas may turn out to have further subdivisions or be subunits of other areas, in light of new data, noted senior author Van Essen.

"The ability to discriminate individual differences in the location, size, and topology of cortical areas from differences in their activity or connectivity should facilitate understanding of how each property is related to behaviour and genetic underpinnings," added Glasser.

on the WEB The automated "areal classifier" and related tools are being shared with the research community via HCP websites <*www.humanconnectome.org*>. In addition, the extensively analyzed data underlying each of the published figures can be accessed via an NIH-funded database developed in the Van Essen laboratory <*http://balsa.wustl.edu*>.

BMI significantly better than fat percentage in predicting death from CVD

An international study led by the University of Granada has determined that the measurement of obesity should include both fat and muscle for a given height and not just excess body fat alone.

In the study, the authors considered whether an accurate measurement of body fat was a more powerful predictor of death from cardiovascular disease than the cheap, fast and simple BMI measurement. To the surprise of many BMI was significantly better than fat percentage in predicting future death from cardiovascular disease.

The researchers analyzed data of more than 60,000 people who were examined over an average of 15 years. The goal was to study how factors such as obesity can predict the risk of dying from cardiovascular disease.

The study was coordinated by Francisco B. Ortega, a Ramón y Cajal researcher at the Faculty of Physical Activity and Sports Sciences at UGR and published in the prestigious American journal *Mayo Clinic Proceedings*.

The team worked in collaboration with respected American researchers epidemiologist Steven N. Blair and cardiologist Charles J. Lavie.

The researchers worked with data from the Aerobics Center Longitudinal Study (ACLS) carried out by the Cooper Institute in Texas, USA. The study, which began in the 1970s, tracked more than 60,000 participants over an average of 15 years. The objective was to study how factors like obesity can predict the risk of dy-

ing from cardiovascular disease.

Unlike most longitudinal studies of this kind, the researchers in the present study measured not only the weight and height but also the amount of fat and muscle of the participants. The weight and height measurements allowed them to calculate the body mass index (BMI=weight (kg) divided by height (m)2). To measure fat and muscle, they used skin fold measurements and, in a subsample of more than 30,000 participants, they used hydrostatic weight testing which is considered a gold-standard in the measurement of body fat.

The concept of BMI was first proposed in 1832 by Adolphe Quetelet and is used internationally to define when a person is overweight (BMI≥25kg/m2) or obese (BMI≥30kg/m2). It has now been used in more than 100,000 published scientific articles, making it the most widely used anthropometric index in the world.

"Nevertheless, BMI is subject to a great deal of heavy criticism due to its inability to discriminate whether a high body weight is due to the person having an excess of fat, muscle or both. Many authors propose using a percentage of fat rather than the BMI, especially when studying with regard to cardiovascular disease," explains UGR researcher Francisco B. Ortega.

In the study, BMI was show to be significantly better than fat percentage in predicting future death from cardiovascular disease.

Furthermore, even when the analysis was restricted to half of the sample (30,000 people), measuring body fat through hydrostatic weight testing, which is an extremely complex and expensive method, BMI was still the best predictor of mortality from cardiovascular causes.

How is it possible that BMI, which measures both fat and muscle relative to height, can predict cardiovascular disease better than accurate indicators of the amount of fat that a person has?

"We considered that a possible hypothesis could be that not only are large amounts of fat associated with greater risk, but also great amounts of muscle or other weight unrelated to fat," says Ortega.

Scientists at UGR tested the hypothesis with data from the study and it was confirmed. This would explain that BMI, which is the sum of fat and muscle relative to height, is a better predictor, at an epidemiological level, of future cardiovascular disease than indicators of the amount of fat alone. In the study, the authors offer different physiological elements that can help to explain the results.

The study offers significant new results which are nearly contradictory to existing beliefs. It also roundly supports the use of BMI in large epidemiological studies and contributes to a better understanding of obesity and its relationship to cardiovascular disease.

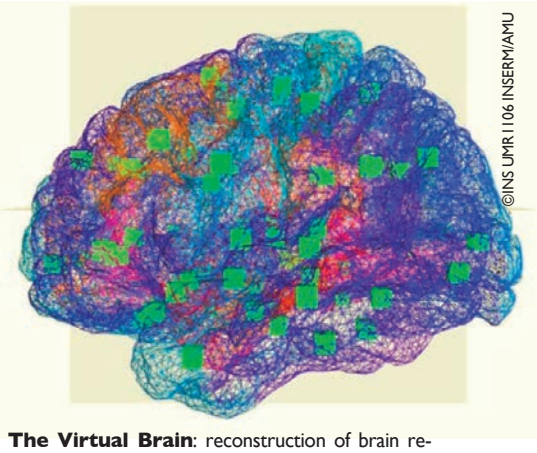
● **doi:** 10.1016/j.mayocp.2016.01.008

A virtual brain helps decrypt epilepsy

Researchers at CNRS, INSERM, Aix-Marseille University and AP-HM have created a virtual brain that can reconstitute the brain of a person affected by epilepsy for the first time. The research enables a better understanding of how the disease works and can also better prepare for surgery. The results are published in *Neuroimage*, July 28, 2016.

Worldwide, one percent of the population suffers from epilepsy. The disease affects individuals differently, so personalized diagnosis and treatment are important. Currently we have few ways to understand the pathology's mechanisms of action, and mainly use visual interpretation of an MRI and electroencephalogram. This is especially difficult because 50% of patients do not present anomalies visible in MRI, so the cause of their epilepsy is unknown.

Researchers have succeeded for the first time in developing a personalized virtual brain, by designing a base "template" and adding individual patient information, such as the specific way the brain's regions are organized and connected in each individual. Mathematical models that cause cerebral activity can be tested on the virtual brain. In this way, scientists have been able to reproduce the place where epilepsy seizures initiate and how they propagate. This brain therefore has real



The Virtual Brain: reconstruction of brain regions and where they are connected. The green cubes indicate the centre of brain regions that are connected.

value in predicting how seizures occur in each patient, which could lead to much more precise diagnosis.

Moreover, 30% of epileptic patients do not respond to drugs, so their only hope remains surgery. This is effective if the surgeon has good indications of where to operate. The virtual brain gives surgeons a virtual "platform". In this way they can determine where to operate while avoiding invasive procedures, and especially prepare for the operation by testing different surgical possibilities, seeing which would be most effective and what the consequences would be, something that is obviously impossible to do on the patient.

In the long run, the team's goal is to provide personalized medicine for the brain, by offering virtual, tailored, therapeutic solutions that are specific for each patient. The researchers are currently working on clinical trials to demonstrate the predictive value of their discovery. This technology is also being tested on other pathologies that affect the brain, such as strokes, Alzheimer's, degenerative neurological diseases, and multiple sclerosis.

This work involves researchers at the Institut de Neurosciences des Systèmes (INSERM/AMU), the Centre de Résonance Magnétique Biologique et Médicale (CNRS/AMU/AP-HM), the Département Epileptologie et du Département Neurophysiologie Clinique at AP-HM, and the Epilepsy Center of Cleveland. It was done in the Fédération Hospitalo-Universitaire Epinext.

● **doi:** 10.1016/j.neuroimage.2016.04.049

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New study explains why MRSA kills influenza patients

Researchers have discovered that secondary infection with the Methicillin-resistant *Staphylococcus* aureus (MRSA) bacterium often kills influenza patients because the flu virus alters the antibacterial response of white blood cells, causing them to damage the patients' lungs instead of destroying the bacterium. The study, was is published online 15 August 2016 in *The Journal of Experimental Medicine*, suggests that inhibiting this response may help treat patients infected with both the flu virus and MRSA.

Many influenza patients develop severe pneumonia as a result of secondary infections with MRSA. Over half of these patients die, even when treated with antibiotics that are usually capable of clearing MRSA infections.

Keer Sun, an assistant professor at the University of Nebraska Medical Center, previously discovered that mice infected with influenza are susceptible to MRSA because the ability of their macrophages and neutrophils to kill bacteria by releasing hydrogen peroxide and other reactive oxygen species is suppressed. But it remained unclear why MRSA-infected influenza patients often die, even after receiving an appropriate antibiotic treatment.

Sun and colleagues now reveal that this may be because the patients' white blood cells cause extensive damage to their lungs. Though the macrophages and neutrophils of mice co-infected with influenza and MRSA were defective at killing bacteria, reactive oxygen species released by these cells induced the death of inflammatory cells within the lungs, lethally damaging the surrounding tissue. Inhibiting NADPH oxidase 2 (Nox2), the enzyme that produces reactive oxygen species in macrophages and neutrophils, reduced the extent of this damage and, when combined with antibiotic treatment, boosted the survival of co-infected mice.

"Our results demonstrate that influenza infection disrupts the delicate balance between Nox2-dependent antibacterial immunity and inflammation," says Sun. "This not only leads to increased susceptibility to MRSA infection but also extensive lung damage. Treatment strategies that target both bacteria and reactive oxygen species may significantly benefit patients with influenza-complicated MRSA pneumonia."

- **doi:** 10.1084/jem.20150514

Researchers discover bacteria from human nose produces novel antibiotic effective against multi-resistant pathogens

Scientists at the University of Tübingen and the German Center for Infection Research (DZIF) have discovered that *Staphylococcus lugdunensis* which colonizes in the human nose produces a previously unknown antibiotic. As tests on mice have shown, the substance which has been named Lugdunin is able to combat multi-resistant pathogens, where many classic antibiotics have become ineffective. The research results are published in the 27 July 2016 issue of *Nature*.

Infections caused by antibiotic-resistant bacteria – like the pathogen *Staphylococcus aureus* (MRSA) which colonizes on human skin – are among the leading causes of death worldwide. The natural habitat of harmful *Staphylococcus* bacteria is the human nasal cavity. In their experiments, Dr Bernhard Krismer, Alexander Zipperer and Professor Andreas Peschel from the Interfaculty Institute for Microbiology and Infection Medicine Tübingen (IMIT) observed that *Staphylococcus aureus* is rarely found when *Staphylococcus lugdunensis* is present in the nose.

"Normally antibiotics are formed only by soil bacteria and fungi," says Professor Andreas Peschel. "The notion that human microflora may also be a source of antimicrobial agents is a new discovery." In future studies, scientists will examine whether Lugdunin could actually be used in therapy. One potential use is introducing harmless Lugdunin-forming bacteria to patients at risk from MRSA as a preventative measure.

Researchers from the Institute of Organic Chemistry at the University of Tübingen closely examined the structure of Lugdunin and discovered that it consists of a previously unknown ring structure of protein blocks and thus establishes a new class of materials.

Antibiotic resistance is a growing problem for physicians. "There are estimates which suggests that more people will die from resistant bacteria in the coming decades than cancer," says Dr Bernhard Krismer. "The improper use of antibiotics strengthens this alarming development" he continues. As many of the pathogens are part of human microflora on skin and mucous membranes, they cannot be avoided. Particularly for patients with serious underlying illnesses and weakened immune systems they represent a high risk – these patients are easy prey for the pathogens. Now the findings made by scientists at the University of Tübingen open up new ways to develop sustainable strategies for infection prevention and to find new antibiotics – also in the human body.

- **doi:** 10.1038/nature18634

Handheld device takes high-resolution images of children's retinas

Engineers and physicians at Duke University have developed a handheld device capable of capturing images of a retina with cellular resolution. The new probe will allow researchers to gather detailed structural information about the eyes of infants and toddlers for the first time.

"Diagnostic tools that examine and image the retina have been well-designed for adults, but are exceedingly difficult to use in infants and young children who can't hold the required position or focus for long enough periods of time," said Cynthia Toth, professor of ophthalmology and biomedical engineering at Duke University. "Before now, it hasn't been possible to measure the impact of injury or diseases on their photoreceptors, the cells in the eye in which light is first converted into nerve signals."

The eye presents a unique opportunity for research and imaging. It is not difficult to access, it is relatively self-contained,

improvements in function are easily measured and there is even a natural opening to peer inside. But it is also delicate, with important structures buried millimetres below its various surfaces, so a wide range of technologies are needed to study it.

Over the past three decades, one of the most popular of these has been optical coherence tomography (OCT). By shining specific frequencies of light into the eye's tissues and comparing those reflections to identical but unimpeded light waves, researchers can build 3D images several millimetres deep of the back of the eye.

The equipment, however, has traditionally been bulky, meaning the patient must sit still in front of the machine and remain focused on a particular point. And the process takes tens of minutes – an eternity to most toddlers, as any parent knows well.

While handheld devices based on OCT and other technologies have been developed before, they are far from ideal. Some weigh several pounds, making holding them still over a child's eye tiresome and difficult, and none provide a high enough resolution to see individual photoreceptors.

In a new paper, published online on August 1, 2016, in *Nature Photonics*, researchers and ophthalmologists from Duke University present a new option. Their handheld device is about the size of a pack of cigarettes, weighs no more than a few slices of bread and is capable of gathering detailed information about the retina's cellular structure.

"This paper demonstrates the first time researchers have been able to directly measure the density of photoreceptors called cones in infants," said Joseph Izatt, the Michael J. Fitzpatrick Professor of Engineering at Duke and a pioneer of OCT technology. "As such, it opens the door to new research that will be key in future diagnosis and care of hereditary diseases."

Without the ability to gather this sort of information, there is little to no data about how a child's retina develops, as it matures by the age of 10. This limits our knowledge of how diseases affect a child's vision early in life and makes diagnosis of these diseases more difficult.

In the paper, a collaborative research group led by Izatt, Sina Farsiu, professor of ophthalmology and biomedical engineering at Duke, and Toth, detail the developments that made their new handheld device possible.

A new type of smaller scanning mirror recently reached a point where it could replace larger, older models. A new design using converging rather than collimated light cut the telescoping length of the device by a third. Custom lenses detailing curvature, thickness and glass type were designed by first author Francesco LaRocca and specially fabricated. And a mechanical design to hold and integrate the components was designed by Derek Nankivil – who, with LaRocca, recently graduated with their PhDs from Duke – and fabricated in a machine shop on Duke's campus.

The new device was then given to clinicians for testing on adults, which proved that it was capable of getting accurate photoreceptor density information. It was also used for research imaging in children who were already having an eye exam under anaesthesia.

"But because children have never been imaged with these systems before, there's no gold standard that we can compare it to," said LaRocca. "The results do, however, match theories of how cones migrate as the eye matures. The tests also showed different microscopic pathological structures that are not normally possible to see with current lower-resolution clinical-grade handheld systems."

With the prototype being used by clinicians at Duke Health, the amount of information being gained from children's scans could eventually create a database to give a much better picture of how the retina matures with age.

● **doi:** 10.1038/NPHOTON.2016.141

Breastfeeding associated with better brain development and neurocognitive outcomes

A new study, which followed 180 pre-term infants from birth to age seven, found that babies who were fed more breast milk within the first 28 days of life had larger volumes of certain regions of the brain at term equivalent and had better IQs, academic achievement, working memory, and motor function.

The findings were published 29 July 2016 in *The Journal of Pediatrics*.

"Our data support current recommendations for using mother's milk to feed preterm babies during their neonatal intensive care unit (NICU) hospitalization. This is not only important for moms, but also for hospitals, employers, and friends and family members, so that they can provide the support that's needed during this time when mothers are under stress and working so hard to produce milk for their babies," says Mandy Brown Belfort, MD, a researcher and physician in the Department of Newborn Medicine at Brigham and Women's Hospital and lead author.

Researchers studied infants born before 30 weeks' gestation that were enrolled in the Victorian Infant Brain Studies cohort from 2001-2003. They determined the number of days that infants received breast milk as more than 50% of their nutritional intake from birth to 28 days of life. Additionally, researchers examined data related to regional brain volumes measured by magnetic resonance imaging (MRI) at each baby's term equivalent age and at seven years old, and also looked at cognitive (IQ, reading, mathematics, attention, working memory, language, visual perception) and motor testing at age seven.

The findings show that, across all babies, infants who received predominantly breast milk on more days during their NICU hospitalization had larger deep nuclear grey matter volume, an area important for processing and transmitting neural signals to other parts of the brain, at term equivalent age, and by age seven, performed better in IQ, mathematics, working memory, and motor function tests. Overall, ingesting more human milk correlated with better outcomes, including larger regional brain volumes at term equivalent and improved cognitive outcomes at age 7. MEH

Photo©International AIDS Society/Marcus Rose

21st International AIDS Conference (AIDS 2016), Durban, South Africa. Ending AIDS with the Voices of Youth. Panel discussion (L-R) Kgomotso Matsuanyane, Elton John, HRH Prince Harry, Loyce Maturu, Brian Ssensalire, Carlo Andre Oliveras Rodriguez.

Call to scale up HIV prevention

While advances in HIV treatment science must be pursued with vigour, now is the time to urgently scale up quality HIV prevention programmes for people left behind by the AIDS response. This was one of the main messages of the 21st International AIDS Conference, which closed in Durban, South Africa, on 22 July 2016.

Throughout the conference, the prevailing sentiment was that much progress had been made since the AIDS 2000 conference, which was held for the first time on Africa soil in Durban fifteen years ago. "From Durban to Durban and beyond" resonated throughout the conference programme as a call to reject complacency and ensure that action is taken to pursue the Fast-Track targets in order to make Ending AIDS as a public health threat by 2030 a reality.

Nkosi Johnson, the 11-year-old boy who spoke powerfully during the opening ceremony of AIDS 2000 conference for the dignity and acceptance of all people living with HIV was at the forefront of delegates' minds, who remembered his quiet bravery in the face of stigma and discrimination against people living with HIV, which still persists.

One of the main themes of the conference was the urgent action that is needed to reduce new HIV infections and AIDS deaths among

Global study shows new HIV infections stagnating at 2.5 million a year

A major new analysis from the Global Burden of Disease 2015 (GBD 2015) study, published 19 July 2016 in *The Lancet HIV* journal, reveals that although deaths from HIV/AIDS have been steadily declining from a peak in 2005, 2.5 million people worldwide became newly infected with HIV in 2015, a number that hasn't changed substantially in the past 10 years.

The new GBD estimates show a slow pace of decline in new HIV infections worldwide, with a drop of just 0.7% a year between 2005 and 2015 compared to the fall of 2.7% a year between 1997 and 2005. The study was launched at the International AIDS meeting in Durban, South Africa on 19 July.

Improvements and updates in GBD's data sources and methodology indicate that the number of people living with HIV has been increasing steadily from 27.96 million in 2000 to 38.8 million in 2015. Annual deaths from HIV/AIDS have been declining at a steady pace from a peak of 1.8 million in 2005, to 1.2 million in 2015, partly due to the scale-up of antiretroviral therapy (ART). Furthermore, the proportion of people living with HIV on ART increased rapidly between 2005 and 2015, from 6.4% to 38.6% for men, and from 3.3% to 42.4% for women (figure 1D). Yet, most countries are still far from achieving the UNAIDS 90-90-90 target of 81% by 2020.

While the annual number of new infections has decreased since its peak at 3.3 million per year in 1997, it has stayed relatively constant at around an estimated 2.5 million a year worldwide for the past decade.

"Although scale-up of antiretroviral therapy and measures to prevent mother-to-child transmission have had a huge impact on saving lives, our new findings present a worrying picture of slow progress in reducing new HIV infections over the past 10 years", says lead author Dr Haidong Wang from the Institute for Health Metrics and Evaluation (IHME) at the University of Washington, Seattle, USA.

"Development assistance for HIV/AIDS is stagnating and health resources in many low-income countries are expected to plateau over the next 15 years. Therefore, a massive scale-up of efforts from governments and international agencies will be required to meet the estimated $36 billion needed every year to realise the goal of ending AIDS by 2030, along with better detection and treatment programmes and improving the affordability of antiretroviral drugs", says the Director of IHME, Professor Christopher Murray.

The findings come from a comprehensive new analysis of HIV incidence, prevalence, deaths and coverage of antiretroviral therapy (ART) at the global, regional, and national level for 195 countries between 1980 and 2015.

The study was funded by the Bill & Melinda Gates Foundation, and National Institute of Mental Health and National Institute on Aging, National Institutes of Health, USA.

● doi: *http://dx.doi.org/10.1016/S2352-3018(16)30087-X*

Start Free, Stay Free, AIDS Free

At the 21st International AIDS Conference in Durban, South Africa, stakeholders came together to forge ahead on the Start Free, Stay Free, AIDS Free initiative, which was launched at the United Nations General Assembly High-Level Meeting on Ending AIDS in June 2016. The initiative is designed as a follow-up to the remarkable success achieved by the 'Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive'.

In a session entitled "Start Free, Stay Free, AIDS Free: finishing the job of the Global Plan," stakeholders reviewed the progress made towards eliminating new HIV infections among children, as well as how to super Fast-Track access to paediatric treatment for mothers and children. The session was organized by a consortium comprising UNAIDS, the United States President's Emergency Plan for AIDS Relief (PEPFAR), the United Nations Children's Fund (UNICEF) and the World Health Organization (WHO).

The Start Free, Stay Free, AIDS Free framework provides a menu of policy and programmatic actions designed to enable countries and partners to close the remaining HIV prevention and treatment gap for children, adolescents, young women and expectant mothers. Stakeholders discussed how to build a concerted and coordinated country-led action that is backed by global support, so that countries can move quickly forward. The framework recognizes that every country needs a tailor-made acceleration and implementation plan. Each plan should respond to the country context, building on successful strategies for systems strengthening and identifying critical opportunities and actions that can expand access to life-saving HIV treatment and prevention services for all children, adolescents and young women as quickly as possible.

Participants at the session discussed the need to ensure that children are at the centre of an AIDS-free generation and examined the major barriers, gaps and opportunities to achieving this goal. The session also discussed the role of public–private partnerships and women living with HIV.

The Start Free, Stay Free, AIDS Free framework establishes three blocks of programme activity that are closely interrelated and should move forwards together. The participants discussed how to ensure that the response takes into account the reality and variability of country, government and partner priorities, and how to create an implementation environment that optimizes partnerships. They discussed the role of accountability and measurement and mechanisms to ensure that countries get timely responses and support.

To support implementation, the framework also calls on industry, civil society and international partners to focus on investing in and finding new, efficient and cost-effective solutions that simplify and innovate to maximize programme outcomes.

adolescents, especially adolescent girls and young women in Africa, who remain disproportionately affected by HIV. Young people were encouraged to take a leading role in ensuring they are no longer left behind in policy or programmes. Key populations, especially sex workers, men who have sex with men and people who inject drugs, were also high on the agenda of both the scientific and community tracks of the conference, coupled with civil society activism on the sidelines of the conference to demand the recognition of their human rights. MEH

> We won't end AIDS as a public health crisis if we don't end AIDS in children first.
> – Chip Lyons, Executive Director, Elizabeth Glaser Pediatric AIDS Foundation

Political Declaration to end AIDS

In June 2016, United Nations Member States committed to implementing a bold agenda to end the AIDS epidemic by 2030 during the United Nations General Assembly High-Level Meeting on Ending AIDS. The progressive, new and actionable Political Declaration <*http://tinyurl.com/zwdj8j6*> includes a set of specific, time-bound targets and actions that must be achieved by 2020 to get on the Fast-Track and end the AIDS epidemic by 2030 within the framework of the Sustainable Development Goals.

During the 21st International AIDS Conference, taking place in Durban, South Africa, participants at a session entitled "From commitments to actions: implications of the 2016 United Nations High-Level Meeting on Ending AIDS," discussed the implications of the Political Declaration, with a focus on implementation and accountability. The need to Fast-Track the AIDS response by breaking the silos and engaging with all sectors and coalitions in a whole-of-government approach in order to achieve the goals and targets of the Political Declaration and the Sustainable Development Goals was highlighted. The participants reiterated the call for a fully funded AIDS response that was made throughout the conference, including full funding for the Global Fund to Fight AIDS, Tuberculosis and Malaria.

AIDS facts for Middle East and North Africa

- In 2014, there were 230,000 people living with HIV in the Middle East and North Africa.
- In 2015, there were an estimated 21,000 new HIV infections in the region.
  - New HIV infections rose by 4% between 2010 and 2015.
  - Worldwide new HIV infections have fallen by 6% since 2010.
- In the Middle East and North Africa, 12,000 people died of AIDS-related causes in 2015.
  - Between 2010 and 2015, the number of AIDS-related deaths in the region increased by 22%.
- Treatment coverage in 2015 was 17% among people living with HIV in the Middle East and North Africa.
- There were 2100 new HIV infections among children in the Middle East and North Africa in 2015.
  - Worldwide new HIV infections among children have declined by 50% since 2010.

More than 10 healthcare facilities were damaged in attacks in July in Aleppo city

Health care increasingly out of reach for Syrians in Aleppo

A report released by WHO Eastern Mediterranean Office in August highlights the tragic, life-threatening circumstances in which the few remaining doctors in Syria are operating and the heart-wrenching decisions with which they are confronted on a daily basis.

Dr Hatem Abu Yazan, general director of the Children's Specialised Hospital in Al Shaa'ar in eastern Aleppo City, was on duty in the hospital's neonatal section on the first floor when he heard the sound of an airstrike. It was a sound that he was used to, and he was wearing his stethoscope which dulled the noise. He did not pay much attention until he saw the doors cave in and the windows break. Together with a nurse and another doctor, he lifted 9 babies from their incubators and carried them to the basement, where he knew they would be safer. "We waited for 10 minutes for the attack to subside, and then we ran back up to bring the incubators down to the basement, so that they would not be at risk in case of another attack.

A few days earlier, Dr Abu Yazan had been overseeing two premature six-day old babies in intensive care when he was told a third baby in critical condition had been admitted. "The hospital only had two functioning intensive care units, so I had to make a decision," he said. "I removed one of the babies – the one that was in less stable condition – and replaced him with the newly admitted baby who had a stronger chance of survival. If more beds had been available that day, all three babies would have survived, instead of two." These are the heart-breaking life-and-death decisions facing medical staff on a daily basis in Syria as war rages, and as hospitals continue to be damaged or destroyed in the conflict.

As the siege continues, large numbers of civilians continue to be at extreme risk.

> Up to 250,000 besieged people in eastern Aleppo City lack access to sufficient food and medical care.

Up to 250,000 besieged people in eastern Aleppo City currently lack access to sufficient food, and medical care, with the United Nations predicting that remaining food supplies are adequate for up to a maximum of one month. Since 7 July 2016, the delivery of medical supplies to eastern Aleppo City has been halted due to intensified conflict, with available stocks inside the city expected to last 3 months.

Attacks on health care reducing life-saving health services

While the demand for medical care has increased, especially for severe war-related injuries, the escalating violence and besiegement of the city has resulted in reduced availability of health services due to attacks on health facilities, shortages of health care workers, and limited medicines and medical supplies. In July 2016 alone, there were at least 10 confirmed attacks on health facilities in Aleppo city, some being hit twice in the span of 12 hours. According to eastern Aleppo City local health authorities, 8 out of 10 hospitals and 13 out of 28 primary health care centres are now partially functional or out of service as a result of these attacks.

At least six healthcare workers have been reportedly killed in Aleppo city as a result of attacks on health care in 2016, decreasing a steadily shrinking pool of available health professionals. According to health cluster data, for every one medical doctor that is killed or flees, more than 40 Syrians are deprived of medical consultations per day. According to eastern Aleppo City local health authorities, only 35 medical doctors remain in the city, and their capacity to cope with the excess demand has been overwhelmed. Dr Abdelqader Farah in Aleppo city recalls that on 2 August at midnight, a heart surgeon working under extreme pressure suffered a cardiac arrest, and with no defibrillator available in the city, doctors could only provide him with life-saving care by moving a patient in less critical condition from the intensive care unit.

At least six healthcare workers have been reportedly killed in Aleppo city as a result of attacks on healthcare facilities in 2016

More than 15 medical doctors who were outside the city before the siege are now unable to return. Although they are aware of the risks and challenges facing them as health professionals, they are determined to join their colleagues inside the city and continue working to save lives.

Health system overwhelmed

Since the escalation of the conflict in Aleppo city, the number of hospital admissions tripled from 1226 in January 2016 to 4398 in June. War-related trauma cases almost doubled from 1900 cases in January 2016 to 3485 in June, while the number of major surgeries more than doubled from 783 in January 2016 to 1847 in June. Due to the heavy caseloads of emergency and trauma cases, hospitals have limited all their other services in an effort to conserve available stocks of medicines and supplies. Patients who require referrals outside the city are given as much treatment as possible, but many have died or suffered permanent disability as a result of limited access to specialised medical care. A few weeks ago, 35-year old Yousef was caught in violence as he was walking home from work, and admitted to hospital with a serious injury to his leg. Because no specialised orthopaedic surgeon was available in East Aleppo city, the trauma surgeon on duty was forced to amputate the leg, which could have been easily saved under the right circumstances.

Up to 90,000 children are among those besieged in Aleppo. Dr Hatem Abu Yazan, the general director of the Children's Specialised Hospital in eastern Aleppo City, says that only 2 paediatric doctors are left in the city, each seeing 100-150 children per day, more than double the usual caseload.

Following attacks on Al Quds hospital and Omar Ibn Abdel Aziz hospital in June and July, both facilities are now non-functional, Al-Zahraa hospital is now the only facility offering obstetric services in eastern Aleppo city, with two gynaecologists handling a caseload of 30-35 deliveries per day. Doctors are working under extreme pressure with limited support, and disruptions in sanitation are placing the lives of mothers and newborns at significant risk. A few days after Al Hakim Pediatric hospital was hit, causing one newborn to die due to interruptions in oxygen services, three babies in ventilators developed infections as a result of interruptions in sanitation services and also died.

Patients suffering from chronic diseases, such as heart disease, kidney diseases, diabetes and hypertension, often lack life-saving treatment, and are at extreme risk. Following an attack on the WHO-supported Al-Ihsan charity haemodialysis centre in June, the centre is currently non-functional, and diabetic patients are now faced with limited access to treatment. Insulin and blood pressure medicines in eastern Aleppo City are expected to last only two months, and cancer patients have been forced to stop all treatment due to zero stock of medicines. X-ray facilities are also not available in the city. Similar limited services also exist in west Aleppo.

Although more than 50% of the population is estimated to be suffering from a mental health disorder, only two mental health specialists are available in East Aleppo city to provide mental health services for thousands of people suffering from a build-up of stress, grief and depression.

> In July 2016 alone, there were at least 10 confirmed attacks on health facilities in Aleppo city.

Supplies waiting to be shipped in

As the situation in eastern Aleppo city continues to deteriorate, WHO and health cluster partners have health and surgical medicines and supplies, ready to be shipped in. WHO has provided supplies for more than 78,700 beneficiaries to 13 nongovernmental organizations in northern Syria to be delivered to operating health facilities in eastern Aleppo city once a humanitarian corridor is opened. An additional shipment of medicines and medical supplies for almost 150,000 beneficiaries is reading and waiting in northern Syria. MEH

Dr Ala Alwan: Stop war on hospitals

On 19 August 2016 – World Humanitarian Day – Dr Ala Alwan, WHO Regional Director for the Eastern Mediterranean, issued the following statement:

At least twice a week for the past few months, we have had to condemn attacks on hospitals and clinics in several countries of the Region. With each statement I read about innocent lives lost and health facilities destroyed, my dismay and despair grows. Despite many condemnations from WHO and other partners, attacks on healthcare facilities in these countries have continued. Behind every such violation of the norms of decency and our common humanity, there is an enormous tragedy. A mother who has lost a child. Patients who have been buried alive under rubble. Utterly heroic health staff who have lost their lives trying to save the lives of others.

Thousands of health workers remain in Syria, Yemen and Iraq today, committed and faithful to the oath they took to save lives. Some have literally gone underground to keep providing care, refusing to abandon their patients. Have we the right to abandon them?

On World Humanitarian Day, it is time for us all to stand in solidarity side-by-side with these doctors, nurses and paramedics, working at the coal face of human misery and inhumanity, and to say loud and clear that these acts of barbarism must stop once and for all.

The humanitarian community can only do so much to advocate for an end to these attacks. This issue is being consistently raised at the highest levels, including the United Nations Security Council and the International Syria Support Group, yet still the attacks on healthcare facilities and personnel continue, with disregard for the neutrality of health, international humanitarian law, or United Nations resolutions calling for their protection.

All efforts at diplomacy have so far failed. Attacks on health workers and health facilities are commonplace in many conflicts. It is time to put an end to this indefensible situation. WHO calls on political leaders worldwide to come together and use their influence to put an end to attacks on healthcare workers and health facilities.

ART production / Shutterstock.com

A woman walks near a residential area in the city of Homs destroyed in the fighting between rebels and the Syrian National Army

Arab uprising has long-term effect on health, lowers life expectancy in several countries

The Arab uprising in 2010 and subsequent wars in the eastern Mediterranean region have had serious detrimental effects on the health and life expectancy of the people living in many of the 22 countries in the region, according to a major study published in *The Lancet Global Health*.

A major new analysis from the Global Burden of Disease Study 2013 (GBD 2013) warns that that the downward turns in life expectancy experienced by Syria, Yemen, Libya, Tunisia, and Egypt since 2010 are threatening to jeopardise health gains over the past two decades.

The GBD 2103 study, published in The Lancet Global Health, shows that between 2010 and 2013, Yemen, Tunisia, and Egypt lost about 3 months of life expectancy, whilst the war in Syria has erased 6 years off average life expectancy, with men expected to live to around 75 years in 2010, falling to about 69 years in 2013. For Syrian women, average life expectancy dropped from about 80 to 75 years over the same period.

"Life expectancy decline is traditionally regarded as a sign that the health and social systems are failing. The fact that this is happening in several countries indicates there is an immediate need to invest in healthcare systems," says Ali Mokdad, Professor of Global Health at the Institute for Health Metrics and Evaluation (IHME) at the University of Washington, Seattle, USA, who led the research.

"Recent conflicts have shattered the basic infrastructure in a number of countries. As a result, millions of people are facing dire

Life expectancy decline is traditionally regarded as a sign that the health and social systems are failing.

water shortages and poor sanitation that will lead to disease outbreaks, which must be controlled."

The study reveals that many of the health gains achieved by countries in the region are at risk of slowing down. For example, there is now evidence that infant mortality rates are rising in some countries. Most strikingly in Syria where infant deaths fell at an average of 6.0% a year in the decade before 2010 in sharp contrast to the rise of 9.1% a year between 2010 and 2013.

The authors warn that the study represents a worrying picture of worsening health conditions across many eastern Mediterranean countries that are likely to have escalated since 2013 when the wars in Syria and Libya intensified and conflicts and unrest continued or broke out in Yemen, Lebanon, Afghanistan, Iraq and Somalia.

"This region has historically seen improvements in life expectancy and other health indicators, even under times of stress. But the Arab uprising has evolved into complex wars that have killed hundreds of thousands of people and displaced millions," explains Professor Mokdad. "Along with population growth and ageing, these ongoing conflicts have dramatically increased the burden of chronic diseases and injuries and many health workers have fled for safer shores. These issues will result in deteriorating health conditions in many countries for many years and will put a strain on already scarce resources."

Using data from GBD 2013, Professor Mokdad and colleagues at IHME analysed patterns of ill health and death due to 306 diseases and injuries and calculated the contribution of 79 risk factors in the eastern Mediterranean region over 23 years (1990 to 2013).

Writing in a linked Comment, Dr Riyadh Lafta from Mustansiriya Medical School, Baghdad, Iraq discusses the health burden of conflict, saying that: "War and other forms of armed conflict cause extensive morbidity (including disabling injuries and adverse effects on mental health) and mortality in military personnel and civilians. Populations suffer health problems during, and after, conflicts because of damage to the health-supporting infrastructure, safe food and water, sanita-

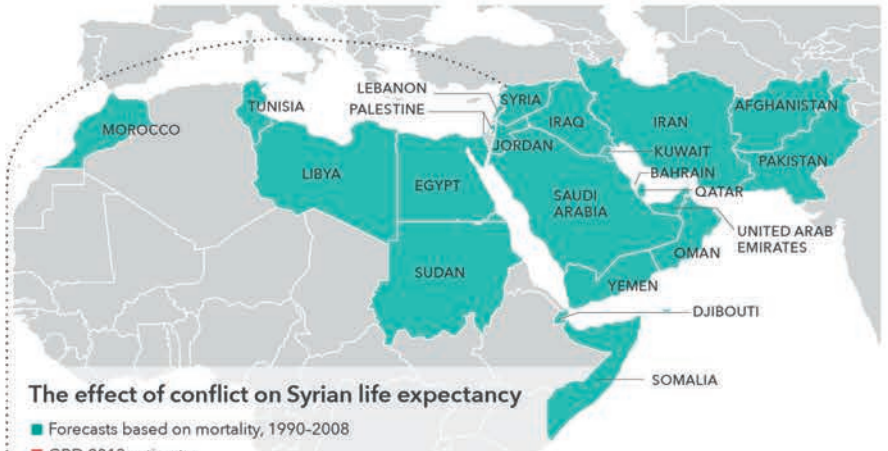
Key findings

- People in the eastern Mediterranean region are living longer on the whole, yet they face increasing threats from chronic diseases, with the leading causes of premature death and health loss shifting from communicable (e.g. diarrhoeal diseases and tuberculosis) to non-communicable diseases (e.g. heart disease, diabetes, and stroke).
- For example, deaths from diabetes rose from 12 to 19 per 100,000 between 1990 and 2013. The authors warn that these trends will lead to additional strain on finances and human resources in a region where they are already scarce.
- Across the region, the growth of non-communicable disease risk factors such as high blood pressure (up 83% since 1990, responsible for 7.7% of disease burden in 2013) and obesity and overweight (up 28%; 7.5%) should be a priority for the region and will require large-scale prevention measures, say the authors.
- Heart disease was the number one cause of death in 2013 (up 17%; responsible for around 9.5% of all deaths in 1990 and 15% in 2013) overtaking diarrhoeal diseases (9.8% of all deaths in 1990 to 3.8% in 2013) and lower respiratory infections (9.7% to 5.8%).
- Mental and substance abuse disorders (predominantly depression, anxiety, and drug use disorders) and musculoskeletal disorders (i.e. low back and neck pain) have increased substantially as a cause of ill health in the region since 1990. The authors warn that the rise in burden of mental-health problems has not been met with investment in prevention by most countries in the region (except perhaps Lebanon and Qatar), and has been largely overlooked by international agencies and national ministries of health.
- In low-income countries, nutritional deficiencies (mainly iron-deficiency anaemia) still cause a disproportionate amount of disability and health burden, ranking as a leading cause of ill health in Yemen and Afghanistan in 2013.
- Across the region, years of good health lost to communicable, maternal, neonatal, and nutritional disorders fell from around 109 million in 1990 to 73 million in 2013. However, child health remains a particular concern, with children aged under 5 contributing to a third (33%) of all health loss in 2013.
- In 2013, lower respiratory infections were ranked among the top-two contributors to health loss in males and females. Diarrhoeal disease remains in the top-10 leading causes of health loss but has fallen considerably in the rankings since 1990, dropping from first place (11.5% of all health loss) to fourth place in 2013 (4.8%). The authors warn that the spread of infectious diseases like Middle East Respiratory Syndrome is worrying – especially given the upcoming Hajj pilgrimage to Mecca in Saudi Arabia in early September.
- Causes of health loss differed by national income level: for low-income countries like Afghanistan and Somalia, lower respiratory infections and diarrhoeal diseases remain the top contributors; while middle-income countries – such as Egypt, Iraq, Morocco – lose substantially more health to heart disease; and for the oil-rich high-income countries like Kuwait and the United Arab Emirates, road injuries, drug use, and diabetes cause the most health loss.

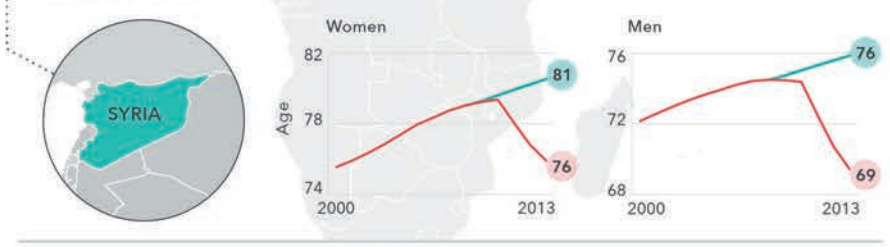
Results from the Global Burden of Disease Study 2013

Health in uncertain times: The burden of disease in the Eastern Mediterranean Region

The Eastern Mediterranean Region (EMR)



The effect of conflict on Syrian life expectancy



Conflict has damaged health in Egypt, Libya, Syria, Tunisia, and Yemen

1990

1990–2010

Life expectancy increased by about 0.25 years every year

In Syria, infant mortality decreased by 5.6% per year

2010–2013

Decline in life expectancy by 0.25 years in Egypt, Tunisia, and Yemen due to the Arab Uprising

Between 1990 and 2013, life expectancy in Syria would have been six years higher had the crisis not happened

2010

The annual rate of increase in infant mortality in Syria was 9.3%

2013

Top regional causes of DALYs* by income grouping, 2013

Rank	Low-income countries	Middle-income countries	High-income countries
1	Lower respiratory infections	Ischemic heart disease	Road injuries
2	Diarrheal diseases	Lower respiratory infections	Low back and neck pain
3	Preterm birth complications	Preterm birth complications	Diabetes mellitus

Leading risks for DALYs* by sex, 2013

Rank	Males	Females	Both sexes
1	High systolic blood pressure	Childhood undernutrition	High systolic blood pressure
2	High body mass index	High body mass index	Childhood undernutrition
3	Childhood undernutrition	High systolic blood pressure	High body mass index

*DALY = disability-adjusted life year. One DALY equals one lost year of healthy life.

For more information

To see country profiles for each of the 22 Eastern Mediterranean Region countries, and to learn more about the Global Burden of Disease study, please visit

healthdata.org/emr

For questions about the Global Burden of Disease, please email

gbdsec@uw.edu

Source: Mokdad AH, Fourozanfar MH, Murray CJL, et al. Health in times of uncertainty in the Eastern Mediterranean region, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*. Published online August 24, 2016.

IHME | UNIVERSITY of WASHINGTON

tion, and medical care and public health services. Moreover, conflicts lead to internal displacement of large numbers of individuals and families, which increases the burden of diseases and injuries, and, consequently, leads to more violence… Addressing this growing burden requires sincere efforts, realistic plans, adoption of new approaches and skills to continuously evaluate and analyse the situation, proposal and implementation of plans for prevention and control measures, and improvement of health services to dilute the effect of the burden of conflict."

doi: 10.1016/S2214-109X(16)30168-1

Zika associated with arthrogryposis

A study by *The BMJ* published 9 August 2016 provides more details of an association between Zika virus infection in the womb and a condition known as arthrogryposis, which causes joint deformities at birth, particularly in the arms and legs.

Microcephaly (a rare birth defect where a baby is born with an abnormally small head) and other severe foetal brain defects are the main features of congenital Zika virus syndrome. However, little is still known about other potential health problems that Zika virus infection during pregnancy may cause.

Until recently there were no reports of an association between congenital viral infection and arthrogryposis. After the outbreak of microcephaly in Brazil associated with Zika virus, two reports suggested an association, but they did not describe the deformities in detail.

So a research team based in Recife, the Brazilian city at the centre of the Zika epidemic, decided to investigate the possible causes of the joint deformities.

They studied detailed brain and joint images of seven children with arthrogryposis and a diagnosis of congenital infection, presumably caused by Zika virus. All children tested negative for the five other main infectious causes of microcephaly – toxoplasmosis, cytomegalovirus, rubella, syphilis, and HIV.

All children showed signs of brain calcification, a condition in which calcium builds up in the brain. The theory is that the Zika virus destroys brain cells, and forms lesions similar to "scars" on which calcium is deposited.

All the children underwent high definition scanning of the joints and surrounding tissues, but there was no evidence of joint abnormalities.

This led the researchers to say that the arthrogryposis "did not result from abnormalities of the joints themselves, but was likely to be of neurogenic origin" – a process involving motor neurones (cells that control the contraction or relaxation of muscles) – leading to fixed postures in the womb and consequently deformities.

They point out that further research is needed with a larger number of cases to study the neurological abnormalities behind arthrogryposis, but suggest that children should receive orthopaedic follow-up ... "because they could develop musculoskeletal deformities secondary to neurological impairment".

Based on these observations, the researchers conclude that "congenital Zika syndrome should be added to the differential diagnosis of congenital infections and arthrogryposis".

Because this is an observational study, no firm conclusions can be drawn about the effect of the Zika virus on arthrogryposis. Nevertheless, the authors suggest that this condition might be related to the way motor neurons carry signals to the unborn baby's muscles, or to problems with arteries and veins (vascular disorders). MEH

Vaccine trial

The US National Institute of Allergy and Infectious Diseases (NIAID) has launched a clinical trial of a vaccine candidate intended to prevent Zika virus infection. The early-stage study will evaluate the experimental vaccine's safety and ability to generate an immune system response in humans.

The investigational Zika vaccine includes a small, circular piece of DNA – a plasmid – that scientists engineered to contain genes that code for proteins of the Zika virus. When the vaccine is injected into the arm muscle, cells read the genes and make Zika virus proteins, which self-assemble into virus-like particles. The body mounts an immune response to these particles, including neutralizing antibodies and T cells. DNA vaccines do not contain infectious material – so they cannot cause a vaccinated individual to become infected with Zika – and have been shown to be safe in previous clinical trials for other diseases.

The Phase 1 clinical trial, called VRC 319, is led by Julie E. Ledgerwood, D.O., chief of the Vaccine Research Center (VRC) clinical trials program.

Initial safety and immunogenicity data from the VRC 319 trial are expected by the end of 2016. If results show a favourable safety profile and immune response, NIAID plans to initiate a Phase 2 trial in Zika-endemic countries in early 2017.

NIAID is conducting and supporting research and development of multiple Zika vaccine candidates.

NIAID's VRC is working with GSK to evaluate a Zika vaccine candidate that uses GSK's self-amplifying mRNA technology. This research, which will take place at the GSK Vaccine R&D Center in Rockville, Maryland, is still in the pre-clinical stage.

The NIAID Laboratory of Infectious Diseases is developing a live-attenuated investigational Zika vaccine. The vaccine contains a live but weakened virus, so that it cannot cause disease

NIAID also will be funding Phase 1 trials of a whole-particle inactivated Zika virus vaccine developed by scientists at the Walter Reed Army Institute of Research (WRAIR). WRAIR announced a cooperative research and development agreement with Sanofi Pasteur in June 2016 to advance the vaccine candidate. Two of the Phase 1 trials are set to launch in late 2016 and early 2017.

Leading experts call on UN to mobilize global action plan on antimicrobial resistance and effective access to antibiotics

Some of the world's leading experts on antibiotic resistance recently called on the UN General Assembly to establish a UN High-Level Coordinating Mechanism on Antimicrobial Resistance (HLCM) – a key aim of which is to reduce the number of deaths globally due to lack of access and inappropriate use of antimicrobials.

The initiative will also require the involvement of organizations such as UNICEF, UNDP, UNEP, UNESCO, and the World Bank.

Writing in the 16 July 2016 issue of *The Lancet*, they call on those attending the upcoming High-Level Meeting of Heads of State in September in New York City to use the opportunity to create and implement a four-part global action plan, similar in scope and ambition to the plan created in 1996 to address the AIDS crisis.

This is only the third time in its history that the UN General Assembly will use its High-Level Heads of State meeting to deliberate on a health issue that threatens the health of populations worldwide. This is also the first time that a 'One Health' issue <*https://en.wikipedia.org/wiki/One_Health*> a concept which involves the health of humans, animals and the environment, is being discussed at this high-level forum.

"Since antibiotics are used widely in livestock, humans and in the environment, the problem of antibiotic resistance can be tackled only by involving all of these sectors," said Ramanan Laxminarayan, Director of the Center for Disease Dynamics, Economics & Policy, and a lead author of the call to action. "The United Nations is the appropriate forum for countries to set goals and commit themselves to global collective action to ensure that our children and grandchildren are able enjoy the benefits of effective antibiotics."

Antibiotic resistance-related deaths

Millions of people do not have ready access to effective antibiotics, and many current antibiotics are losing their effectiveness. Antibiotic resistance is responsible for over 700,000 deaths worldwide, including 214,000 sepsis-related deaths of infants within four weeks of birth, according to a commentary piece published *The Lancet*.

Laxminarayan says that many deaths are caused by insufficient access and delays in getting antibiotics. Antibiotic resistance-related deaths are being reported in all countries and at all income levels. UN organizations, countries, civil society, non-governmental organizations, industry and development agencies must work collaboratively to change how the global community treats bacterial infections.

The initiative would have four core responsibilities:

- Launch a global advocacy campaign to raise awareness about the lack of access to antibiotics and drug resistance
- Monitor and evaluate defined, enforceable targets to reduce the number of deaths globally due to lack of access and inappropriate use of antimicrobials in humans as well as animals
- Mobilize resources from donors, aid agencies and countries to effectively finance the effort, and
- Support and coordinate multisectoral action to implement the World Health Organization's Global Action Plan on Antimicrobial Resistance alongside national efforts to improve access to effective antimicrobials

The UN meeting in September offers a rare opportunity to change how the global community responds to this health crisis that will become exponentially more deadly in all countries without any sustainable, coordinated action.

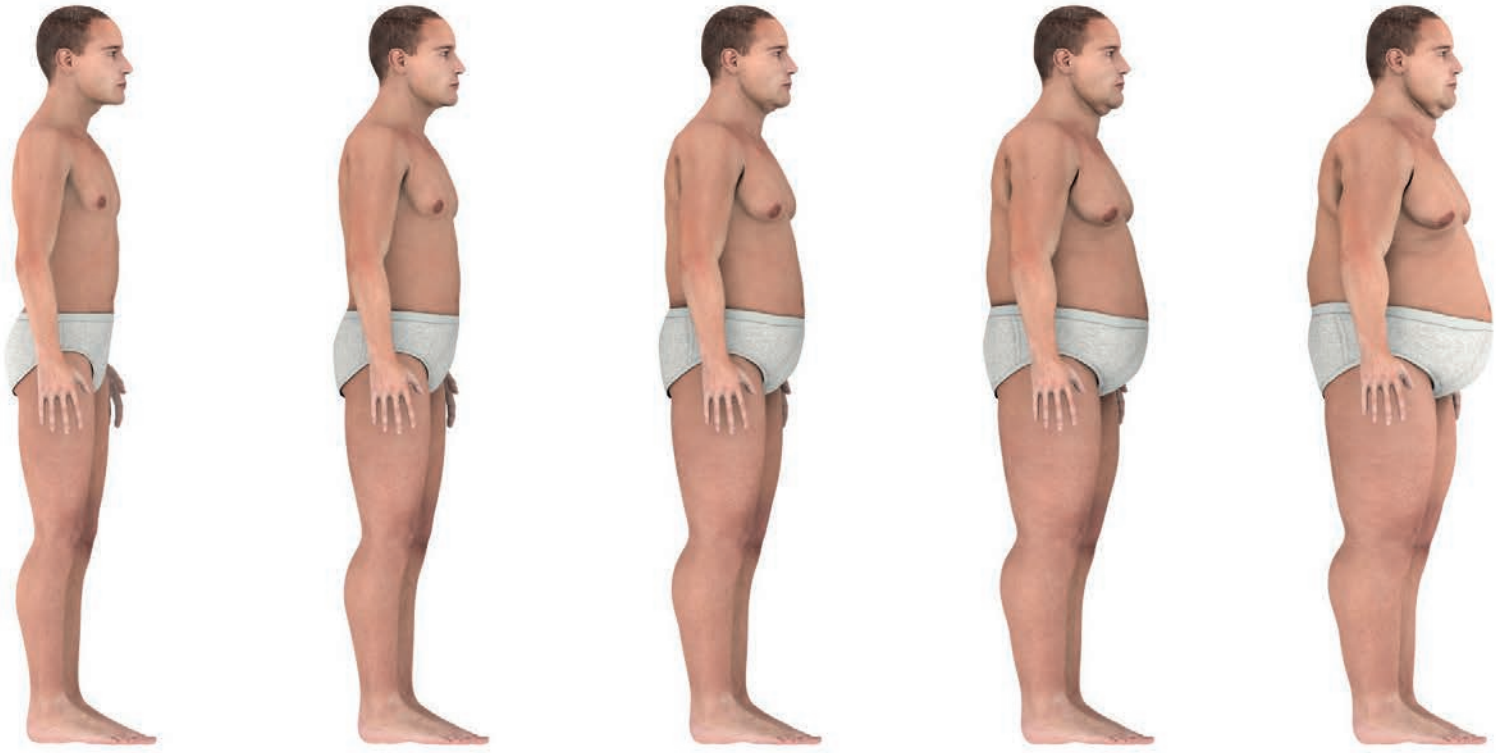
"The UN General Assembly discussions in September present an unprecedented opportunity for the world to advance its response to rising drug-resistant infections," said Lord Jim O'Neill, chairman of the Review on Antimicrobial Resistance. "The authors are right that the UN must play a central role in the fight against a global health problem that could undo much of the progress the world has made against disease and poverty. Over the next few months we should all continue to push for a robust and ambitious set of commitments at the UN which will see this problem being tackled head on."

> Antibiotic resistance is responsible for over 700,000 deaths worldwide, including 214,000 sepsis-related deaths of infants within four weeks of birth.

- UN High-Level Meeting on antimicrobials – what do we need?

doi: *http://dx.doi.org/10.1016/S0140-6736(16)31079-0*

on the WEB Ramanan Laxminarayan - TED Talk on antibiotic resistance - September 2014 *www.ted.com/talks/ramanan_laxminarayan_the_coming_crisis_in_antibiotics*



The rising trends of obesity and overweight and its impact on children and adolescents in the United Arab Emirates

By **Alexander Woodman** M.P.H., M. Sci.
and **Haik Balayan** M.D., Ph.D.

Background

Rates of obesity are increasing in adults and children worldwide. Obesity is a leading preventable cause of death worldwide and it is viewed by authorities view it as one of the most serious public health problems of the 21st century. Obesity is stigmatized in much of the modern world, particularly in the west. Historically, in a number of places around the world, obesity has been viewed as a symbol of wealth and fertility. This view persists in some parts of the world. In 1997 the World Health Organization (WHO) formally recognized obesity as a global epidemic. In 2013 the American Medical Association classified obesity as a disease.

Obesity is a medical condition, in which excess body fat accumulates to the extent that it may have a negative effect on the health. People are considered obese when their body mass index (BMI), a measurement obtained by dividing a person's weight by the square of the person's height, exceeds 30 kg/m2.

Obesity can result in reduced life expectancy and increased health problems. Prior to the 20th century, obesity was rare.

WHO estimates that about 13% of the world's adult population (11% of men and 15% of women) were obese in 2014. WHO notes that the worldwide prevalence of obesity more than doubled between 1980 and 2014. According to the WHO, in 2014 more than 1.9 billion adults aged 18 years and older were overweight. Of these over 600 million adults were obese. And an estimated 41 million children under the age of 5 years were overweight or obese.

Trends

In the United Arab Emirates (UAE), obesity has become a major problem. Over 60% of Emirati nationals are overweight,

UAE MoH, Emirates Diabetes Society in partnership with AstraZeneca launch Circle of Care for diabetes

The UAE Ministry of Health and Prevention in partnership with the Emirates Diabetes Society, and within the framework of the new MoU signed by the Ministry with AstraZeneca Gulf, has launched Circle of Care, an education and support programme aimed to improve the well-being of people in the UAE living with or at risk of developing type 2 diabetes. The programme seeks to address the findings from a recent local diabetes report, undertaken by Project HOPE, a global health education and humanitarian assistance organization, beginning with a focus on Emirati diabetic patients.

Dr Hussein Al Rand, Assistant Under-Secretary for Health Centers and Clinics at the UAE Ministry of Health and Prevention, highlighted the importance of the new initiative, especially with its focus on chronic disease and impact on the society, something that ranks high on the Ministry's national agenda.

"The Circle of Care partnership reinforces the Ministry's goal to form strategic partnerships for community programmes, which supports the National Health Agenda to improve the curative and preventive services related to chronic diseases in the UAE, with the hope of decreasing the diabetes comparative prevalence in the country from 19.3 percent (IDF Diabetes Atlas, 6th Edition) in 2015 to 16.28 percent by 2021, complementing UAE Vision 2021." he said.

Circle of Care comprises of three pillars that focus on:

1. Uplifting healthcare professionals' medical capabilities
2. Supporting initiatives set by local health authorities and medical societies' regarding the importance of early diagnosis and diabetes control, and
3. Educating patients and caregivers.

The initiative also includes providing new and culturally relevant diabetes resources and materials specifically developed for UAE residents, in line with the findings of the Project HOPE report, which focused on the main challenges that face diabetic patients. Another important component is scientific research on diabetes, in which the UAE will take part.

and this figure is expected to rise. According to a recent study, published by a *BMC Public Health* journal, the UAE ranks as the fifth fattest nation in the world. Additionally, according to Forbes, 68.3% of citizens of the UAE have unhealthy body weight.

This growing health issue is worrisome to Emirati health officials, particularly when obesity, a leading cause of death, is preventable.

Over the past four decades, the UAE has gone through a profound and rapid socioeconomic transition to a more affluent society, which has led to fundamental changes in the population's lifestyle, dietary habits, and physical activity pattern. This is similar to the modernization processes that occurred in the western world, but in the UAE it has occurred over a much shorter time.

There are several causes of obesity in the UAE. One of the major predictors is the lack of energy balance. Energy balance means that energy 'in' equals and energy 'out'. Overweight and obesity occurs when more calories are consumed than utilized. Another factor is the environment, which is generally not conducive to an active lifestyle. There is a failure to promote healthy living. There is a lack of educational and informational tools that target and educate the population on impact of eating habits and lifestyle choices (Hajat, Harrison, & Shather, 2012).

Inactivity

Habitually, the population in the UAE is physically inactive. There are several factors that influence inactivity. One reason for the inactivity pertains to the number of hours they spend in front of the television (TV) and computer, whether to engage in professional duties, schoolwork, or leisure activities. In fact, two or more hours of daily TV viewing time has been linked to people becoming overweight and obese.

Inactivity in UAE is also due to the over reliance on automobile transport, as opposed to walking or cycling. Additionally, the physical demands at work and in the home have declined because of the availability of, and help of modern technology and conveniences.

At an early age, inactivity is reflected in the lack of physical education classes and sports activities in schools. Children who are inactive are more likely to gain weight as they do not burn the calories they consume from foods and drinks.

Another contributing factor is genetics and family history. Studies of identical twins, who have been raised apart, show that genes have a strong influence on a person's weight. Overweight and obesity tend to run in families. The chances of being overweight are greater if one or both of parents are overweight, or obese.

Other factors include medical status, psychological factors, age, pregnancy, lack of sleep, and cultural influences.

Generally, cultural values represent as an influential variable, particularly in the home. This is exemplified in households where children observe the unhealthy eating habits their parents exhibit. Children are likely to adopt this attitude and behavior during early childhood. Unhealthy eating tends to run in families.

Prevalence

The prevalence of overweight and obesity in the UAE is significantly high among children and adolescents – and it continues to grow. Obesity during childhood should be regarded as a chronic medical condition that is likely to require long-term treatment. Childhood obesity can be a strong indicator of weight-

related health problems in later life. This supports the view that learned unhealthy lifestyle choices continue into adulthood (Musaiger et, al., 2013).

Consequences

The health consequences of obesity fall into two broad categories: those attributable to the effects of increased fat mass (such as osteoarthritis, obstructive sleep apnea, social stigmatization) and those due to the increased number of fat cells (diabetes, cancer, cardiovascular disease, non-alcoholic fatty liver disease).

Increases in body fat alter the body's response to insulin, potentially leading to insulin resistance. Increased fat also creates a pro-inflammatory state and a pro-thrombotic state. Overweight and obese people have an increased incidence of coronary heart disease. Being overweight, or obese increases the risk of developing high blood pressure. Obesity adversely impacts existing endocrine and metabolic disorders.

Metabolic syndrome

Metabolic syndrome is one of the fastest growing obesity-related health concerns in the UAE. It is characterized by a cluster of health problems, including obesity, hypertension, abnormal lipid levels, and high blood sugar. According to the US Centers for Disease Control and Prevention (CDC), metabolic syndrome affects almost one quarter (22%) of the Arabian population – an estimated 47 million people.

Obesity has a negative effect on lipid levels in the blood, which often leads to the development of dyslipidemia. Separately, thyroid hormones drive metabolism, which is why it is often assumed that there is a direct link between obesity, the thyroid gland, and its related thyroid conditions.

Other obesity-related health conditions include colon cancer, polycystic ovary syndrome, reproduction/sexually issues, type-2 diabetes, and childhood obesity.

When complications occur, they are either directly caused by obesity, or indirectly related to its mechanisms. In a nutshell, the common denominators are unhealthy diet and a sedentary lifestyle (Baglar, 2013).

Further Education: (left to right) Mohammed Alteneiji, Sarah Bawazir, Mohammed Alharmoodi, Salim Almulla from Khalifa University (KU) have flown to Washington, D.C. to participate in the Sheikh Zayed Institute for Pediatric Surgical Innovation's annual Student Innovators Program (SIP), a summer program taking place at the Children's National Medical Center. The students were selected alongside 20 others from universities around the world, and will have access to world-class paediatric healthcare facilities and educational opportunities at the Sheikh Zayed Institute. The students will work on a number of projects with institute physician-scientists and bioengineers, mainly focusing on robotics in medicine and innovation in patient care and disease treatment. Other projects will also include basic science research and mobile app development.

Childhood obesity

Childhood obesity is linked to numerous health problems. These encompass an increased risk of eating disorders, including misguided attitudes to eating, weight concerns, dieting, binge eating, anorexia and bulimia. In some Emirati states, obesity is found in nearly 40% of children. Besides negative psychological effects, childhood obesity causes physiological issues such as liver, lung, heart, and musculoskeletal complications.

Unfortunately, many people in the general UAE population are unaware that childhood obesity can lead these health complications (Junaibi, Abdulle, Sabri, Hag-Ali, & Nagelkerke, 2013).

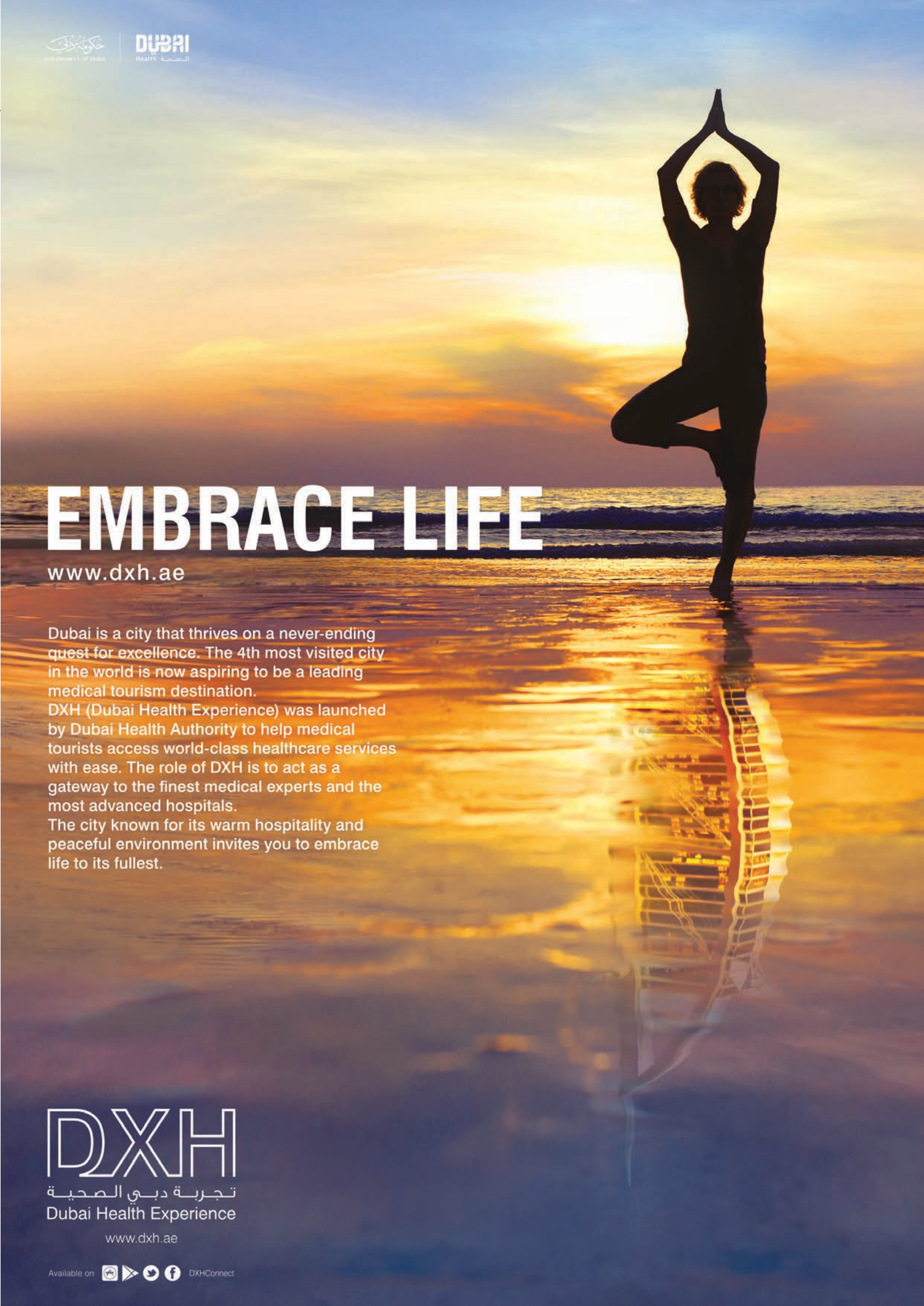
Diabetes

Obesity has been linked with type 2 diabetes. More than 80% of people with Type 2 diabetes, the most common form of the disease, are obese or overweight. Excess body fat underlies 64% of the cases of diabetes in men and 77% of the cases in women. Data from the CDC and the National Health and Nutrition Examination Survey III show that two-thirds of adult men and women in the UAE diagnosed with Type 2 diabetes have a body mass index (BMI) of 27, or greater. This is classified as overweight.

Prevention

Obesity management is an important step in the prevention and control of chronic non-communicable diseases. Obesity-related cardiovascular diseases, diabetes, hypertension, and certain cancers contribute to 60% of the overall morbidity and mortality rate in most Arab countries (Musaiger, O. A., Zall, bin A. A., & D'Souza, R., 2013).

There are numerous strategies to promote the prevention of obesity. One measure is to encourage parental participation. It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Parental perceptions towards children's weight status and its determinants in the Arab world seem to have been largely overlooked, despite the high prevalence of overweight and obesity in this population.

is a key factor in the prevention of, and management of childhood obesity.

Several studies in the UAE have reported high levels of parental misperception of their children's weight. Of all parents, 33.8% misclassified their children's weight status – underestimating (27.4%) or overestimating (6.3%). Misclassification was highest among parents of overweight/obese children (63.5%) and underweight (55.1%) children.

To involve parents, however, would require parental recognition of their child's weight status. Parents should be equipped to recognize and evaluate a child as overweight and obese. Incorrect perception may lead to an incorrect assessment of children's eating habits and physical activity levels.

In a recent systematic review, it was found that parental misperception is common. For example, 62.4% of overweight/obese children were incorrectly perceived as having normal weight. In some countries, parents neither understand nor use, or trust common clinical measures to identify their children's weight status. Fewer than 50% of parents accurately identified their child's weight status. Apparently, parents resorted to alternative approaches, such as visual assessments and comparisons to extreme cases, in evaluating their children's weight status.

The issues of mistakenly identifying children's weight status may be attributed to the accepted cultural norms within a population, or society. Parental perceptions towards children's weight status and its determinants in the Arab world seem to have been largely overlooked, despite the high prevalence of overweight and obesity in this population. This is particularly concerning, especially when the prevalence of childhood obesity in this population is one of the highest in the world. Arguably, some parents may have deliberately chosen to underestimate the weight status of their child in order to avoid stigmatization associated with obesity (Aljunaibi, Abdishaku, & Nagelkerke, 2013).

It is well documented that childhood obesity is a risk factor for several non-communicable chronic diseases during adulthood. The World Health Organization reported that the nutrition transition is observable in all Eastern Mediterranean countries. From a health perspective, the growing level of obesity among children and adolescents is particularly worrying. Therefore, it is important for the UAE to focus on prevention strategies.

Prevention strategies should focus on younger children, particularly those with a parental history of obesity (WHO, 2012). In addition, the consumption of dairy food should be encouraged. Moreover, it is recommended that longitudinal studies, that investigate the trends and the impact of childhood obesity on the prevalence of non-communicable diseases in the UAE, should be conducted.

Importantly, it is necessary to address the issues impacted by the concept of body image. Body image is a fairly stable belief system. Children, who exhibit higher levels of body dissatisfaction, are likely to practice this belief into adolescence and young adulthood. Consequently, it may result in eating disorders.

To address the challenges, and to combat the impact of obesity, the Arab Center for Nutrition prepared a strategy for the region. However, for this strategy to succeed, it will need proper and sufficient baseline data on the epidemiology and etiology of obesity among children and adults in this region (Junaibi, Abdulle, Sabri, Hag-Ali, & Nagelkerke, 2013).

The Authors

- **Alexander Woodman** is a faculty member of Department of Humanities and Social Sciences at Prince Mohammad Bin Fahd University, Saudi Arabia.
  awoodman@pmu.edu.sa
- **Haik Balayan** is a faculty member of the Department of Surgery, Yerevan State Medical University, Armenia.

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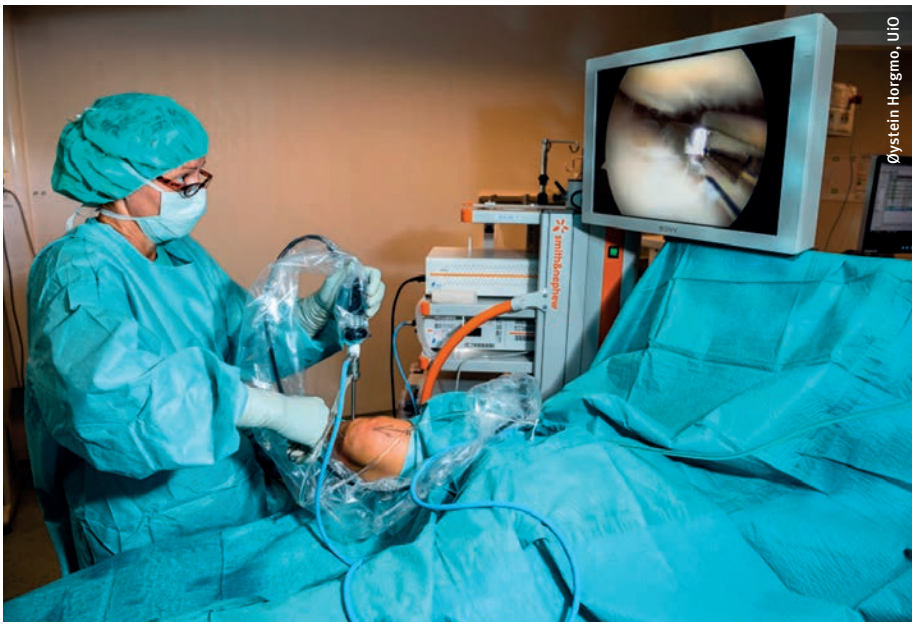
Most surgical meniscus repairs unnecessary

Three out of four people could avoid knee surgery with a new form of exercise therapy, with significant cost savings for society.

Injury to the menisci, the cartilaginous discs within the knee joint, can be painful when running, and can cause the knee to give way or 'lock'. Such injuries are troublesome and sometimes painful, and can prevent you from exercising or attending work.

A new study shows that exercise therapy is just as effective for treating meniscus injuries as surgery. PhD candidate and orthopaedic surgeon Nina Jullum Kise is in charge of the study. She is a senior consultant at the Department of Orthopaedic Surgery, Martina Hansen's Hospital in Bærum, Norway



Nina Jullum Kise, PhD candidate, orthopaedic surgeon and senior consultant, performs an arthroscopic procedure on the meniscus of a patient.

No difference between surgery and exercise

A total of 140 patients with meniscus injuries in Norway and Denmark took part in the study. They drew lots for treatment with either exercise or surgery.

Commenting on the study, Dr Jullum Kise says: "Two years later, both groups of patients had fewer symptoms and improved functioning. There was no difference between the two groups.

"However, those who had exercised had developed greater muscular strength. This is consistent with previous research, which showed that surgery yielded no additional benefits for patients who had had exercise therapy."

The current study is the first to compare cases where the patient had only exercise therapy or only surgery.

Big savings

Dr Jullum Kise believes that as many as three in four could be spared surgery with the right exercise therapy programme.

In 2015 almost 11,000 people in Norway underwent arthroscopic meniscus repair, a form of keyhole surgery. However, the general trend is to place more patients on exercise therapy programmes and hold off on surgery.

"A single meniscus operation is estimated to cost taxpayers in excess of 16,000 Norwegian kroner (about US$1900). And then there's absence from work on top of that," remarks Dr Jullum Kise.

Although exercise therapy also has costs, these are lower than for surgery. Reducing the number of surgical meniscus repairs would thus lead to significant savings for society.

Training with physiotherapist

In the study, the patients attended training sessions with a physiotherapist 2-3 times a week for 12 weeks.

"The exercise therapy programme involves a warm up and various types of strength training. It is built up in stages that become more challenging as the patient improves and becomes stronger," explains Dr Jullum Kise.

Each patient receives a personalized training programme, and learns to do the exercises under the supervision of a physiotherapist. Once they have learned the exercises, they train on their own but attend weekly sessions with the physiotherapist for adjustments and to be given new exercises.

May counteract osteoarthritis

Menisci are crescent-shaped discs of cartilage on both sides of the knee joint. The meniscus is a shock absorber that distributes weight across the joint and at

the same time stabilizes the joint when you walk or run.

"We hope that the stronger muscles of the exercise therapy group may counteract osteoarthritis, a type of arthritis that often occurs in patients who have undergone surgery for a meniscus injury," says Dr Jullum Kise.

In principle there are two types of meniscus injury.

- Acute injuries, which often occur in younger people who might, for example, twist a knee during downhill skiing.
- Wear and tear (degenerative) injuries, which are the first sign that the joint is beginning to break down, so-called osteoarthritis.

Young people with acute injuries should undergo surgery. That way, the meniscus can continue to protect the cartilage in the joint. Damage due to wear and tear cannot be repaired surgically, but the joint can be cleared of worn tissue that would otherwise cause the knee to lock or to give way.

doi: 10.1136/bmj.i3740

Danish-Norwegian collaboration

The study is a Danish-Norwegian collaboration and was designed and initiated by:

- Professor Ewa Roos, at the University of Southern Denmark
- Professor May Arna Risberg, at the Norwegian School of Sport Sciences and NAR, Norwegian Research Center for Active Rehabilitation
- Professor Lars Engebretsen, at the University of Oslo and orthopaedic surgeon at Oslo University Hospital
- Dr Silje Stensrud, physiotherapist, who used data from the first three months of the study to complete her PhD thesis.

The exercise therapy programme in the study was developed by Stensrud, Risberg and Roos, in collaboration with physiotherapists at the Norwegian Institute of Sports Medicine (NIMI).

Robot therapist hits the spot with athletes

Prototype robot is being used in trials for sports rehabilitation

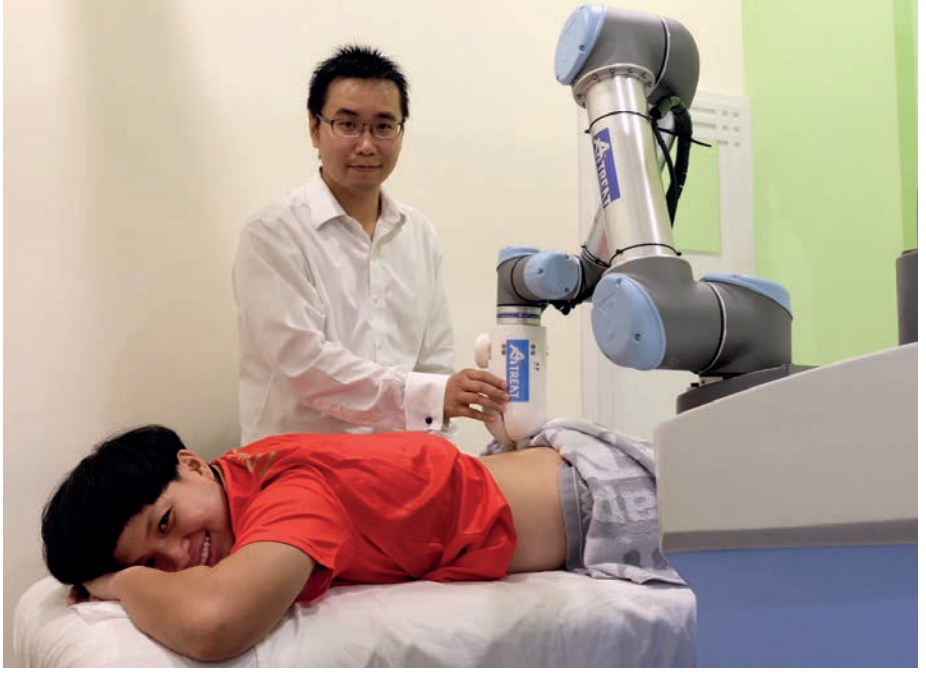
Trials of a prototype robot for sports therapy have just begun in Singapore, to create a high quality and repeatable treatment routine to improve sports recovery, reducing reliance on trained therapists.

The robot named Emma, short for Expert Manipulative Massage Automation, has already treated more than 50 patients in trials including professional athletes for conditions ranging from tennis elbows, stiff neck and shoulders, to lower back pain.

Emma is a robotic arm that comes with a 3D stereoscopic camera and a custom made 3D-printed massage tip. It uses sensors and diagnostic functions to measure the response of a patient and the stiffness of a particular muscle or tendon. The detailed diagnostics are analysed and uploaded to the cloud so the patient's recovery can be closely monitored over time.

Emma is created by a graduate of Nanyang Technological University, Singapore (NTU Singapore) whose start-up company is incubated by the university.

Emma is currently undergoing user trials at Kin Teck Tong, a modern medical institution with a chain of clinics that offer sports injury rehabilitation and pain management through the integration of advanced sports science and traditional Chinese medicine.



Nanyang Technological University graduate and creator of Emma Albert Zhang starts the massage treatment for Singaporean athlete Lim Jia Min

NTU graduate Albert Zhang, the creator of Emma who founded the startup AiTreat to develop and eventually market this innovation, said he wanted to solve some of the challenges faced by sports therapy and pain management clinics, such as a shortage of trained therapists and a need to deliver high quality therapy consistently.

"We have designed Emma as a clinically precise tool that can automatically carry out treatment for patients as prescribed by a physiotherapist or Chinese physician," ▶

said Zhang, who graduated in 2010 from NTU's Double Degree programme in Biomedical Sciences and Chinese Medicine.

"This will be one of the first robots out in the market specifically for use by sports therapists and Traditional Chinese Medicine (TCM) physicians. Our aim is not to replace the therapists who are skilled in sports massage and acupoint therapy, but to improve productivity by enabling one therapist to treat multiple patients with the help of our robots."

Emma, which has a user-friendly interface and recommended guidelines for various sports injuries, was designed by Zhang based on his experience of treating sports injury as a licensed TCM physician in Singapore for the past five years.

The robot also has several safety features working in tandem with advanced pressure sensors to ensure the safety and comfort of its patients.

Coco Zhang, Executive Director of Kin Teck Tong, said the new physiotherapy robot has the potential to be a disruptive innovation, especially for the sports science and pain management industry.

"Just like countries such as the United States, Europe, Japan and China, Singapore is also facing a rapidly aging population. Over the next decade, more people are going to suffer from physical ailments such as arthritis and will be seeking treatment," Coco Zhang said.

"Since the younger generation prefer knowledge-based jobs rather than physically intensive jobs such as massage therapists, there will likely be a shortage of trained therapists in future. In our trials with the robot, the experience has been very good, as it can perform most treatments as well as our therapists."

Physiotherapy meets the Cloud

Emma is equipped with sensors and diagnostic functions with detailed diagnostics sent to the cloud for analysis and generation of performance reports of the patient's progress. With Emma, patients can accurately measure their recovery using precise empirical data.

This is valuable for athletes as their injuries, treatment and recovery can now be measured and monitored by their physician and therapists. In addition, the treatment programmes can be adjusted based on the progress of the patients' recovery.

Zhang and his teammates won the Microsoft Developer Day Start-up Challenge earlier this year and the propriety cloud intelligence used by Emma is supported by Microsoft.

After the clinical trials are completed, a second-generation robot will be developed that is more compact and mobile.

on the WEB See Emma in action
http://tinyurl.com/jfuf5l2

The best way to improve muscle strength

Engaging in short, explosive leg contractions is the most effective way of strengthening muscles, Loughborough research reveals.

The study, led by Dr Jonathan Folland, Reader in Human Performance and Neuromuscular Physiology at Loughborough University, is the first to directly compare short, explosive contractions lasting less than one second with sustained contractions lasting three seconds.

Strength training is widely regarded to be an effective way of boosting the physical performance and health of all individuals, from high performing athletes through to older people and those undergoing rehabilitation following injury or who are suffering from conditions such as osteoarthritis.

The results showed that explosive contractions are an easier and less tiring way of increasing strength and functional capacity of the muscles, and therefore a highly efficient method of training. The method increases strength by assisting the nervous system in 'switching on' and activating the trained muscles. In comparison, the more traditional sustained contractions – which demand a lot of effort and soon become tiring – are actually a more effective way of increasing muscle mass. Increasing muscle mass may be the main training goal for some people, including athletes in some sports, for aesthetic reasons or metabolic health.

The study investigated the effect of the different contractions on the participants' quadriceps muscles located on the front of the thigh. The selected participants (43 healthy males in their twenties) had not completed lower body strength training for 18 months and were not involved in systematic physical training. One group did the explosive contractions, one group did the sustained contractions, and a third group acted as a control group. The participants trained with 40 contractions repeated three times a week for three months. The force produced by every contraction was prescribed and monitored to ensure it was either explosive or sustained. An extensive range of performance and physiological measurements were done before and after the training to assess the changes.

Dr Folland, from Loughborough University's School of Sport, Exercise and Health Sciences, part of the National Centre for Sport and Exercise Medicine East Midlands, said: "The easiest way to make muscles stronger has been debated by fitness and sports professionals for many years, but this study shows that it doesn't have to mean lots of pain for any gain.

"Whereas traditional strength training is made up of slow, grinding contractions using heavy weights which is quite hard work, this study shows that short, sharp contractions are relatively easy to perform and a very beneficial way of building up strength. These short, explosive contractions may also be beneficial to older individuals and patient groups such as those with osteoarthritis, who would benefit from getting stronger, but are reluctant to undergo tiring sustained contractions."

● **doi:** 10.1152/japplphysiol.00091.2016

Sheikh Khalifa Medical City – a national leader in amputee rehabilitation

Over the past decade or so there has been a substantial increase in investment in rehabilitation medicine around the world, leading to the specialty becoming a frontline health service. Compared to the 1950's and 1960's, people who sustain severe and complex injuries now have a higher chance of living independent lives with a good quality of life because of advancements in rehabilitation medicine.

The Physical Medicine and Rehabilitation (PM&R) Institute at Sheikh Khalifa Medical City (SKMC) provides a broad range of specialised rehabilitation services in a multidisciplinary and consultative environment to the people of Abu Dhabi and the United Arab Emirates.

The Institute has evolved to become the national leader in medical rehabilitation care. It was established in 2009 at SKMC, one of Abu Dhabi Health Services Company hospitals. The Institute uses the most up-to-date international methods of administering interdisciplinary, acute and post-acute rehabilitation with a patient-centred approach.

All of the Institute's consultants are qualified by leading institutes in the West and are fully trained and accredited in the field of rehabilitation medicine.

The Institute offers comprehensive medical rehabilitation services, and includes the following facilities: Acute rehabilitation unit, Outpatient clinics, Satellite inpatient therapy areas, Outreach/Outside SKMC Interdisciplinary consultations.

The aim of the rehabilitation is to ensure patients have successful prosthetic use and can lead an independent life.

Phases of rehabilitation

- Pre-prosthetic, prosthetic and post prosthetic training
- Lifelong follow up
- Management of complications

Some elderly amputees can have other co-morbidities such as ischemic heart disease, hypertension, end stage renal disease with dialysis, and arthritis which can pose a number of challenges in amputee rehabilitation.

Eligible amputee patients who have congenital or acquired limb deficiency are provided inpatient and outpatient services at PM&R Institute.

Outpatient services

- Patients of all age groups are assessed by a multidisciplinary team consisting of physiatrist, prosthetist, rehabilitation nurse, physiotherapist and occupational therapist
- Regular follow ups for repairs, maintenance, modifications and prevention of complications.

Inpatient services

- Meetings between the multidisciplinary team and the patient, carers and family are arranged to discuss goal setting
- Weekly formal multidisciplinary meetings for each patient are conducted to identify problems, set goals, monitor progress and plan discharge

Seating clinic

The seating clinic is only one arm of SKMC's fully integrated equipment provision service which is a crucial component of any rehabilitation service.

The PM&R Institute at SKMC provides twice weekly clinics for those individuals who have congenital or acquired disabilities secondary to trauma or illness.

The clinics are led by consultants and are run by SKMC's interdisciplinary team which includes a doctor (consultant accredited in the speciality of medical rehabilitation) supported by an occupational therapist, physiotherapist and a rehabilitation nurse – all specialised in equipment service provision.

B4 ward

The B4 ward at SKMC is a tertiary neuro-rehabilitation and general rehabilitation unit. It is a consultant-led medical rehabilitation unit.

The unit is designed in a way to allow the safe, secure and private provision of service for those who have both complex physical and as severe congenital disabilities.

The unit makes use of the latest technology and techniques for pain management, spasticity management, orthotic and prosthetic services, amongst others. MEH

Triathlete regains her stride after minimally invasive hip procedure at the University of Chicago Medicine

Several years ago, Sara Llibre decided to celebrate her upcoming 50th birthday by re-kindling her athletic career. The mother of two started running and eventually did her first marathon. Within a few years, the suburban Chicago resident joined a triathlon team and completed her first Ironman (2.4-mile swim/112-mile bike/26.2-mile run) race.

But heavy training took a toll and a year-and-a-half ago, Llibre's right hip hurt so much she could barely run. An MRI showed impingement (the hip bones rubbing together) and a labral tear in her hip. One doctor told Llibre she'd never run again.

Intent on getting a second opinion, she visited Sherwin S. W. Ho, MD, professor of orthopaedic surgery and director, sports medicine fellowship program, at the University of Chicago Medicine. The medical centre was founded in 1927 and is part of the University of Chicago, an institution that consistently ranks among the 10 best universities in the world.

Sherwin S. W. Ho, MD, professor of orthopaedic surgery and director, sports medicine fellowship program, at the University of Chicago Medicine

"Dr Ho knows athletes and I could tell that he knew exactly from my description of the pain what I was dealing with," said Llibre. "He didn't promise me anything but he said chances were good that I could run again. And he was right."

In January 2014, Ho performed a minimally invasive, outpatient procedure that repaired the impingement and tear. Eight months later, in September 2014, Llibre ran a pain-free Ironman Wisconsin and set a personal record while placing fourth in her age group. Now she's looking forward to another personal record while competing in the Ironman competition in Louisville, KY.

"It just feels natural to me," said the cheery Chicago public school teacher, about training and racing.

"If we get to these patients early enough, we can save the hip and allow them to continue with an active, healthy lifestyle," explained Ho, an expert in sports medicine and minimally invasive arthroscopic procedures of the shoulder, elbow, hip, knee and ankle. "Especially in athletes such as Sara who want to do triathlons late in life, a surgery like this can give them additional miles and years on their hips."

Just a decade ago, impingement (known as femoroacetabular impingement or FAI) often went undiagnosed and patients were told they were suffering from tendonitis or arthritis and to live with the pain. When the pain was

Sara Llibre trains for a triathlon following her hip replacement

> Today with the advent of better MRIs and minimally invasive procedures, we can diagnose patients who have impingement and tears and treat them before they get arthritis.

advanced enough to show up as arthritis on an X-ray, patients would get hip replacements.

"Today with the advent of better MRIs and minimally invasive procedures, we can diagnose patients who have impingement and tears and treat them before they get arthritis," explained Ho. "Our job as hip preservation specialists is to maintain our patient's natural hip and avoid the need for hip replacement later in life."

Impingement generally occurs with hip flexion beyond 90 degrees. The hip's ball and socket are designed to flex to a certain degree but when you exceed that limit repeatedly, the two bones can bump into each other, causing pain and in Llibre's case, damage to the labrum – a rim of cartilage around the socket.

A runner flexes tens of thousands of times over the course of a run. But other activities can aggravate hips as well: "Going up stairs, squatting to pick something up, sitting, biking, playing tennis, soccer, skating – pretty much everything we do is done with hips in flexion so that can predispose us to this particular problem (FAI)," explained Ho.

In Llibre's case, Ho repaired the tear and addressed the biomechanical defect (impingement) by reshaping the bones that rubbed against each other. (Tendonitis and early arthritis can also be addressed during surgery.)

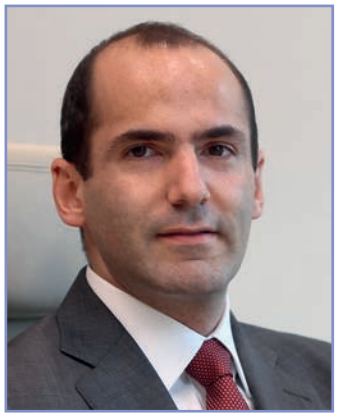
For Llibre, the 90-minute procedure was a life-changer. She was on crutches for almost four weeks but after three weeks started swimming and a few weeks later, began biking. Three months later she was running again, at about 80 percent effort. "I got such good advice from Dr Ho about how much I could do and when to back off -- and I didn't have to back off a lot."

Llibre's now back to training six days a week, usually twice a day. "To me, Dr Ho is a miracle worker," she said.

Ho is part of a team of University of Chicago Medicine orthopaedic specialists dedicated to comprehensive hip care. The team also includes Richard W. Kang, MD, MS, and Hue Luu, MD.

● To learn more about the University of Chicago Medicine, please contact our International Programs office by visiting *international.uchospitals.edu*, emailing *international.services@uchospitals.edu*, or calling +1-773-702-0506. MEH

A remedy for the region



By **Emile Salhab**, Principal, Health at Booz Allen Hamilton MENA

In healthcare settings across the world, the concept of excellence is undergoing a fundamental change, shifting to a model in which quality of care is no longer defined by clinical performance alone. Key now to determining, evaluating and ensuring best practice is the experience at the very heart of healthcare: the experience of the patient.

The scale of change is clear: almost half (45%) of US hospitals now report having a formal definition for patient experience as part of their care guidelines, and a recent study by Booz Allen Hamilton and Ipsos found that 32% of physicians are now working towards a patient-centered model of care.

With the shift in the US from fee-for-service to pay-for-performance, and therefore to quality rather than quantity of care, the incentives to provide a high-quality service are greater than ever – as are the penalties for failing to do so. Incentives under pay-for-performance are measured by patient outcomes (70%) and patient satisfaction (30%), demonstrating the direct impact that satisfaction can now have on a provider's financial bottom line.

In the MENA region, patient experience is increasingly forming an integral part of service delivery strategies. Recognizing that clinical procedures are only a part of the bigger care picture, some of the leading providers have created their own Patient Experience Team, particularly since two-thirds of interactions between patients and providers occur pre- and post-treatment, with hands-on treatment and time in hospital accounting only for a third.

While patient-centered care may appear to be a straightforward concept, its simplicity belies the diverse array of interactions that constitute a patient's experience of the healthcare system. From basics such as access to information and interactions within the healthcare setting, to practicalities such as insurance cover and understanding bills, the healthcare journey is complex. Yet, patients will quickly form opinions on the care environment: Is my room clean? Are the facilities tired or state-of-the-art? Is the environment a quiet and calm one, or disorganized and chaotic?

These are just a few of the many questions that feed into the patient experience, not just of care, but pre- and post-care too, with technology playing an increasingly important role in shaping that experience for the better.

Pre-Care

New technology means care today is not delivered only in a clinical setting. At home, patients are now able to take advantage of a range of devices and apps to help them manage their health, and many will be familiar with the lifestyle end of the healthcare technology market, such as smartphone apps and fitness trackers. But, a new generation of healthcare-related products and services that provide robust medical interventions are beginning to make their mark, helping patients manage chronic conditions such as diabetes and heart disease in the comfort of their own home. Smart devices now mean vital information such as weight, blood pressure, physical activity, glucose levels and diet can be recorded on a daily basis by patients themselves, with the data relayed to healthcare workers for remote assessment.

Care

Within the care setting, new technological solutions are modernizing and enhancing the patient experience. Integrated electronic records systems are enabling immediate access to patient notes, thereby improving communication, clinical safety and quality of care – efficiencies that benefit both staff and patients. Radio frequency identification (RFID) wristbands also enable healthcare providers to monitor waiting times and notify patients, while kiosks and mobile apps allow patients to schedule appointments, view and pay bills and even make food choices. Enhancing the patient experience further: entertainment options, from on-demand television to a range of gaming possibilities.

Post-care

Technology is revolutionizing the post-treatment phase, too. New robotic surgery systems – able to carry out numerous procedures ranging from hysterectomies to heart bypass surgery – bring welcome advantages including faster patient recovery times and fewer post-operative complications. Back at home, advances in telehealth enable patients to remain connected to the healthcare system via smart devices, allowing their condition to be monitored, vital signs tracked and analysed, and in-person follow-up appointments scheduled if necessary.

As these pre-care, care and post-care developments attest, technology is destined to play a leading role in enabling a truly patient-centred culture of care, and steady growth in health informatics investment points to a desire amongst stakeholders to support the trend. Last year alone, healthcare providers in the Middle East spent over US$1.8 billion on integrating information technology with healthcare.

Technological tools

With investment in place, new technological tools will continue to facilitate a proactive approach to healthcare, shifting the care model from responding to a critical situation to instead employing longer-term, preventative measures. Already, trials of telemedicine have shown reductions of between 30% and 50% in re-admissions.

Stanford Medicine's ClickWell Care program is demonstrating the possibilities of telehealth. Launched at the start of 2015, ClickWell Care enables patients to schedule appointments via an app, speak with doctors via telephone or video calls, and transmit data from their home health devices. The program has achieved 60% adoption from its available patient base, and a year after its launch has seen more than 4,000 visits across a panel of 2,000 patients.

Results like these, which demonstrate the ability of technology to elegantly tackle long-standing systemic issues, have led industry experts to predict that use of home smart health technologies will skyrocket over the coming decade. A recent report from marketing intelligence firm Tractica pointed to the potential for staggering growth, estimating that worldwide take-up will grow from 14.3 million users in 2014 to 78.5 million in 2020.

On a broader scale, digital health solutions are fast-tracking the Middle East's ambitions to be a world leader in healthcare provision and innovation. At the same time, it is necessary to bear in mind certain factors that will allow the MENA region to reap the full benefits of a patient-centred, digitally-driven healthcare culture. Knowledge, training and commitment to change among healthcare professionals will be essential to ensuring a successful transition to the new model of care. Organizations will also need a fully functioning IT landscape, clear strategy and governance to implement the relevant degree of change.

Education and awareness among healthcare staff as well as a phased integration with existing services will ensure the transition is smooth and efficient. In a survey of Saudi Arabian healthcare providers, 71% said the main barrier to adopting telemedicine was a lack of knowledge of its meaning, applications and benefits, with 40% citing a lack of time to integrate it into their services. Over a fifth of the respondents said they did not perceive telemedicine as sufficiently important to warrant adopting it.

It is clear that new digital solutions and approaches have a central role to play, both in patients' health and that of the care system itself, and can go a long way in easing the pressure on medical staff resources in the Middle East. They can also aid the system in dealing with the difficulties of finding, recruiting and, crucially, retaining, qualified medical staff. The benefits of new technology – increased productivity, improved clinical outcomes and a better patient experience – can bring great benefits in an environment where healthcare resources are limited. And while shifting to a new culture of technology-led, patient-centred care can be long and sometimes cause a short-term dip in productivity, it is important to keep in mind that the long-term benefits far outweigh the transition challenges.

A model that is more flexible, and provides responsive and proactive care can help healthcare providers in the Middle East successfully tackle the challenges of the coming decades, while at the same time containing costs and ensuring sustainable and robust systems for years to come. A fully integrated digital approach with foresight, conviction and a buy-in from all stakeholders and most importantly, with the patient at its centre, will enable providers to efficiently adapt to the changing dynamics of the healthcare industry. MEH

The two ceiling-mounted arms on Multitom Rax can be moved into position automatically using robotic technology. While one arm moves the X-ray tube and the large touchscreen, the other carries the 43 x 43 cm flat panel detector, which can record static, dynamic and real 3D sequences.

Siemens Healthcare introduces first twin robotic X-ray system

Radiology's answer to the Swiss army knife

Siemens Healthcare has introduced the world's first twin robotic X-ray system. They call it the Multitom Rax (Robotic Advanced X-ray). The system enables a wide variety of examinations in a range of clinical areas to be performed using only a single X-ray system. In addition to conventional 2D X-rays, the system also makes it possible to perform fluoroscopy examinations, angiography applications and 3D imaging.

An operator controls of the system's movement. With the push of a button, both robotic arms are positioned automatically around the patient, improving both safety and convenience. There is no need to move the patient or to change rooms for further imaging procedures, which improved work processes in hospitals and increases economic efficiency.

The system was demonstrated for the first time late last year at the University Hospital Erlangen in the Netherlands.

"We see the Multitom Rax as a universal device that covers all aspects of X-ray diagnostics. You could call it radiology's answer to the Swiss army knife," says Professor Michael Lell, Senior Physician at the Imaging Science Institute of the University Hospital Erlangen.

The new system can be used in a wide range of applications, from emergency medicine to orthopaedics, angiography or fluoroscopy, and can thus help optimize clinical work processes. The detector can be freely positioned enabling quite different X-ray images, both static and dynamic, which can be taken in a single room using a single system.

Precision X-ray

The two ceiling-mounted arms on Multitom Rax can be moved into position automatically using robotic technology, and they can also be moved manually, servo motor supported, when required – to make fine adjustments, for example. While one arm moves the X-ray tube and the large touchscreen, the other carries the 43 x 43 cm flat panel detector.

"The robotic technology ensures a new level of precision and automation, enabling a new level of standardization and throughput", explains Francois Nolte, head of the X-ray Products Business Line at Siemens Healthcare. "The precise positioning of the arms in all three planes makes the examinations so much easier: regardless of whether the patient is standing, sitting or lying down, the robotic arms move with perfect accuracy using robotic technology. Our strategy is based on the principle that the system moves, not the patient, which reduces risk of additional injuries and pain."

With conventional radiography systems, the detector often has to be placed in an external holder. In addition to the extra time required, this also involves the challenge of positioning the tube at exactly 90 degrees. Multitom Rax does this at the push of a button for free exams. This also prevents any risk of having to repeat image processes because the tube was not precisely positioned.

The system also offers wireless, portable detectors in two different sizes that can be positioned directly between the wheelchair

or mattress and the patient's back, which avoids the need to sit the patient up. The automatic control of the robotic arms ensures that they will always take the shortest and safest route to reach the next programmed position. Pre-programmed safety zones and an automatic stop in response to contact also improve safety.

3D imaging

3D computed tomography (CT) images are often used in situations such as orthopaedic examinations involving the implantation of prosthetic joints, for example, to ensure that the artificial joint is best adapted to fit the patient's anatomy. The Multitom Rax makes it possible to take 3D images under the patient's natural weight bearing condition. 3D images can be made of all areas of the body with the patient seated, lying down or standing. Images taken while the patient is standing are essential because for example knees, pelvis and spinal column appear differently under the influence of the patient's body weight compared to when the patient is lying down. As a result, 3D images acquired by Multitom Rax offer better diagnostic and planning certainty compared to those that do not reflect a natural weight bearing condition. Conventional 2D x-rays, for example, do not always reveal fine hairline fractures in the bone. If a bone fracture is suspected, it has previously been necessary to take a 3D image using a CT system to be sure of the diagnosis. With Multitom Rax, however, a 3D image can be taken with the same system, and so the patient does not have to wait for a further appointment or to be transferred to the CT unit.

Easy access

A free-standing patient table and fully mobile system elements with Multitom Rax provide a more comfortable examination atmosphere. The system is designed for all patient types, from children to the elderly, mobile, immobile and obese individuals. The fact that the table can be adjusted to a very low 50 centimetre table height means that children can get onto it by themselves. It can also be positioned at the most convenient working height. The result is an improvement in both safety for the patient and the examining physician.

Future treatment trends

Care (Combined Applications to Reduce Exposure) applications support treatment standardization using Multitom Rax and aim to keep the radiation dose as low as possible for both patients and hospital staff. Removable scatter grids and a copper filter, combined with the sensitive detector, help to minimize dose. Precisely focusing on the area of the body to be X-rayed and avoiding the need to repeat examinations using X-rays helps protect patients from unnecessary exposure to radiation. In the case of fluoroscopy examinations, such as gastrointestinal or swallow exams, several Care features keep the dose low. A preliminary examination using an especially low radiation dose to fine-tune the tube and detector helps to correctly position even in very challenging exams. For all examinations, in addition, the dose used is automatically reviewed and recorded.

As a part of the Max system family from Siemens Healthcare, Multitom Rax stands out by providing the same image impression and thus making it easier to compare X-ray images. The controls and user interfaces on the Max systems are identical, which means the operators have no need to familiarize themselves over again with new equipment. The wireless detectors in the Max family can also be used equally with all the systems in the family, improving the level of flexibility. Multitom Rax is also configured to accommodate future trends in treatment with functions that can be adapted at a later time. And lastly, its closed surfaces are easy to keep clean, which contributes to the long service life of the system. MEH

Hip osteoarthritis may not appear on x-ray

In the majority of cases, hip x-rays are not reliable for diagnosing hip osteoarthritis (OA), and can delay the treatment of this debilitating disease.

These findings are the first to evaluate the diagnostic performance of an x-ray in patients with clinical signs and symptoms of classic OA. The study appears in the *British Medical Journal*.

Hip osteoarthritis (OA) is a significant source of morbidity causing pain, difficulty walking, and disability.

Researchers looked at the Framingham Osteoarthritis and Osteoarthritis Initiative studies, with nearly 4,500 participants. In the Framingham study, only 16% of patients with hip pain had radiographic hip OA, and only 21% of hips with radiographic OA had hip pain. Results of the Osteoarthritis Initiative were similar with nine percent and 24%, respectively. In both study populations, hip pain was not present in many patients with radiographic OA, and many with hip pain did not have imaging evidence of hip OA.

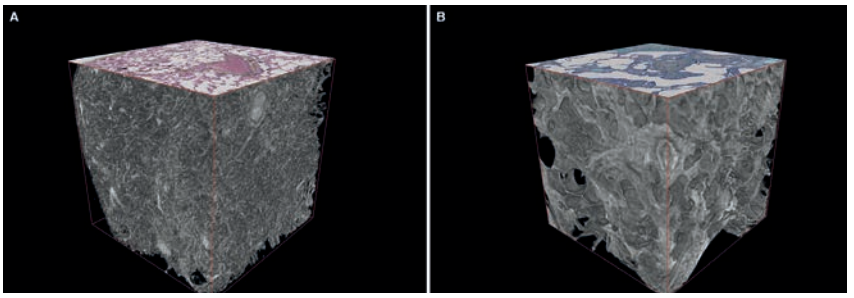
"The majority of older subjects with high suspicion for clinical hip osteoarthritis did not have radiographic hip osteoarthritis, suggesting that many older persons with hip osteoarthritis might be missed if diagnosticians relied on hip radiographs to determine if hip pain was due to osteoarthritis," explained corresponding author Chan Kim, MD, instructor of medicine at Boston University School of Medicine.

Missing the diagnosis of hip OA has consequences. According to Kim, up to 10% of patients with OA do not meet adequate physical activity recommendations, and are associated with having higher risk of developing heart or lung disease, diabetes, obesity and falls. "Given these findings, patients with suspected hip OA should be treated regardless of x-ray confirmation." MEH

Advanced 3D imaging technique applied for the first time to lung disease

Doctors and scientists at the University of Southampton have used advanced 3D X-ray imaging technology to give new insight into the way an aggressive form of lung disease develops in the body.

Originally designed for the analysis of substantial engineering parts, such as jet turbine blades, the powerful scanning equipment at Southampton's µ-VIS Centre for Computed Tomography, has been used to image Idiopathic Pulmonary Fibrosis (IPF) lung tissue samples for the first time.



2 mm cubes of lung tissue imaged by microCT. In (A) is normal lung tissue and in (B) is IPF lung tissue. The very fine lung structure seen in the normal lung tissue is destroyed by IPF and replaced by the much thicker scar tissue seen in (B).

IPF is usually diagnosed via a hospital CT scan or by using a microscope to view a lung biopsy sample however Southampton researchers have now successfully applied Microfocus CT to image biopsy samples. This allowed them to view each lung sample with a level of detail similar to an optical microscope but now in 3D.

It had been thought that active scarring in IPF progressed like a large 'wave' from the outside to the inside of the lung. Instead, the study, published in *JCI Insight*, found that there are large numbers of individual sites of active disease scarring. The research team, from the National Institute for Health Research Southampton Respiratory Biomedical Research Unit, believes this finding will help to ensure doctors develop targeted therapies focussing on these areas.

In the UK alone there are over 5,000 new cases of IPF are diagnosed each year, and the number of cases is increasing by around 5% every year. The condition, one of a group of disorders known collectively as interstitial lung diseases, causes inflammation and scarring of the lung tissue. This makes it increasingly difficult to breathe, and it leaves sufferers with a life expectancy of only three to five years.

The study's lead author Dr Mark Jones, a Wellcome Trust fellow from the University of Southampton and University Hospital Southampton, comments: "Whilst accurate diagnosis of IPF is essential to start the correct treatment, in certain cases this can be extremely challenging to do using the tools currently available. This technology advance is very exciting as for the first time it gives us the chance to view lung biopsy samples in 3D. We think that the new information gained from seeing the lung in 3D has the potential to transform how diseases such as IPF are diagnosed. It will also help to increase our understanding of how these scarring lung diseases develop which we hope will ultimately mean better targeted treatments are developed for every patient."

Microfocus CT can scan inside objects in great detail – rotating 360 degrees whilst taking thousands of 2D images, which are then used to build detailed 3D images.

Professor Ian Sinclair, Director of the µ-VIS Centre for Computed Tomography, says: "Our centre examines a wide variety of objects from the layup of individual carbon fibres in aircraft wing components, to the delicate roots of growing plants, and now parts of the body. By being a multidisciplinary centre we have a wealth of expertise that have allowed us to apply this technology in a way that has not been done before. This work is of great significance to us, with the long-term potential to translate our research from the bench to the bedside of patients."

The Southampton team are now studying how this technique can help doctors improve the way we diagnose such diseases more accurately, to ensure every patient will receive the correct treatment.

● doi:10.1172/jci.insight.86375 MEH

Xbox gaming technology may improve X-ray precision

With the aim of producing high-quality X-rays with minimal radiation exposure, particularly in children, researchers have developed a new approach to imaging patients. Surprisingly, the new technology isn't a high-tech, high-dollar piece of machinery. Rather, it's based on the Xbox gaming system.

Using proprietary software developed for the Microsoft Kinect system, researchers at Washington University School of Medicine in St. Louis have adapted hands-free technology used for the popular Xbox system to aid radiographers when taking X-rays.

The software coupled with the Kinect system can measure thickness of body parts and check for motion, positioning and the X-ray field of view immediately before imaging, said Steven Don, MD, associate professor of radiology at the university's Mallinckrodt Institute of Radiology. Real-time monitoring alerts technologists to factors that could compromise image quality. For example, "movement during an X-ray requires retakes, thereby increasing radiation exposure," Dr Don said.

"The goal is to produce high-quality X-ray images at a low radiation dose without repeating images," Dr Don said. "It sounds surprising to say that the Xbox gaming system could help us to improve medical imaging, but our study suggests that this is possible."

The technology could benefit all patients but particularly children because of their sensitivity to radiation and greater variation in body sizes, which can range from premature infants to adult-sized teenagers. Setting appropriate X-ray techniques to minimize radiation exposure depends on the thick- ▶

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Insider on Unilever's 'zerobased budgeting' strategy

Rafael Grossman
Healthcare Futurist, Technology Innovator and Surgeon, US

World's first Google Glass surgeon

TUESDAY 18
FINANCE & INTELLIGENT CITIES

James Baresse
Former CTO, **PAYPAL**

One of the leading minds behind the biggest fintech disruptor

Jonathan Reichental
CIO, **CITY OF PAOLO ALTO**

How to transform into a number one digital city in the world

WEDNESDAY 19
RETAIL & EDUCATION

Paul Clarke
Chief Technology Officer, **OCADO**

Becoming the world's largest online grocery store using AI & robotics

Assine George
CIO, **UNIVERSITY OF WESTERN AUSTRALIA**

Mapping a path to the most connected campus & pioneering the future of learning

THURSDAY 20
ENERGY

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ness of the body part being imaged. High-quality X-rays are critical in determining diagnoses and treatment plans.

Traditionally steel callipers have been used to measure body-part thickness for X-rays. However, callipers are a "time-consuming, intrusive and often scary to kids, especially those who are sick or injured," said Dr Don, a paediatric radiologist who treats patients at St. Louis Children's Hospital.

"To achieve the best image quality while minimizing radiation exposure, X-ray technique needs to be based on body-part thickness," Dr Don said. The gaming software has an infrared sensor to measure body-part thickness automatically without patient contact.

"Additionally, we use the optical camera to confirm the patient is properly positioned," he explained.

Originally developed as a motion sensor and voice and facial recognition device for the Xbox gaming system, Microsoft Kinect software allows individuals to play games hands-free, or without a standard controller. Scientists, computer specialists and other inventors have since adapted the Xbox technology for nongaming applications.

Dr Don and his colleagues, for example, combined the Microsoft Kinect 1.0 technology with proprietary software to improve X-ray imaging. With help from Washington University's Office of Technology Management, the team has applied for a patent.

Dr Don developed the technology with William Clayton, a former computer programmer at the School of Medicine, and Robert MacDougall, a clinical medical physicist at Boston Children's Hospital.

Dr Don and his colleagues are continuing the research with the updated Microsoft Kinect 2.0 and seek feedback from radiological technologists to improve the software.

While further research and development are needed, the eventual goal is to apply the technology to new X-ray machines as well as retrofitting older equipment.

"Patients, technologists and radiologists want the best quality X-rays at the lowest dose possible without repeating images," Dr Don said. "This technology is a tool to help achieve that goal." MEH

Does this ankle need an X-ray? There's an app for that

The Ottawa Rules, a set of rules used around the world to help health professionals decide when to order x-rays and CT scans, are now available as a free mobile health app.

● The Ottawa Rules app can be downloaded from the Apple App store on any device compatible with iOS or the Google Play Store for Android operating systems.

Developed by emergency department physicians at The Ottawa Hospital and the University of Ottawa, the Ottawa Rules are evidence-based decision trees that help physicians determine whether a scan is needed for injured bones, cutting down on unnecessary radiation and wait times. The existing rules for ankle, knee and spine injuries have been bundled together in a mobile app to appeal to a new generation of wired doctors, nurses and paramedics.

"Studies have repeatedly shown that the Ottawa Rules reduce unnecessary use of x-rays and CT scans, reduce wait times and save money for the health-care system," said Dr Ian Stiell, an emergency physician and research chair at The Ottawa Hospital, distinguished professor at the University of Ottawa and creator of the Ottawa Rules. "I am excited to be able to make the Ottawa Rules more accessible to clinicians around the globe."

The app includes the Ottawa Knee Rule, the Ottawa Ankle Rules and the Canadian C-spine Rule, which were previously only available as posters or online. The Ottawa Rules have been validated by more than 20 studies, translated into several languages and adopted worldwide. For example, two of Dr Stiell's rules made a list of the top five ways doctors in the United States can reduce unnecessary procedures, published in the prestigious journal *JAMA Internal Medicine*.

Seeing the potential of mobile technology to put the Ottawa Rules into the hands of health-care professionals, Dr Stiell joined forces with The Ottawa Hospital mHealth Research team led by Dr Kumanan Wilson, a specialist in general internal medicine and senior scientist at The Ottawa Hospital and professor at the University of Ottawa.

"I think it is great how a group of creative young people can take a world-class discovery like the Ottawa Rules and make it accessible to a new generation of physicians," said Dr Wilson, who also holds a chair in public health innovation. "This is a great model for innovation in medical care."

Studies have repeatedly shown that the Ottawa Rules reduce unnecessary imaging and emergency room wait times, which allows patients to feel more comfortable while waiting to be seen by a clinician. The Rules also lead to significant savings for hospitals. However, the creators of the Rules still face the challenge of dissemination. The team hopes the new mobile and web formats, with images of bone structures and YouTube videos, will help the Rules become more widespread in emergency departments around the world. MEH

Developed by emergency department physicians at The Ottawa Hospital and the University of Ottawa, the Ottawa Rules are evidence-based decision trees that help physicians determine whether a scan is needed for injured bones, cutting down on unnecessary radiation and wait times. The existing rules for ankle, knee and spine injuries have been bundled together in a mobile app to appeal to a new generation of wired doctors, nurses and paramedics.

Leading international expert in Metabolic Liver Disease to direct Hepatology Program at Children's Hospital of Pittsburgh of UPMC

Patrick McKiernan, M.D., a leading expert in metabolic liver disease, has been appointed director of the Pediatric Hepatology Program at Children's Hospital of Pittsburgh of UPMC, part of the Division of Pediatric Gastroenterology, Hepatology, and Nutrition. Dr McKiernan will also join the staff of the hospital's Center for Rare Disease Therapy.

Dr McKiernan specializes in treating children with inherited metabolic disease and has an interest in developing less invasive therapies to help patients avoid or delay the need for liver transplantation. His research focus covers the clinical aspects of inherited metabolic liver disease, portal hypertension, novel endoscopic techniques, non-invasive markers of hepatic fibrosis, and immunosuppression following liver transplantation. He is actively involved in research on stem cell therapy for metabolic liver diseases and recently was the U.K. principle investigator on a stem cell study involving children with urea cycle disorders and Crigler-Najjar syndrome.

"Dr McKiernan is among the world's leading physician-scientists with expertise in pediatric hepatology, specifically inherited metabolic disease," said Mark Lowe, M.D., Ph.D., chief of the Division of Pediatric Gastroenterology, Hepatology and Nutrition at Children's Hospital. "His appointment enhances Children's ability to provide care for children from around the world with complex metabolic conditions in need of the highest level of care."

Dr McKiernan also has a special interest is tyrosinemia, an inherited disorder caused by an enzyme deficiency that can lead to life-threatening liver and kidney failure. In a study published in 2014, Dr McKiernan and his colleagues found that children whose tyrosinemia was identified at birth through newborn screening and started on the drug nitisinone developed normally and showed no signs of liver or kidney disease.

Patrick McKiernan M.D., director of the Pediatric Hepatology Program at Children's Hospital of Pittsburgh of UPMC.

> Dr McKiernan specializes in treating children with inherited metabolic disease and has an interest in developing less invasive therapies to help patients avoid or delay the need for liver transplantation.

Dr McKiernan comes to Children's from Birmingham Children's Hospital in the United Kingdom, where he was a hepatologist in the liver unit since 1994. He trained in medicine and pediatrics at Queen's University in Belfast.

Dr McKiernan is a member of the British Medical Association, British Society of Pediatric Gastroenterology, Hepatology and Nutrition, British Association for the Study of the Liver, and American Association for the Study of Liver Diseases. He also is an associate professor at the University of Pittsburgh School of Medicine.

As an international expert in metabolic disease, Dr McKiernan is part of the Center for Rare Disease Therapy at Children's, an integrated team of experts who have developed innovative therapies to treat a multitude of rare diseases.

Children's has performed more than 330 liver transplants for patients with metabolic disease, which is more than any other center, including adult facilities. In addition, Children's is a leading center for liver transplantation as a therapeutic option for children with maple syrup urine disease (MSUD). Children's developed the first liver transplant protocol for MSUD in 2004 and since then has successfully performed more liver transplants in patients with MSUD than any other center in the world with 100% patient and graft survival.

■ For more information on Dr McKiernan and the Pediatric Hepatology Program at Children's Hospital of Pittsburgh of UPMC, please visit *www.chp.edu/hepatology*.

KIMES grows from

The 32nd Korea International Medical and Hospital Equipment Show (KIMES 2016) was held in Seoul's COEX centre from 17-20 March.

Under the theme "Leading Technology, Better Healthcare", the event aimed to assist the further development of the medical equipment industries in Korea and neighbouring nations, as well as promote trade, on both the domestic and international levels in medical equipment.

In a further boost to the status of KIMES, the Ministry of Trade, Industry and Energy selected KIMES 2016 as a Top Leading Exhibition in Korea as it supports the recruitment of new customers and reinforces medical business from Korea to the world.

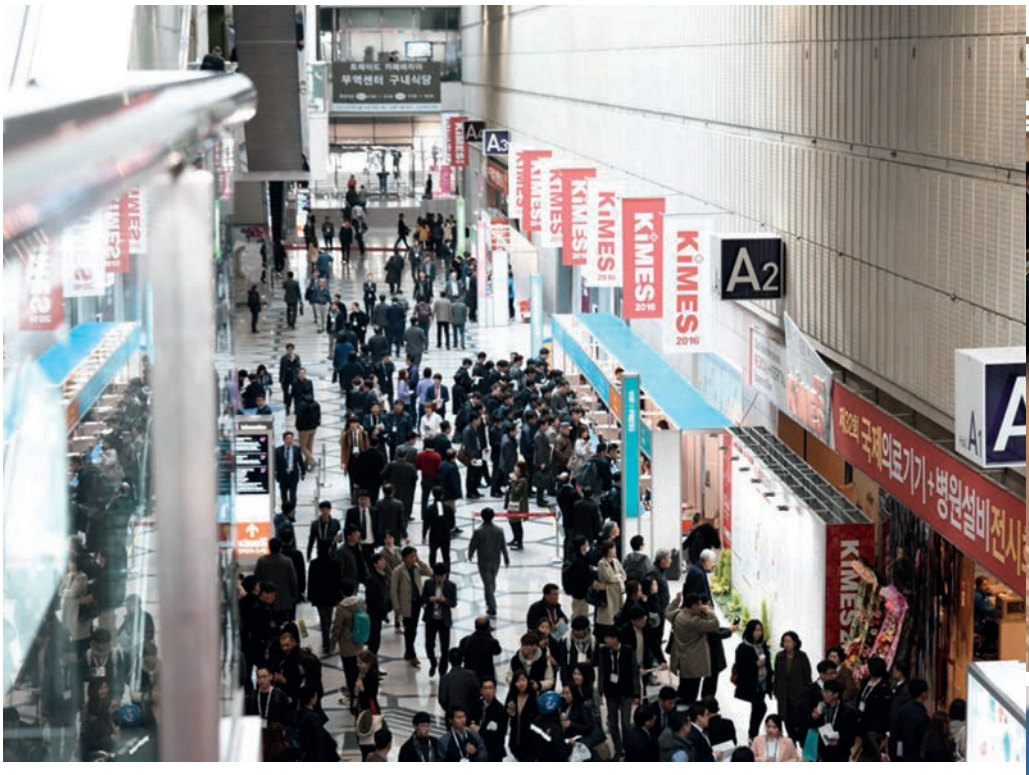
The Korean Government noted that the medical industry is one of the key industries that will propel the Korean economy in the future, and if offering substantial financial and political support to the industry.

At KINES 2016 a wide range of products were on offer from some 548 Korean manufacturers and from many other countries including USA 107, Japan 64, Germany 75, and China 139.

Large Korean companies were present such as Samsung, Listem, JW Medical, DK Medical, BIT Computer and Alpinion. And several global brands also exhibited their products including: GE, Fuji, Shimadzu, Hitachi and Wego.

In total there were 37 countries exhibiting with 1,152 companies, the highest number in the event's 32-year history.

The main exhibits cover the following: Consultation & Diagnosis Equipment; Clinical Examination Equipment; Radiology Equipment; Surgical Apparatus & Equipment; Cure Apparatus & Equipment; Physiotherapy Apparatus; Ophthalmic Apparatus; Dental Apparatus; Central Supply Equipment; Hospital Facilities & Emergency Equipment; Medical Information Systems; Oriental Medicine; Pharmaceutical Equipment; Cosmetic Dermatology; Medical Device Component & Service; and Disposable Apparatus, among others.



There were more than 73,000 visitors from 86 countries including Oman, UAE, Qatar and Saudi Arabia. This is also a record for KIMES and is indicative of the growing stature and importance of this trade show.

Alongside the exhibition 139 seminars were concurrently held in the COEX Center which provided information and expert knowledge on a wide range of topics, including government policies

strength to strength

on the medical devices market, the latest medical device technologies, and financial technology for doctors.

Trade

A Global Bio & Medical Plaza was set up to facilitate cooperation and trading between Korean and overseas companies in the bio and medical industries. It was designed to develop concrete business relationships and pursue potential contract opportunities between guests from overseas and Korean companies.

Scholarship

As an aside to the annual event, KIMES, wishing to contribute to the healthcare industry through finding talented students and fostering upcoming generations, started to offer "KIMES Scholarships" to young students whose college major is in biomedical engineering from 2014. This is a welcome addition for students. MEH

Major study shows little progress in tackling global pandemic of physical inactivity

A new study of over 1 million people finds that doing at least one hour of physical activity per day, such as brisk walking or cycling for pleasure, may eliminate the increased risk of death associated with sitting for 8 hours a day.

Physical inactivity is linked to an increased risk of heart disease, diabetes and some cancers and is associated with more than 5 million deaths per year and, as the first global economic analysis of physical inactivity shows, costs the world economy over US$67.5 billion per year in healthcare costs and lost productivity.

The findings come from a new four-paper Series published in The Lancet. The authors of the Series warn there has been too little progress in tackling the global pandemic of physical inactivity, with a quarter of adults worldwide still failing to meet current recommendations on physical activity.

Sitting time, physical activity and risk of death (paper 1)

Researchers analysed data from over 1 million people from 16 studies. The research team wanted to see how many hours of daily physical activity would be required to eliminate the association between prolonged sitting time and increased risk of death. Examples of physical activity were brisk walking at 5.6 km/h or cycling for pleasure at 16 km/h.

The researchers classified individuals into four equally sized groups according to how active they were – less than 5 mins a day for the least active, up to 60-75 mins a day for the most active.

People who sat for 8 hours a day but were physically active had a much lower risk of death compared to people who sat for fewer hours a day, but were not physically active. This suggests that physical activity is particularly important, no matter how many hours a day are spent sitting. In fact, the increased risk of death associated with sitting for 8 hours a day was eliminated for people who did a minimum of 1-hour physical activity per day. The greatest risk of death was for people who sat for long periods of time and were inactive.

WHO guidelines recommend that adults should do at least 150 mins of physical activity per week, which is much lower than the 60-75 mins per day identified in this analysis. The study also warns of the progress that remains to be made in increasing levels of physical activity since only about 25% of people in the analysis did an hour or more physical activity per day.

"There has been a lot of concern about the health risks associated with today's more sedentary lifestyles," says lead author Professor Ulf Ekelund, the Norwegian School of Sports Sciences, Norway and the University of Cambridge, UK. "Our message is a positive one: it is possible to reduce – or even eliminate – these risks if we are active enough, even without having to take up sports or go to the gym."

He adds: "For many people who commute to work and have office-based jobs, there is no way to escape sitting for prolonged periods of time. For these people in particular, we cannot stress enough the importance of getting exercise, whether it's getting out for a walk at lunchtime, going for a run in the morning or cycling to work. An hour of physical activity per day is the ideal, but if this is unmanageable, then at least doing some exercise each day can help reduce the risk."

The research team also looked at time spent watching TV per day – a specific type of sedentary behaviour - in a subgroup of approximately half a million people. They found similar results: sitting watching TV for over 3 hours per day was associated with an increased risk of death in all activity groups, except the most active. The authors stress that the association is likely not because of a causal link between watching TV and an increased risk of death, but simply that watching TV is a specific type of sedentary behaviour. The increased risk of death associated with sitting watching TV for many hours a day was slightly greater than the increased risk of death associated with total sitting time. The authors say that this could be due to a number of factors – for instance, long hours watching TV may be a marker of a more unhealthy lifestyle in general including being less likely to take exercise. Also, because people usually watch TV in the evenings after dinner which might affect their metabolism, or because people may be more likely to snack while watching TV.

The authors warn that the study mainly included data from people aged over 45 years old from the USA, Western Europe and Australia, so may not apply to other populations.

Economic burden of physical inactivity (paper 2)

In the first study to estimate the global economic burden of physical inactivity, researchers estimated the total cost of physical inactivity to be at least INT$67.5 billion in 2013 – equivalent to what US$67.5 billion could buy in the United States in 2013, or the total Gross Domestic Product of Costa Rica in the same year. In the USA alone, the economic burden of physical inactivity in 2013 was US$27.8 billion, compared to R$3.3 billion in Brazil, £1.7 billion in the UK and AUS$805 million in Australia.

The study found that high-income countries bear a much larger proportion of the economic burden associated with physical inactivity (80.8% of health-care costs in high-income countries and 60.4% of indirect costs), whereas low-income and middle-income countries have a larger proportion of the disease burden (75.0% of the global burden of disease for physical inactivity is borne by low and middle-income countries).

"The current economic cost of physical inactivity is borne mainly by high-income countries. However, as low and middle income countries develop, and if the current trajectory of inactivity continues, so too will the economic burden in low and middle income countries who are currently poorly equipped to deal with chronic diseases linked to physical inactivity," says lead author Dr Melody Ding, University of Sydney, NSW, Australia. "Our study makes the economic case for a global response to promote physical activity to tackle diseases such as diabetes, heart disease and some cancers, with the aim of reducing health inequalities."

The authors note that the study only included costs for the five major diseases associated with physical inactivity (coronary heart disease, stroke, type 2 diabetes, breast cancer, and colon cancer), therefore the cost calculations are based on conservative estimates, and the true cost may be even higher.

Progress since the 2012 Olympic Games (paper 3)

Although there has been progress in developing national policies, the authors found these were too often not being put into practice. In 2010, 75% of countries reported having a physical activity policy but only 44% reported it being operational. In 2015, over 90% had a policy and 71% reported it being operational. But there has been little progress in increasing levels of physical activity with 23% of the global adult population and 80% of school-going adolescents failing to meet the WHO recommendation of 150 minutes of moderate-intensity exercise per week in 2015.

"In the past four years, more countries have been monitoring progress in physical activity, but evidence of any improvements is scarce. We know that physical inactivity is linked to diseases including heart disease, diabetes and some cancers, and new evidence also shows that 300,000 cases of dementia could be avoided annually if all people were physically active. The global pandemic of physical inactivity remains, and the global response has been far too slow," says lead author Professor Jim Sallis, University of California San Diego, San Diego, CA, USA.

Smarter approaches to physical activity (paper 4)

Increasing levels of physical activity will require collaboration between schools, urban planning, transport, sports and recreation and the environmental sectors, and greater efforts should be made to actively monitor physical activity as a risk factor in clinical practice. The authors point to several successful examples such as the Bus Rapid Transit (BRT) System introduced in Curitiba (Brazil), Bogota (Colombia) and Cambridge (UK) which puts stops further apart than traditional bus stops to encourage walking; or the Coordinated Approach to Child Health (CATCH) in the USA which promotes a healthy school environment including physical activity, food, nutrition and sun protection.

"Large-scale problems require large-scale solutions, and we need commitment from governments, as well as international organisations to tackle the global public health challenge of physical inactivity. Science and practice are providing important evidence, but now is the time for action," says Professor Rodrigo Reis, Washington University in St Louis, St Louis, MO, USA.

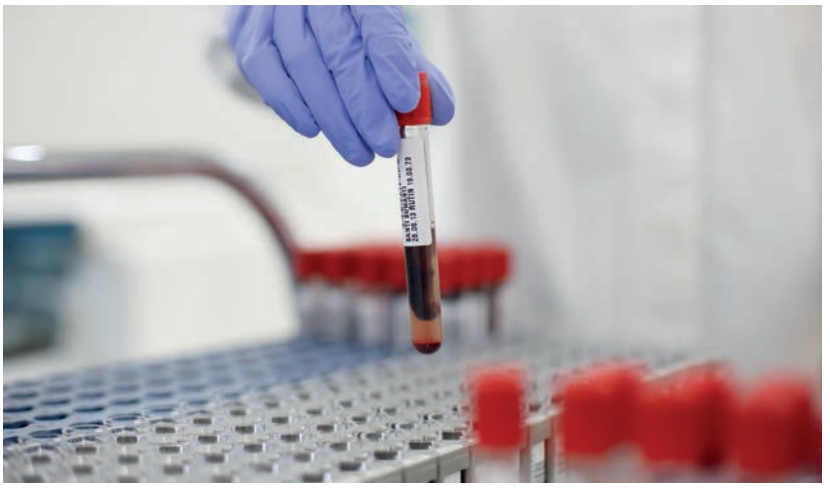
Writing in a linked Comment, Dr Pam Das, Senior Executive Editor and Dr Richard Horton, Editor-in-chief of The Lancet say: "The world needs to get serious about physical activity. And that means money – for capacity in public health departments to undertake adequate surveillance, cross-sector partnerships, interventions, policy monitoring, and research, especially the cost-effectiveness of interventions. There is extensive evidence about the need for action to improve physical activity, what actions are most promising, and who needs to be involved. But capacity and funding remains insufficient because physical activity is not taken seriously enough to rise to the top of the funding priorities."

on the WEB The Lancet Series – Physical Activity 2016: Progress and Challenges
www.thelancet.com/series/physical-activity-2016 MEH

In-vitro Diagnostics – the more questions we answer, the more lives we save

Demand for healthcare is growing around the globe. In almost every corner of the world, the proportion of the population aged over 60 is growing faster than any other age group[1]. The rising pervasiveness of chronic diseases such as cancer, diabetes and cardiovascular diseases, costs and scarce resources are at a collision.

Countries can no longer afford inefficient healthcare systems. If treatments are given incorrectly, money is squandered and outcomes are diminished. Failure in accurately diagnosing diseases early on paves the way to a plethora of pro¬blems including but not limited to: expensive, late-stage and overuse of therapies and poor disease management. From an economic perspective, these inefficacies result in superfluous spending.



What are in-vitro diagnostics?

In vitro diagnostics (IVDs) are non-invasive tests performed outside of the body on the blood, tissue, or other body fluids of a patient. IVDs play a critical role in driving clinical decision-making across medicine and their true impact includes the cost savings and increased efficiencies of the downstream activities to which the testing leads or prevents (Petry et al., 2015; Sharma et al., 2015; Vyberg et al., 2015). Despite the potential of modern IVDs to advance sustainable healthcare, they remain currently underexploited and undervalued. For example, IVDs account for 2.3% and 1.4% of total health care expenditure in the U.S. and Germany, respectively, while driving 66% of clinical decision-making (Rohr et al., 2016).

IVD testing answers many crucial questions about a patient's health status: their risk or predisposition for developing a certain condition, the severity of their disease, chances of responding to a given procedure or therapy and disease progression once treatment has begun. IVDs have the potential to reduce costs by allowing earlier, personalised interventions that can reduce consequent health problems, ward off unfavourable consequences, reduce or even eliminate time spent in hospital and avoid the cost of late-stage or unnecessary treatment (Davis et al., 2009; Institute of Medicine, 2015).

Medical Value IVDs that provide validated, relevant and actionable data (Schäfer et al., 2015a, 2015b) empower providers and payers to reduce spending improve outcomes and deliver cost-effective care at every step of the patient's journey.

So why are IVDs underutilised?

Firstly, it is complex to gauge the cost of not doing something, such as ordering a test. If a payer captures laboratory test bills, but not long-term savings (i.e. less use of downstream resources), diagnostic testing will always appear as a net cost. Moreover, convincing evidence of the direct health and economic effects of IVDs on patient outcomes is scarce (Hallworth, 2015a; Lewin Group, 2009b; Rohr et al., 2016).

In addition, IVDs are too often easy targets for short-term budget cuts, even if those cuts ultimately increase society's overall healthcare bill. For instance, the World Health Organization (WHO) recently completed a longitudinal study of tuberculosis (TB) control using data from 21 EU countries. Due to shrinking public health budgets during the 2008-2011 economic downturn, IVD testing decreased, and rates of TB case detection fell by 5.22 percent across the EU (Reeves et al., 2015). The result? WHO projects that the prevalence of TB and TB-attributable mortality will increase by as much as 3 percent for more than a decade after the recession ended (Ibid.)

However, IVDs are uniquely capable of advancing sustainable healthcare in three key ways:

1. Early detection and treatment
2. Targeted delivery of medicine
3. Optimised disease management

A recent WHO report concluded that evidence-based treatment using diagnostic tools is urgently needed in developing nations to replace the less effective "syndromic management" approach, which treats patients on the basis of a constellation of symptoms, rather than on data (Peeling and McEnerney, 2011).

At Roche Diagnostics, innovations in solutions are helping to remove uncertainty from healthcare, providing fast answers to patients' most pressing questions, and saving providers' money without compromising environmental impact reduction goals.

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There are treatments available for Orphan or Rare Diseases

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

On the rare occasion I fall ill, I often assume and take for granted that there is some sort of medication available that will cure me or at least improve my symptoms. For common illnesses I find there are a variety of therapies and many different brands of similar products on the market, as much research and development is spent on improving medicines for the most common and well established illnesses. However, those suffering from rare or orphan diseases often can be left with very few treatment options.

A disease is classified as rare when there are less than a designated number of recorded cases. This number varies dependent on which country but as an example, within the EU a rare disease is classified by having less than 10,000 cases, and in the USA it is less than 200,000. Rough estimates suggest that there are 350 million people worldwide living with an orphan or rare disease. Globally, there have been 6000-8000 orphan diseases identified, yet only an estimated 500 of them have treatment options, not all of which are successful. That leaves a large number of patients who have little to no treatment options. In particular, the Middle East has many unmet needs for orphan disease drugs. I recently read that among the estimated population of 400 million, around 2.8 million patients in the Middle East are suffering from a rare or orphan disease.

The pharmaceutical industry has actually witnessed a significant shift towards research and development of drugs for orphan and rare disease indications. Putting the patient first is at the heart of the industry, and with this in mind, most regulatory agencies across the world have allowed some flexibility in the supply process in order to provide patients-in-need access to life-changing medicines, without having to wait for approval or commercial launch. These methods come under the umbrella term 'Managed Access Programs' (MAPs). MAPs are a method of bridging the gap between clinical trials and commercial availability. They are put in place in order to provide patients with no other viable treatment options and an unmet medical need, the ability to access potentially lifesaving medicines at various stages of their product lifecycle.

The high cost of drug development, stringent regulations and a low return on investment can discourage pharmaceutical companies from investing money into the research and development of drugs for small populations of patients. Because of this, government involvement is necessary to support the orphan drug market. According to *www.orphan-drugs.org*, some governments have assisted hospitals in the GCC region with importing medication from other countries by offering reimbursement. Government incentives such as the FDA Orphan Grants Program, and the 10 years' market exclusivity and reduced regulatory fees offered by the European Medicines Agency, have allowed the orphan drug market to become an increasingly viable financial option for pharmaceutical companies. In addition to this, clinical trials involving orphan drugs tend to be smaller and shorter, and successful treatments are pushed through regulatory processes substantially quicker than medicines for more common indications. This means that orphan drug clinical trials are typically a less financially demanding investment.

MAPs can not only assist an innovator in providing potentially lifesaving treatment, the programs can also help identify or confirm patient populations, key physicians and opinion leaders, and provide an opportunity to gain access to real world treatment and usage patterns while collecting supplementary data. Durbin has been running Managed Access Programs and worldwide distribution programs for pharmaceutical and biotech companies on an exclusive basis for over 25 years. We have extensive knowledge of the regulatory requirements in the EMEA markets and rest of the world. I am extremely proud to say we have assisted in saving the lives of many people and will always strive to continue doing so! MEH

Durbin PLC is a British company based in South Harrow, London. Established for over 50 years, Durbin is a global specialist distributor operating in niche areas of pharmaceutical and medical distribution. Comprising of nine specialist divisions, Durbin prides itself on being a trusted global partner to healthcare manufacturers. The company is fully licensed by the UK MHRA, USA Pharmacy Authorities and DEA. Durbin has offices in the UK and in the USA and so can provide US, UK and European products directly from source.

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Prenatal exposure to paracetamol may increase autism spectrum and hyperactivity symptoms in children

A new study has found that paracetamol (acetaminophen), which is used extensively during pregnancy, has a strong association with autism spectrum symptoms in boys and for both genders in relation to attention-related and hyperactivity symptoms.

The findings were published in July 2016 in the *International Journal of Epidemiology*. This is the first study of its kind to report an independent association between the use of this drug in pregnancy and autism spectrum symptoms in children. It is also the first study to report different effects on boys and girls. Comparing persistently to nonexposed children, the study has found an increase of 30% in the risk of detriment to some attention functions, and an increase of two clinical symptoms of autism spectrum symptoms in boys.

Researchers in Spain recruited 2644 mother-child pairs in a birth cohort study during pregnancy. 88% were evaluated when the child was one year old, and 79.9% were evaluated when they were five years old. Mothers were asked about their use of paracetamol during pregnancy and the frequency of use was classified as never, sporadic, or persistent. Exact doses could not be noted due to mothers being unable to recall them exactly.

The study shows that 43% of children evaluated at age one and 41% assessed at age five were exposed to any paracetamol at some point during the first 32 weeks of pregnancy. When assessed at age five, exposed children were at higher risk of hyperactivity or impulsivity symptoms. Persistently exposed children in particular showed poorer performance on a computerised test measuring inattention, impulsivity and visual speed processing.

Boys also showed more autism spectrum symptoms when persistently exposed to paracetamol. Lead author Claudia Avella-Garcia, researcher at CREAL, an ISGlobal allied centre in Barcelona, explained that, "although we measured symptoms and not diagnoses, an increase in the number of symptoms that a child has, can affect him or her, even if they are not severe enough to warrant a clinical diagnosis of a neurodevelopmental disorder".

Co-author Dr Jordi Júlvez, also a researcher at CREAL, commented on the possible reasoning for the effects of paracetamol on neurodevelopment: "Paracetamol could be harmful to neurodevelopment for several reasons. First of all, it relieves pain by acting on cannabinoid receptors in the brain. Since these receptors normally help determine how neurons mature and connect with one another, paracetamol could alter these important processes. It can also affect the development of the immune system, or be directly toxic to some foetuses that may not have the same capacity as an adult to metabolize this drug, or by creating oxidative stress."

There could also be an explanation for why boys are more likely to have autism spectrum symptoms: "The male brain may be more vulnerable to harmful influences during early life," said Claudia Avella-Garcia. "Our differing gender results suggest that androgenic endocrine disruption, to which male brains could be more sensitive, may explain the association."

The study concluded that the widespread exposure of infants to paracetamol in utero could increase the number of children with ADHD or autism spectrum symptoms. However, they stressed further studies should be conducted with more precise dosage measurements, and that the risks versus benefits of paracetamol use during pregnancy and early life should be assessed before treatment recommendations are made.

doi: 10.1093/ije/dyw115

Paracetamol could be harmful to neurodevelopment for several reasons. First of all, it relieves pain by acting on cannabinoid receptors in the brain. Since these receptors normally help determine how neurons mature and connect with one another, paracetamol could alter these important processes. It can also affect the development of the immune system, or be directly toxic to some foetuses that may not have the same capacity as an adult to metabolize this drug, or by creating oxidative stress.

Colour up your lab!

The times are over when hospitals, doctor's offices and laboratories were completely kept in sterile white. More and more often you see a consistent design and colour concept in laboratories, also called Corporate Identity. No matter if you like to create colourful accents or even choose one colour for all surfaces, your design possibilities are almost endless. The combination of different materials like wood with granite or the mixture of cold and warm tones gives your laboratory design that little extra something you are looking for. You have a wish – we have the solution, true to our slogan "WE CREATE SOLUTIONS". In this context, we do not limit ourselves only to laboratory furniture and laboratory table plates, but rather we also colour match our preparation cabinets for storing histological tissue samples with the corporate identity of your laboratory.

During production of high pressure laminate, fine paper layers as well as a thin eco-friendly melamine resin film are applied on top and bottom of a wooden base plate. Then, the different layers are pressed together under high pressure of 75 kg/cm³ and temperature of approximately 150 °C, making the furnishings colour fast and light insensitive; moisture resistant and hence suitable for damp environments; resistant against high temperature and most chemicals. Nonetheless you may not forget that good medical support also requires high standards of hygiene and cleanliness. For that reason, all of our laboratory furniture made of high pressure laminate is additionally coated with the antimicrobial Sanitized® coating with silver ions, which kills 99.9 % of bacteria within 24 hours.

Eco-Friendly Lab Solutions – For the good of your employees and the environment

Working in a pathology laboratory involves working with harmful substances such as gases, fumes or suspended particulates. With every breath, laboratory staff runs risk of taking up those harmful substances. We have taken this issue to heart and created eco-friendly working tables for slicing and preparing histological tissues with integrated permanganate carbon filters that provide a pollution-free working environment while preserving energy and resources. By using such filters, we enable our customers to permanently reduce their operation costs by up to 30%. The reason for this is the fact that these tables do not have to be connected to a site-mounted exhaust system. The integrated ventilation systems take over the job of filtering and purifying contaminated air. The interesting thing about those filters is that contaminated air is being vacuumed downwards and even backwards throughout the entire working area preventing harmful substances from rising. Results have shown that the MAC value (maximum concentration value) for work involving formaldehyde and formalin are significantly underscored.

Additionally, these special working tables have a soundproofed exhaust fan that substantially reduces the noise level to a minimum and to top it off, the tables are even being delivered ready for use. Hence, laboratory processes are not disturbed or even interrupted by expensive installation work.

This means for the user: Plug in and Work!

● For more information, please contact Kugel Medical via e-mail at: *info@KUGEL-medical.de*

Timesco Optima Pocket diagnostic sets designed with precision optics

The Timesco Optima Pocket diagnostic sets have been designed to offer the clinician and student alike with a perfect diagnostic tool for ophthalmology and aural examination with the convenience of being small enough to be carried in a pocket!

The Timesco Optima Pocket diagnostic sets feature the same superb quality optics, precision lenses, fibre optics and Xenon illumination for pure white light and durable materials as our Desk and Wall mounted Diagnostic sets, Optima Neo.

Individual Ophthalmoscopes and Otoscopes as well as a combination of both in diagnostic sets in hard and soft cases are available.

The Optima Pocket Ophthalmoscopes feature durable construction, superb bright Xenon white light Illumination and five apertures: large, small macular (spot), half moon, fixation, red free filter and 18 dioptre lenses.

The Optima Pocket Otoscopes features high intensity Xenon illumination and fibre optics.

Timesco Optima Pocket Diagnostic Sets are constructed from durable plastics, metal alloys and stainless steels.

Timesco Healthcare diagnostic products are ISO, CE and FDA approved and guaranteed for materials and manufacture.

- For more information, visit: *www.timesco.com*

Rethinking ways to prevent bacteria propagation

Healthcare Acquired Infections are a leading cause of complications or death around the world. Our hands are infection vectors for the microbes. Preventing deadly diseases such as MRSA, SARS, NHN1, Ebola, Clostridium difficile and norovirus is a top priority for hospitals which must take new measures to prevent bacteria spreading and keep patients, staff or visitors safe.

Bowman specializes in all Personal Protective Equipment (PPE) dispensing needs.

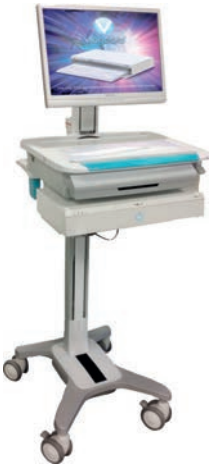
As the leader in dispensing protection, Bowman offers 4 different solutions to meet the isolation requirements. Bowman's versatile Protection Systems can satisfy any space, volume or budgetary specifications to help improve staff compliance to sanitary requirements.

Bowman Protection System Solutions

- Dispensers designed to enable the PPE to be always visible and accessible, allowing easy compliance and restocking.
- Dispensers accommodating most major brands of Gowns, Gloves and Masks enabling to keep the same durable dispensers even when changing suppliers of protective materials.
- Dispensers designed for low, medium or high PPE usage volumes.
- Dispensers adapting to your environment - Units can hang on the wall or door, permanently or temporarily, recess into the wall or be mobile with the unique cart dispensing system.
- Bowman offers Isolation Reference Cards & Free printable isolation signs to help prevent the spread of Healthcare Associated Infections.

■ For more information, visit: *www.BowmanDispensers.com*

Vioguard's Self-Sanitizing Automatic Keyboard System



The spreading of deadly pathogens through cross-contamination is increasing with the greater use of shared computer keyboards in OR and patient rooms. Manually disinfecting the uneven surface of keyboards is not efficient in urgent situations or busy environments. Keyboards are a main vector of transmission for viruses and bacteria.

Vioguard's Self-Sanitizing Keyboard uses the germicidal properties of ultraviolet light (UV-C) to automatically and consistently disinfect keyboards after every use, killing 99.99% of harmful microorganisms within seconds, eliminating the need for disposal of biohazard waste.

■ For more information, visit: *www.vioguard.com*
Watch video: *www.youtube.com/watch?v=nPxQckZBN-I*

Roche launches innovative Accu-Chek Guide blood glucose monitoring system

Roche has launched their Accu-Chek Guide, the next-generation blood glucose monitoring system. This new system is designed to make everyday blood glucose (BG) monitoring easier with features such as the spill-resistant SmartPack test strip vial, which helps users to remove just one strip at a time and avoid spillage or contamination. First markets to launch the new system are Denmark, Switzerland and Australia. More countries will follow in early 2017.

The Accu-Chek Guide system enables on-board pattern detection that helps to increase awareness of too high or too low glucose readings as well as Bluetooth Low Energy connectivity to the Accu-Chek Connect diabetes management solution via a mobile app. This cloud-based solution guarantees a secure online data exchange and automatic data logging. People with diabetes, caregivers, and healthcare providers can share diabetes information virtually anywhere for timely advice and remote monitoring.

The Accu-Chek Guide system not only fulfills current accuracy standards but delivers even tighter 10/10 accuracy for more reliable results. Consistently accurate measurements are essential for reliable BG monitoring and deriving the correct therapy decisions. Large deviations of the measured BG values from the true glucose levels can result in higher HbA1c levels, glycemic excursions and markedly increased rates of hypoglycemic events, as a recently published retrospective study revealed. In addition, studies have demonstrated that only about half of the BG meters evaluated meet the minimum accuracy requirements as defined by the ISO 15197:2013/EN ISO 15197:2015 standard.

■ For more information, visit: *www.accu-chek.com*

Carestream shipping new DRX Core family of detectors

Carestream is shipping its new DRX Core family of DRX detectors designed to make reliable, high-quality DR imaging affordable for imaging centres, small to mid-size hospitals, urgent care facilities, specialty clinics and providers that perform mobile imaging exams.

The DRX Core portfolio includes wireless gadolinium (GOS) and cesium (CsI) scintillators in 35 x 43 cm and 43 x 43 cm sizes – as well as fixed 43 x 43 cm detectors with both scintillators. The detectors are available in the United States, Canada and many countries in Europe, Asia and Latin America.

DRX Core detectors can be used with Carestream's DRX-Ascend System, DRX-Mobile Retrofit Kits and DRX-Motion Mobile X-ray System. Up to two DRX Core detectors can be registered with each system at any time. Facilities can combine DRX Plus, DRX-1 and DRX Core detectors to have a combination of eight detectors registered with DIRECTVIEW Software on each imaging system for simultaneous use.

DRX Core detectors deliver a preview image in three seconds and full-resolution display in 12 seconds. These detectors use the same battery as DRX Plus and DRX-1 detectors to maximize return on investment and streamline imaging operations.

DRX Core detectors can be used with Carestream's DIRECTVIEW software or Image Suite software. Image Suite software offers beam detection advantages that eliminate the need for a cable connection to the generator. Image capture will automatically start when the detector senses the X-ray exposure. DIRECTVIEW users can employ direct connection or beam detection methods. Carestream supports more than 180 different generator connection types.

DRX Core detectors offer a Level 4 liquid rating that provides protection against water spray from any direction. Tri- and bi-colour LED lights offer improved feedback of detector status.

■ For more information, visit: *www.carestream.com*

3D sound used as guidance system for visually impaired

The visually impaired will be able to use a new system of sensorial guidance that uses 3D sounds. The system was developed by Geko NAVSAT, a company that receives assistance from the Business Incubator at the Universidad Carlos III de Madrid (UC3M) Science Park. The application is designed to be installed in a mobile phone and uses satellite navigation and augmented acoustic reality to indicate to the user the correct path that is clear of obstacles.

The system uses three-dimensional acoustic stimuli to guide the user along unfamiliar routes without the need to carry a mobile and look at it. The way the system works is simple and intuitive: the user can hear a cracking sound through any stereo earphone and identifies where it is coming from. "We use the richness of 3D perception that sound has and we combine it with satellite navigation technology so that users can orient themselves in a specific direction," explains one of the creators of this innovation, Rafael Olmedo, the head of Geko NAVSAT.

Another one of the proposals offered by these researchers is the use of bone conduction earphones, which allow the user to continue to hear sounds from the surrounding area as well as the cracking sounds. "This is important because visually impaired people need to continue hearing environmental sounds and these bone conduction earphones allow them to hear a layer of augmented acoustic reality that is superimposed on the environmental sounds," says Rafael Olmedo.

"The distinctive feature is that we using all the richness of 3D perception. That 3D perception is what allows users to identify and orient themselves in a concrete environment.

"A sensory stimulus based on 3D stimulus has more intuitive processing. The user doesn't have to be thinking about the information. The information is perceived," Olmeda points out.

"The main innovation with the sensory guidance, is on the one hand to integrate binaural 3D sounds with satellite technologies.

"We have a first product development that we are using with mountain sports users that we are improving and making accessible to people with visual disabilities.

"Our challenge is to make users able to use this precise system within a metre distance, so that they can trust that the system is taking them along the right path."

The company has already developed a mobile application (Acoustic Trail) that uses 3D acoustic stimuli to guide people who practice mountain sports, and it is working on a prototype that would be accessible to visually impaired individuals; they expect it to become available in the coming months. "The UC3M Science Park is helping us to introduce the system to the market," those at the company comment. "Our main challenge is to make it so that the system's GPS guidance is precise to within one meter, so that the user can feel completely confident that the system is leading them down the right path," adds Olmedo.

This company's goal is to take full advantage of satellite navigation and integrate its potential with other technologies in order to develop innovative products and produce new application. Based on their experience carrying out international and national collaborative R+D projects, Geko NAVSAT is applying advanced satellite navigation technology to develop innovative technological solutions and products in sectors such as aerospace, intelligent transportation, ICT, security, emergencies and the environment. MEH

Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
SEPTEMBER 2016		
International Congress on Antiphospholipid Antibodies 2016	21 – 24 September, 2016 Antalya, Turkey	*www.apsistanbul2016.org*
1st Dubai Shoulder Course	22 – 24 September, 2016 Dubai, UAE	*www.DubaiShoulder.com* *DubaiShoulder@InfoPlusEvents.com*
Surgery and Anesthesia Summit	24 -26 September, 2016 Dubai, UAE	*www.bioleagues.com/conference/surgery-anesthesia-conference*
World Congress on Otology, Rhinology and Laryngology	24 -26 September, 2016 Dubai, UAE	*www.bioleagues.com/conference/otorhinolaryngology-meetings-dubai*
The Middle East Health Care Facility Design Projects Conference	25 – 27 September 2016 Dubai, UAE	*www.healthcarefacilityprojects.com*
Oman Health 2016	26 – 28 September 2016 Muscat, Oman	*info@omanexpo.com* *www.omanhealthexpo.com*
6th International Arab Neonatal Care Conference	29 September – 1 October 2016 Dubai, UAE	*www.ancc2016.com*
Contemporary Diagnosis and Management of Cardiovascular Diseases	30 September – 1 October 2016 Dubai, UAE	*www.bit.ly/28ShWXD*
Breast Cancer Conference 2016	29 September – 1 October 2016 Kuwait City, Kuwait	*contact@diaedu.com* *http://bcckuwait.com*
October 2016		
Dubai Health Regulation & Medical Tourism Conference	4 – 5 October, 2016 Dubai, UAE	*www.dhrc.ae*
MEHIS — Middle East Healthcare Informatics Summit	4 – 6 October, 2016 Dubai, UAE	*www.mehisummit.com*
International Conference on Molecular Biology	10 – 11 October, 2016 Dubai, UAE	*www.molecularbiology.conferenceseries.com*
8th Annual Pharma Middle East Congress	10 – 12 October, 2016 Dubai, UE	*www.middleeast.pharmaceuticalconferences.com*
3rd World Congress on Hepatitis and Liver Diseases	10 – 12 October, 2016 Dubai, UAE	*www.hepatitis.omicsgroup.com*
MENA Physical Medicine and Rehabilitation Congress	13-15 October, 2016 Dubai, UAE	*www.menaphysicalrehab.com*
Dubai Otology, Neurotology & Skull Base Surgery Conference	12 – 14 October, 2016 Dubai, UAE	*http://dubaioto.com*
National Conference on Updates in Anaesthesia 2016	14 October 2016 Ajman, UAE	*www.gmu.ac.ae*
Men's Health Exhibition & Conference	15 – 16 October, 2016 Dubai, UAE	*www.menshealthexhibition.com*

Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
8th Annual UAE Cancer Congress	20 – 22 October, 2016 Dubai, UAE	*www.uaecancercongress.ae*
International Psychology Conference Dubai 2016	21 – 22 October, 2016 Dubai, UAE	*www.psych-me.com*
The 2nd International Conference of the Kurdistan-Iraq Society of Obstetricians and Gynecologists	26 – 28 October, 2016 Erbil, Kurdistan, Iraq	*toc@theorganizers-iraq.com* *www.kisogconference.com*
November 2016		
International Nursing and Healthcare Conference 2016	1 – 3 November, 2016 Dubai, UAE	*www.nursing.conferencesus.com*
World Congress On Neurology and Brain Disorders 2016	1 – 3 November, 2016 Dubai, UAE	*www.neurology.conferencesus.com*
Pathology Update 2016	3 – 4 November, 2016 Abu Dhabi, UAE	*www.ascpme.org/index.php*
The Fourth Clinical Congress and Gulf Chapter Annual Meeting	3 – 5 November 2016 Dubai, UAE	*contact@diaedu.com* *www.aacegulf.org*
5th International Congress for Joint Reconstruction - Middle East	3 – 5 November, 2016 Dubai, UAE	*www.icjr.net/2016middleeast*
5th International Society for Evidence-Based Healthcare Congress	7 – 9 December, 2016 Kish Island, Iran	*www.isehc2016.com*
13th Global Vaccines & Vaccination Summit and Expo	8-9 November, 2016 Istanbul, Turkey	*www.vaccines.global-summit.com/middleeast*
International Conference on General Practice & General Medicine	10-11 November, 2016 Istanbul, Turkey	*www.generalpractice.conferenceseries.com*
Advanced Medicine Congress	11 – 12 November, 2016 Abu Dhabi, UAE	*www.icldc.ae/event/advanced-medicine-congress*
Paediatric Medical Congress	13-14 November 2016 Abu Dhabi, UAE	*www.pmcabudhabi.com*
8th Global Obesity Meeting	14 – 15 November, 2016 Dubai, UAE	*www.obesitymeeting.conferenceseries.com*
15th Global Diabetes Summit and Medicare Expo	14 – 16 November, 2016 Dubai, UAE	*www.diabetesexpo.com/middleeast*
2nd Emirates Surgery Society Congress 2016	16 – 20 November 2016 Dubai, UAE	*www.epsc.ae* *sardor.rafikov@medorg.ae*
International Conference on Chest	17 – 18 November, 2016 Dubai, UAE	*www.chest.conferenceseries.com*
8th Global Summit on Healthcare	17 – 19 November, 2016 Dubai, UAE	*www.healthcare.global-summit.com/middleeast*
Gastro 2016 I EGHS-WGO International Congress	17 – 19 November, 2016 Abu Dhabi, UAE	*www.gastro2016.com*
Arab Diabetes Medical Congress	17 – 20 November, 2016 Doha, Qatar	*info@arabdiabetescongress.com* *www.thedasil.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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- Worldwide Monitor
- The Laboratory
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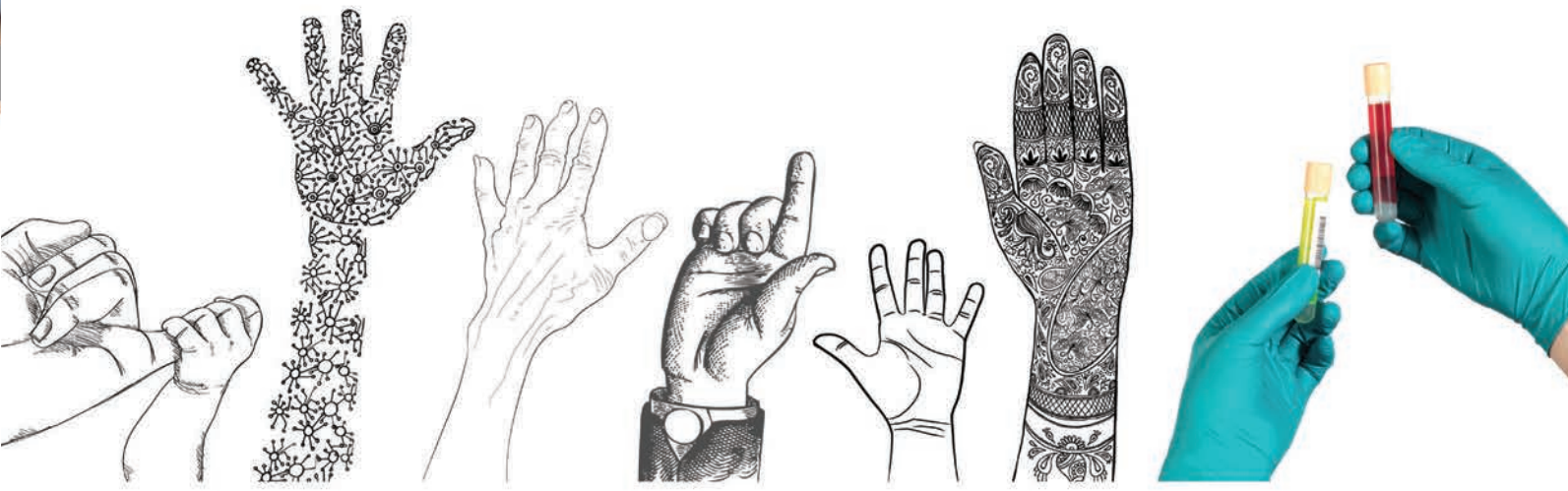

People are different and so are diseases.

That's why we are committed to discovering and developing personalised medicines and targeted diagnostic tests to help people live better, longer lives.

Roche

BEST CHILDREN'S HOSPITALS
U.S.News & WORLD REPORT
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2015-16

Giving new hope to children with metabolic disease

Children's Hospital of Pittsburgh of UPMC is a leading international center for liver transplantation as a treatment for metabolic disease.

As one of the top ten pediatric hospitals in the United States, as ranked by *U.S. News & World Report*, Children's Hospital of Pittsburgh of UPMC is a pioneer in the field of liver transplantation, which has proven to be a life-changing solution for patients with metabolic disease.

Liver transplantation can dramatically reduce symptoms, and in cases like maple syrup urine disease (MSUD), can provide a cure.

Liver transplantation is more than a lifesaving procedure; it's also an attractive approach for improving quality of life for many patients with metabolic disease. In 2004, we developed the protocol for liver transplantation for MSUD. Today, we've performed more transplants on patients with MSUD than any other center in the world. That's more than 65 patients with a 100-percent survival rate. All of these patients show normal liver function, have avoided the risk of neurological complications, and enjoy an unrestricted diet.

We've performed more liver transplants for patients with metabolic disease than any other transplant center.

Since the inception of our program in 1981, our world-renowned experts have performed more than 1,700 liver transplants — that's more than any other center in the United States — with survival rates that exceed national averages. Additionally, we've performed more than 320 liver transplants for patients with metabolic disease, which is more than any other center, including adult facilities. Also, we're leaders in living-donor liver transplants, which eliminate wait times for a deceased donor and can provide excellent outcomes.

Find out more about our excellent outcomes and extraordinary care.

Our experience, expertise, and commitment to innovation and compassionate care are reasons why patients and families from around the world travel to Children's Hospital of Pittsburgh of UPMC. For a free phone consultation with one of our experts on liver transplantation as a therapeutic option for metabolic disease, please visit **www.chp.edu/metabolic** or send an email to **international@chp.edu**

Sources: Internal data, Hillman Center for Pediatric Transplantation; Scientific Registry of Transplant Recipients (www.srtr.org), December 2015 release.

Children's Hospital of Pittsburgh | of UPMC