

# Middle East HEALTH

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September - October 2017

## Brain injury biomarkers

New hope for live-saving  
sports pitch-side test

### Voices from the frontline

ICRC issues disturbing report  
on casualties of urban warfare

### UAE medical research boost

10 studies selected for Dh2m funding  
by Sheikh Hamdan bin Rashid Award

#### In the News

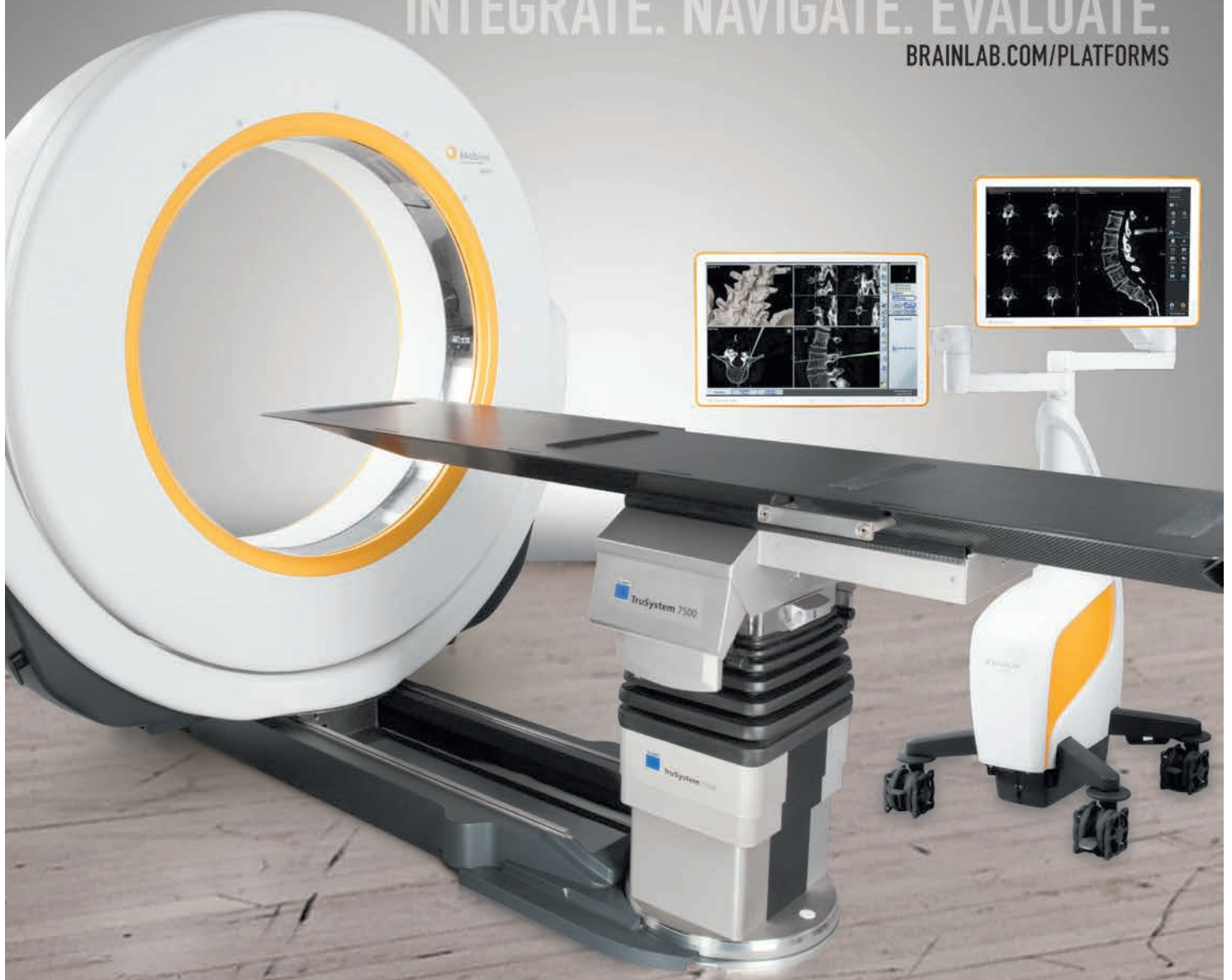
- New imaging technique overturns longstanding textbook model of DNA folding
- US defense agency awards contracts for implantable neural interface technology
- Scientists replay movie encoded on DNA
- WHO supports China's 'Health Silk Road' initiative



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## Giving new hope to children with metabolic disease

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





## Casualties of Urban Warfare

The International Committee of the Red Cross has issued a special report on civilians caught in the urban warfare in Iraq, Syria and Yemen. The report reveals that five times more civilians die in offensives carried out in cities than in other battles. It also found that between 2010 and 2015, nearly half of all civilian war deaths worldwide occurred in Syria, Iraq and Yemen.

This eye-opening report – titled *I Saw My City Die* – gives a voice to those civilians caught in the crossfire, enabling them to tell of their horrific ordeals. You can read more about this revealing report in this issue of *Middle East Health* – and then I recommend you download it and read in full. There is a link to the report in the article.

Also in this issue, we look at several new research developments in Sports Medicine, including a study of new inflammatory biomarkers which can be used pitch-side to test for traumatic brain injury and be potentially life-saving. The researchers note that “being able to detect compounds in the blood which help to determine how severe a brain injury is would be of great benefit to patients and aid in their treatment”.

In this issue’s UAE Report, we look at a number of new developments in healthcare in the country, including the allocation of Dh2 million by the Sheikh Hamdan bin Rashid Award for medical sciences to fund 10 research projects. Projects include for example, the identification of a genetic and molecular basis for hearing loss in two UAE affected families; and the examination of breastfeeding self-efficacy, infant feeding methods, and perinatal mental health among women in the United Arab Emirates.

Funding of local medical research is essential to the development of appropriate diagnoses and treatments for illnesses that are unique to the Arab world. This is particularly important when looking at genetic diseases.

In world news, China recently launched the Health Silk Road initiative, part of their Belt and Road programme. The initiative has received the praise and support of the World Health Organisation. At the launch of the initiative in Beijing, Dr Tedros Adhanom Ghebreyesus, the new Director-General of the WHO, noted that the increasing and more complex epidemics, pandemics and disasters affecting the world will have a bigger impact on human health, the social fabric, security and the economy.

“As a community, as countries that are inextricably linked, we are only as strong as our weakest link. And this is why a global initiative that elevates health to the centre of economic and social development is immensely encouraging,” he said.

As in each issue of *Middle East Health*, in this issue you’ll find a wealth of medical news, interviews and product reviews.

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Middle East Health is published by Hurst Publishing FZE,  
Creative City Fujairah, Licence Number: 3910/2013 FBCC.

UAE National Media Council - Approval Number: 2207

### Middle East Health website

[www.MiddleEastHealthMag.com](http://www.MiddleEastHealthMag.com)



Middle East Health is printed by Atlas Printing Press.  
[www.atlasgroupme.com](http://www.atlasgroupme.com)



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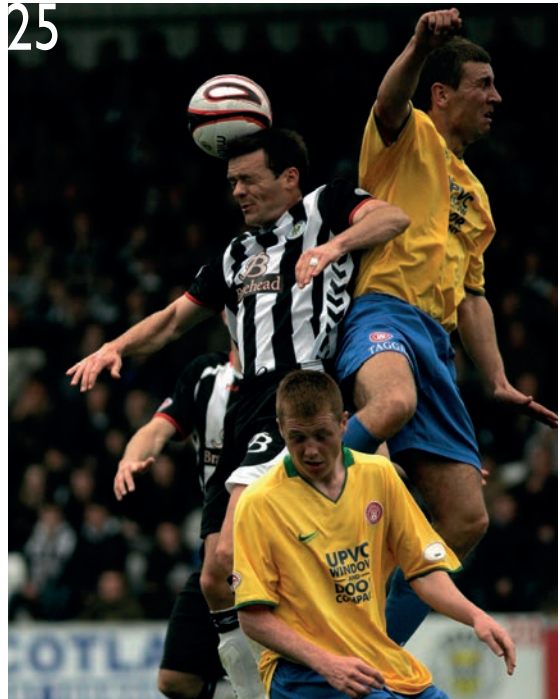
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# middle east monitor

Update from around the region



## HAAD says 56% of asthma cases are children under 18 years old

The Health Authority – Abu Dhabi (HAAD), the regulator of the Healthcare Sector in the Emirate of Abu Dhabi, has revealed that over 56% of asthma cases registered with Abu Dhabi healthcare facilities occur among children between the ages of 0-17.

HAAD made the announcement as part of their annual “Breathe Freely, Enjoy Life” asthma awareness campaign.

With the aim to keep asthma under control, HAAD continues to ramp up its efforts to shed light on this chronic respiratory disease. The campaign targets the entire community and parents, in particular, to increase awareness about asthma, including its triggers and risk factors. It aims to teach patients self-management skills and keep healthcare professionals updated on the latest international guidelines for the treatment of asthma.

Dr Omniyat Al Hajeri, Director of Public Health Division at HAAD, said: “In line with our vision towards a healthier Abu Dhabi, HAAD is intensifying its efforts on its “Breathe Freely, Enjoy Life”

campaign to reach all members of the community with a focus on educating asthma patients. Targeting affected children is vital, as often they are too young to fully comprehend the seriousness of their condition, let alone keep it under control – making parental intervention a necessity. Asthma patients can enjoy completely normal lives and incorporate physical exercise provided they maintain regular check-ups and use prescribed asthma medications as indicated by their doctors.”

Aside from following a doctor-prepared asthma management plan, HAAD strongly advises affected patients to avoid asthma triggers by limiting exposure to strong odours (e.g. Bakhour and air fresheners), traffic and industrial fumes, sandstorms, dust and mould. Asthma sufferers are also advised to limit their interaction with household pets with fur, as well as take measures to curb psychological factors, such as stress.

A survey conducted by HAAD to measure the community’s awareness and perceptions on asthma found that there are still widely held misconceptions about the management of the respiratory illness amongst

the local population. Over 34% of surveyed participants believed that the use of inhalers leads to addiction, while over 26% listed physical exercise as a cause of asthma.

Commenting on the results of the survey, Dr Al Hajeri said: “Regular physical exercise can actually improve the immune system and strengthen respiratory muscles. However, if asthma patients have difficulty breathing during physical activity this could be an indication that the illness is being poorly managed, and may require a revised treatment plan. Asthma medications are in no way addictive; the misconceptions surrounding the use of asthma medications such as inhalers may be a result of the repetitive nature of their use. Much like any other chronic disease, asthma requires regular and continued treatment in order to allow patients to live healthy and normal lives.

“At HAAD, we cannot stress enough the importance of patients reviewing their asthma management plan regularly with their doctors as well as the avoidance of known triggers.”

Asthma is a chronic inflammatory disease of the lungs that causes periodic episodes of wheezing, breathlessness, chest tightness and coughing. Although the underlying asthma cannot be cured, the severity and the frequency of acute attacks can be greatly reduced by taking the proper medication as prescribed and avoiding asthma triggers. While most often diagnosed during childhood, asthma can affect people of all ages.

HAAD launched its “Breathe Freely, Enjoy Your Life” campaign as part of the annual chronic respiratory disease awareness program introduced in 2012. The program aims to raise public awareness about the prevention and treatment of chronic respiratory diseases, particularly asthma and chronic obstructive pulmonary disease (COPD). In cooperation with various governmental and private healthcare facilities.

● For more information about asthma, its triggers and methods of keeping it under control, visit: [www.haad.ae/Asthma](http://www.haad.ae/Asthma)

## Dubai Health Authority installs Masimo Patient SafetyNet

Masimo announced that the Dubai Health Authority (DHA), the government organization that oversees the healthcare systems of Dubai, is augmenting its current inventory of Masimo equipment and technology with the implementation of Masimo Patient SafetyNet, a supplemental remote monitoring and clinician notification system, at two hospitals in Dubai.

Masimo Patient SafetyNet enables information from bedside monitors, such as Masimo Root with the Radical-7 or wearable Radius-7 Pulse CO-Oximeter, to be accessible from a central viewing station. When changes occur in measured values, which may indicate deterioration in a patient's condition, Patient SafetyNet automatically sends wireless alerts directly to clinicians, wherever they may be. In addition, Patient SafetyNet can automate the transfer of patient data, including admission data, vital signs, early warning scores (EWS), and other physiological parameters, directly to hospital electronic medical record (EMR) systems, helping to improve clinician workflows and reduce the possibility of transcription errors.

Dr Andreas Taenzer and colleagues found in an 11-month study conducted at Dartmouth-Hitchcock Medical Center that using Patient SafetyNet and Masimo SET pulse oximetry as part of a comprehensive alarm management strategy reduced rescue events by 65% and intensive care unit transfers by 48%, and as a result, reduced costs by US\$1,480,000. In a subsequent article, they announced that after five years, Dartmouth-Hitchcock had had zero preventable deaths or instances of brain damage due to opioids since the installation of Patient SafetyNet. In 2016, after 10 years, they reported achieving a 50% reduction in unplanned ICU transfers and a 60% reduction in rescue events, despite increases in patient acuity and occupancy.

The two Dubai Health Authority medi-

cal centers implementing Patient SafetyNet are Dubai Hospital (625 beds), which provides general medical and surgical care, and Latifa Hospital (367 beds), which specializes in maternal and child care. Dubai Hospital installed its first Patient SafetyNet in 2013. Latifa Hospital is in the process of installing four systems, with a further system planned for Dubai Hospital.

"We are excited to deepen our partnership with Masimo," said Humaid Al Qatami, Chairman of the Board and Director General of Dubai Health Authority. "The Dubai Health Authority's mission is to develop an integrated and sustainable healthcare system that ensures our comprehensive services achieve the highest international standards, and we believe that Masimo's monitoring devices, now even more connected to hospital infrastructure through the power of Patient SafetyNet, will help us meet that goal."

"Patient SafetyNet, in conjunction with Masimo SET pulse oximetry, enables continuous supplemental monitoring of active patients in post-surgical wards and can help save the lives of patients on opioids, among many other benefits," said Joe Kiani, Founder and CEO of Masimo. "We applaud the Dubai Health Authority, dedicated to providing no less than the best health care in the world, for recognizing the importance of implementing such a proven and powerful centralized monitoring and patient surveillance system."

## Cleveland Clinic Abu Dhabi commissions survey into Emirati cardiac mortality

Cleveland Clinic Abu Dhabi, the region's leading heart care hospital, is to commission a survey into the root causes of Emirati heart deaths, in an attempt to stem the rise in cardiovascular disease (CVD), the nation's number one killer.

CVD, which includes stroke and heart attack, continues to be the leading cause of death in the UAE, with the disease accounting for 34.9% of all deaths in 2015,

according to the Health Authority Abu Dhabi (HAAD).

The Cleveland Clinic Abu Dhabi survey has been designed to allow the acute care hospital's caregivers to better understand UAE nationals' knowledge and attitudes regarding CVD.

"Our survey will focus squarely on UAE nationals' attitudes toward control and management of the disease. If we can shift their thinking about how lifestyle affects individual outcomes, then we can move the entire society toward a healthier, more sustainable future," said Dr Johannes Bonatti, chief of the Heart and Vascular Institute at Cleveland Clinic Abu Dhabi.

According to the World Heart Federation, CVD kills more than 17.3 million people a year, with the disease accounting for 31% of all deaths globally, making it the number one cause of death in the world.

World Heart Day was founded in 2000 by the World Heart Federation, which is based in Geneva, Switzerland, to spread awareness about CVD.

Cleveland Clinic Abu Dhabi is marking World Heart Day, which is held every year on September 29, with its own theme of "Love Your Heart".

The results of the Cleveland Clinic Abu Dhabi CVD survey are due to be announced in September.

## Infectious diseases down in KSA

According to a report in *Arab News*, the Saudi Arabian Ministry of Health has noted that there has been a decrease in the incidence of infectious diseases in the Kingdom.

Ministry spokesman Meshal Al-Rubaian said the incidence of mumps went down by 87% compared to 2000; pertussis or whooping cough decreased by 78%; and neonatal tetanus dropped by 79%.

Al-Rubaian added that the incidence of chickenpox also went down by 86%; new hepatitis infections by 97%; and meningococcal infection by 98%. ■







# 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.

For more information about our international knowledge transfer services and training, please contact Naif Alsantli, regional manager of International Programs, at [Naif.Alsantli@uchospitals.edu](mailto:Naif.Alsantli@uchospitals.edu) or call +1-872-201-9453.

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# worldwide monitor

Update from around the globe



## Dr Tedros praises China's 'Health Silk Road' initiative

Dr Tedros Adhanom Ghebreyesus, the new Director-General of the WHO, spoke at the recent 'Belt and Road Forum for Health Cooperation: Towards a Health Silk Road' in Beijing. Following is an excerpt of his speech.

As you know, the world faces increasing and more complex epidemics, pandemics and disasters. Not only are these events more likely to occur, they're also likely to have a bigger impact on human health, the social fabric, security and the economy.

As a community, as countries that are inextricably linked, we are only as strong as our weakest link.

And this is why a global initiative that elevates health to the centre of economic and social development is immensely encouraging.

[Chinese] President Xi's proposal for a Health Silk Road, which strengthens and renews ancient links between cultures and people, with health at its core, is indeed visionary.

If we are to secure the health of the billions of people represented here, we must seize the opportunities the Belt and Road Initiative provides.

But how can we accomplish this? Her Excellency [Liu Yandong] has said most of them.

First, we must put in place systems to contain outbreaks or crises where they start, and prevent them from becoming epidemics.

WHO has proposed a strategic partnership with China to target vulnerable countries along the Belt and Road and in Africa.

Among these there are countries in conflict, or coming out of conflict.

We are committed to building response capacity for emergencies, as well as to provide essential health services to countries in crisis.

Second, health is a human right. People should never have to choose between getting

the care they need and financial hardship or impoverishment.

The Belt and Road Initiative contains the fundamentals to achieve universal health coverage: infrastructure, access to medicines, human resources, and a platform to share experience and promote best practices.

Third, women, children, and adolescents must be at the centre of global health and development. Women and children are particularly hard hit in emergencies. We need to take concrete steps to protect them, and nothing will help this often vulnerable group more than universal health coverage.

China has much to teach us about these issues.

It is a world leader in disease surveillance and outbreak control, and was one of the first countries to step in during the Ebola outbreak.

China has built a nationwide health insurance scheme that covers more than 95% of its population.

The country also has a great capacity for research and development, and was one of the first countries to meet the Millennium Development Goal for maternal health.

We should build upon these experiences. We will adopt the outcomes document for this event, and begin technical expert discussions to ensure that our words turn into action.

## No country meets standards for breastfeeding – UNICEF

No country in the world fully meets recommended standards for breastfeeding, according to a new report by UNICEF and

WHO in collaboration with the Global Breastfeeding Collective, a new initiative to increase global breastfeeding rates.

The *Global Breastfeeding Scorecard*, which evaluated 194 nations, found that only 40% of children younger than six months are breastfed exclusively (given nothing but breastmilk) and only 23 countries have exclusive breastfeeding rates above 60%.

Evidence shows that breastfeeding has cognitive and health benefits for both infants and their mothers. It is especially critical during the first six months of life, helping prevent diarrhoea and pneumonia, two major causes of death in infants. Mothers who breastfeed have a reduced risk of ovarian and breast cancer, two leading causes of death among women.

"Breastfeeding gives babies the best possible start in life," said Dr Tedros Adhanom Ghebreyesus, Director-General of WHO. "Breastmilk works like a baby's first vaccine, protecting infants from potentially deadly diseases and giving them all the nourishment they need to survive and thrive."

The scorecard was released at the start of World Breastfeeding Week alongside a new analysis demonstrating that an annual investment of only US\$4.70 per newborn is required to increase the global rate of exclusive breastfeeding among children under six months to 50% by 2025.

*Nurturing the Health and Wealth of Nations: The Investment Case for Breastfeeding*, suggests that meeting this target could save the lives of 520,000 children under the age of five and potentially generate \$300 billion in economic gains over 10 years, as a result of reduced illness and healthcare costs and increased productivity.

"Breastfeeding is one of the most effective – and cost effective – investments nations can make in the health of their youngest members and the future health of their economies and societies," said Anthony Lake, UNICEF Executive Director. "By failing to invest in breastfeeding, we are failing mothers and their babies – and paying a double price: in lost lives and in lost opportunity."

The investment case shows that in five

of the world's largest emerging economies – China, India, Indonesia, Mexico and Nigeria – the lack of investment in breastfeeding results in an estimated 236,000 child deaths per year and \$119 billion in economic losses.

Globally, investment in breastfeeding is far too low. Each year, governments in lower- and middle-income countries spend approximately \$250 million on breastfeeding promotion; and donors provide only an additional \$85 million.

The Global Breastfeeding Collective is calling on countries to:

- Increase funding to raise breastfeeding rates from birth through two years.
- Fully implement the International Code of Marketing of Breast-milk Substitutes and relevant World Health Assembly resolutions through strong legal measures that are enforced and independently monitored by organizations free from conflicts of interest.
- Enact paid family leave and workplace breastfeeding policies, building on the International Labour Organization's maternity protection guidelines as a minimum requirement, including provisions for the informal sector.
- Implement the Ten Steps to Successful Breastfeeding in maternity facilities, including providing breastmilk for sick and vulnerable newborns.
- Improve access to skilled breastfeeding counselling as part of comprehensive breastfeeding policies and programmes in health facilities.
- Strengthen links between health facilities and communities, and encourage community networks that protect, promote, and support breastfeeding.
- Strengthen monitoring systems that track the progress of policies, programmes, and funding towards achieving both national and global breastfeeding targets.

Breastfeeding is critical for the achievement of many of the Sustainable Development Goals. It improves nutrition (SDG2), prevents child mortality and decreases the risk of non-communicable diseases (SDG3), and supports cognitive development and education (SDG4).

Breastfeeding is also an enabler to ending poverty, promoting economic growth and reducing inequalities.



The Global Breastfeeding Scorecard  
<http://uni.cf/breastfeeding>

### Scientists replay movie encoded on DNA

For the first time, a primitive movie has been encoded in – and then played back from – DNA in living cells. Scientists funded by the US National Institutes of Health say it is a major step toward a “molecular recorder” that may someday make it possible to get read-outs, for example, of the changing internal states of neurons as they develop.

“We want to turn cells into historians,” explained neuroscientist Seth Shipman, Ph.D., a post-doctoral fellow at Harvard Medical School, Boston. “We envision a biological memory system that’s much smaller and more versatile than today’s technologies, which will track many events non-intrusively over time.”

Shipman, Harvard’s Drs. George Church, Jeffrey Macklis and Jeff Nivala report on their proof-of-concept for a futuristic “molecular ticker tape” online July 12, in the journal *Nature*. The work was funded by NIH’s National Institute of Mental Health, National Institute of Neurological Disorders and Stroke, and the National Human Genome Research Institute.

The ability to record such sequential events like a movie at the molecular level is key to the idea of reinventing the very concept of recording using molecular engineering, say the researchers. In this scheme, cells themselves could be induced to record molecular events – such as changes in gene expression over time -- in their own genomes. Then the information could be retrieved simply by sequencing the genomes of the cells it is stored in.

“If we had those transcriptional steps, we could potentially use them like a recipe to engineer similar cells,” added Shipman. “These could be used to model disease – or even in therapies.”

For starters, the researchers had to show that DNA can be used to encode not just

genetic information, but any arbitrary sequential information into a genome. For this they turned to the cutting-edge, gene editing technology CRISPR. They first demonstrated that they could encode and retrieve an image of the human hand in DNA inserted into bacteria. They then similarly encoded and reconstructed frames from a classic 1870s race horse in motion sequence of photos – an early forerunner of moving pictures.

The researchers had previously shown that they could use CRISPR to store sequences of DNA in bacteria. CRISPR is a group of proteins and DNA that act as an immune system in some bacteria, vaccinating them with genetic memories of viral infections. When a virus infects a bacterium, CRISPR cuts out part of the foreign DNA and stores it in the bacteria’s own genome. The bacterium then uses the stored DNA to recognize the virus and defend against future attacks.

“The sequential nature of CRISPR makes it an appealing system for recording events over time,” explained Shipman.

The researchers then similarly translated five frames from the race horse in motion photo sequence into DNA. Over the course of five days, they sequentially treated bacteria with a frame of translated DNA. Afterwards, they were able to reconstruct the movie with 90% accuracy by sequencing the bacterial DNA.

Although this technology could be used in a variety of ways, the researchers ultimately hope to use it to study the brain.

“We want to use neurons to record a molecular history of the brain through development,” said Shipman. “Such a molecular recorder will allow us to eventually collect data from every cell in the brain at once, without the need to gain access, to observe the cells directly, or disrupt the system to extract genetic material or proteins.”

● doi: 10.1038/nature23017

### Global hepatitis burden improving

New WHO data from 28 countries – representing approximately 70% of the global hepatitis burden – indicate that efforts to eliminate hepatitis are gaining





momentum. Published to coincide with World Hepatitis Day on 28 July, the data reveal that nearly all 28 countries have established high-level national hepatitis elimination committees (with plans and targets in place) and more than half have allocated dedicated funding for hepatitis responses.

On World Hepatitis Day, WHO called on countries to continue to translate their commitments into increased services to eliminate hepatitis. The WHO has also added a new generic treatment to its list of WHO-prequalified hepatitis C medicines to increase access to therapy, and is promoting prevention through injection safety: a key factor in reducing hepatitis B and C transmission.

“It is encouraging to see countries turning commitment into action to tackle hepatitis,” said Dr Tedros Adhanom Ghebreyesus, WHO Director-General. “Identifying interventions that have a high impact is a key step towards eliminating this devastating disease. Many countries have succeeded in scaling-up the hepatitis B vaccination. Now we need to push harder to increase access to diagnosis and treatment.”

World Hepatitis Day 2017 was commemorated under the theme “Eliminate Hepatitis” to mobilize intensified action towards the health targets in the 2030 Sustainable Development Goals. In 2016, the World Health Assembly endorsed WHO’s first global health sectors strategy on viral hepatitis to help countries scale up their responses.

The new WHO data show that more than 86% of countries reviewed have set national hepatitis elimination targets and more than 70% have begun to develop national hepatitis plans to enable access to effective prevention, diagnosis, treatment and care services. Furthermore, nearly half of the countries surveyed are aiming for elimination through providing universal access to hepatitis treatment. But WHO is concerned that progress needs to speed up.

“The national response towards hepatitis elimination is gaining momentum. However, at best one in ten people who are

living with hepatitis know they are infected and can access treatment. This is unacceptable,” said Dr Gottfried Hirsenschall, WHO’s Director of the HIV Department and Global Hepatitis Programme.

“For hepatitis elimination to become a reality, countries need to accelerate their efforts and increase investments in life-saving care. There is simply no reason why many millions of people still have not been tested for hepatitis and cannot access the treatment for which they are in dire need.”

Viral hepatitis affected 325 million people worldwide in 2015, with 257 million people living with hepatitis B and 71 million people living with hepatitis C – the two main killers of the five types of hepatitis. Viral hepatitis caused 1.34 million deaths in 2015 – a figure close to the number of TB deaths and exceeding deaths linked to HIV.

Hepatitis C can be completely cured with direct acting antivirals (DAAs) within 3 months. However, as of 2015, only 7% of the 71 million people with chronic hepatitis C had access to treatment.

WHO is working to ensure that DAAs are affordable and accessible to those who need them. Prices have dropped dramatically in some countries (primarily in some high-burden, low-and lower middle income countries), facilitated by the introduction of generic versions of these medicines. The list of DAAs available to countries for treating hepatitis C is growing.

WHO has just prequalified the first generic version of one of these drugs: sofosbuvir. The average price of the required three-month treatment course of this generic is between US\$260 and \$280, a small fraction of the original cost of the medicine when it first went on the market in 2013. WHO prequalification guarantees a product’s quality, safety and efficacy and means it can now be procured by the United Nations and financing agencies such as UNITAID, which now includes medicines for people living with HIV who also have hepatitis C in the portfolio of conditions it covers.

With high morbidity and mortality globally, there is great interest also in the development of new therapies for chronic hepatitis B virus infection. The most effective current hepatitis B treatment, tenofovir, (which is not curative and which in most cases needs to be taken for life), is available for as low as \$48 per year in many low and middle income countries. There is also an urgent need to scale up access to hepatitis B testing.

Use of contaminated injection equipment in healthcare settings accounts for a large number of new HCV and HBV infections worldwide, making injection safety an important strategy. Others include preventing transmission through invasive procedures, such as surgery and dental care; increasing hepatitis B vaccination rates and scaling up harm reduction programmes for people who inject drugs.

WHO has launched a range of new educational and communication tools to support a campaign entitled “Get the Point-Make smart injection choices” to improve injection safety in order to prevent hepatitis and other bloodborne infections in health-care settings. MEH



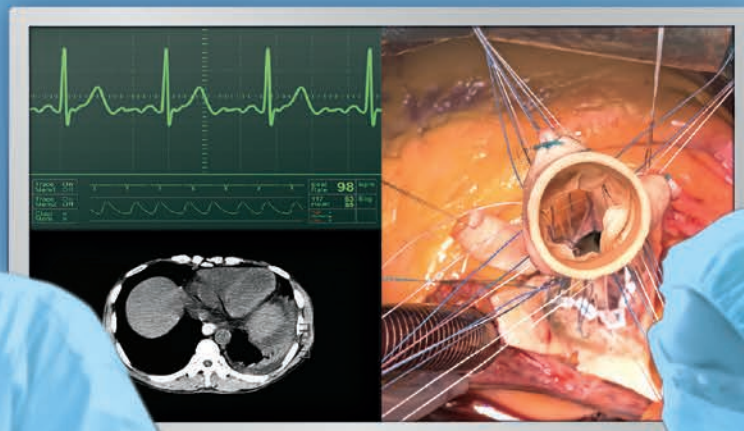
Injection Best Practice Guidelines  
<http://tinyurl.com/ya4et56b>

## World Hepatitis Summit

World Hepatitis Summit 2017, 1–3 November in São Paulo, Brazil, promises to be the largest global event to advance the viral hepatitis agenda, bringing together key players to accelerate the global response. Organised jointly by WHO, the World Hepatitis Alliance (WHA) and the Government of Brazil, the theme of the Summit is “Implementing the Global health sector strategy on viral hepatitis: towards the elimination of hepatitis as a public health threat”.

■ [www.worldhepatitisummit.org](http://www.worldhepatitisummit.org)

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# the laboratory

Medical research news from around the world



## Researchers show existence of eye microbiome

Bugs in your eyes may be a good thing. Resident microbes living on the eye are essential for immune responses that protect the eye from infection, new research shows. The study, which appears in the journal *Immunity* on 27 June 2017, demonstrates the existence of a resident ocular microbiome that trains the developing immune system to fend off pathogens. The research was conducted at the US National Eye Institute (NEI), part of the National Institutes of Health.

“This is the first evidence that a bacterium lives on the ocular surface long-term,” explained Rachel Caspi, Ph.D., senior investigator in NEI’s Laboratory of Immunology. “This work addresses a longstanding question about whether there is a resident ocular microbiome.”

For years, the ocular surface was thought to be sterile because of the presence of an enzyme called lysozyme that destroys bacteria, antimicrobial peptides, and other factors that rid the eye of microbes that may land from the air (or from our fingers) onto the surface of the eye.

Anthony St. Leger, Ph.D., research fellow in Caspi’s laboratory, was able to culture bacteria from the mouse conjunctiva, the membrane that lines the eyelids. He found several species of *Staphylococci*, which are commonly found on the skin, and *Corynebacterium mastitidis* (*C. mast*). But it wasn’t clear whether those microbes had just arrived on the eye and were en route to being destroyed, or whether they

lived on the eye for extended periods of time.

The researchers found that *C. mast*, when cultured with immune cells from the conjunctiva, induced the production of interleukin (IL)-17, a signalling protein critical for host defence. Upon further investigation, they found that IL-17 was produced by gamma delta T cells, a type of immune cell

found in mucosal tissues. IL-17 attracted other immune cells called neutrophils -- the most abundant type of white blood cell -- to the conjunctiva and induced the release of anti-microbial proteins into the tears. The researchers are currently investigating the unique features that can make *C. mast* resistant to the immune response that it itself provokes and allow it to persist in the eye.

To determine whether the microbe was contributing to the immune response in mice, St. Leger formed two groups, one control (with *C. mast*) and one treated with an antibiotic to kill *C. mast* and other ocular bacteria, and then challenged them with the fungus, *Candida albicans*. The mice receiving antibiotics had a reduced immune response in their conjunctiva and were not able to eliminate *C. albicans*, leading to full-blown ocular infection. The control mice with normal *C. mast* on the other hand were able to fend off the fungus.

St. Leger noticed that mice from the NIH animal facility had *C. mast* on their eyes, but mice from the Jackson Laboratory (JAX) in Maine and other commercial vendors did not. This fortuitous observation allowed the researchers to determine if *C. mast* was truly a resident microbe, as opposed to a transient microbe that lands on the eye from the environment. They did this by inoculating *C. mast*-free mice with the microbe and determining if the microbe could be cultured from those animals’ eyes many weeks later. They also determined whether the microbe could easily be transmitted among cagemates.

When inoculated with *C. mast*, JAX

mice produced conjunctival gamma delta T cells that released IL-17. Bacteria could still be cultured from their eyes after many weeks. By contrast, several other strains of bacteria inoculated onto the eyes of JAX mice disappeared without inducing local immunity. “We still don’t know what enables *C. mast* to successfully establish itself in the eye, whereas other similar bacteria fail to colonize,” Caspi said.

Interestingly, *C. mast* was not spread to cage-mates even after eight weeks of co-housing; however, *C. mast* can be passed from mother to pup. Both of these observations support the notion that *C. mast* is a resident commensal, not a bacterium that is continually re-introduced to the eye from the skin or the environment, Caspi explained.

Although *C. mast* appears to stimulate a beneficial immune response, there may be situations in which it could cause disease, St. Leger noted. For instance, the elderly tend to have suppressed immune systems, which might allow *C. mast* to grow out of control and cause disease.

The researchers are currently investigating whether other bacteria play a role in regulating eye immunity.

“We’ve established the proof of concept of a central ocular microbiome,” St. Leger said. “It’s well known that there are good bacteria in the gut that modulate the immune response. Now we show that this relationship exists in the eye. That’s important for how we think about treating ocular disease.”

• doi: 10.1016/j.immuni.2017.06.014

## Biological bypass shows promise in coronary artery disease

A new gene therapy that targets the heart and requires only one treatment session has been found safe for patients with coronary artery disease, according to a successful trial carried out in Finland. Enhancing circulation in the oxygen-deficient heart muscle, the effects were visible even one year after the treatment.

The randomised, blinded, placebo-controlled phase 1/2a trial was carried out in collaboration between the University of Eastern Finland, Kuopio University Hospital and



Turku PET Centre as part of the Centre of Excellence in Cardiovascular and Metabolic Diseases of the Academy of Finland.

The biological bypass is based on gene transfer in which a natural human growth factor is injected into the heart muscle to enhance vascular growth. The trial was the first in the world to use a novel vascular growth factor that has several beneficial effects on circulation in the heart muscle. The trial also developed a novel and precise method for injecting the gene into the oxygen-deficient heart muscle area. A customised catheter is inserted via the patient's groin vessels to the left ventricle, after which the gene solution can be injected directly into the heart muscle. The method is as easy to perform as coronary balloon angioplasty, which means that it is also suitable for older patients and patients who are beyond a bypass surgery or other demanding surgical or arterial operations.

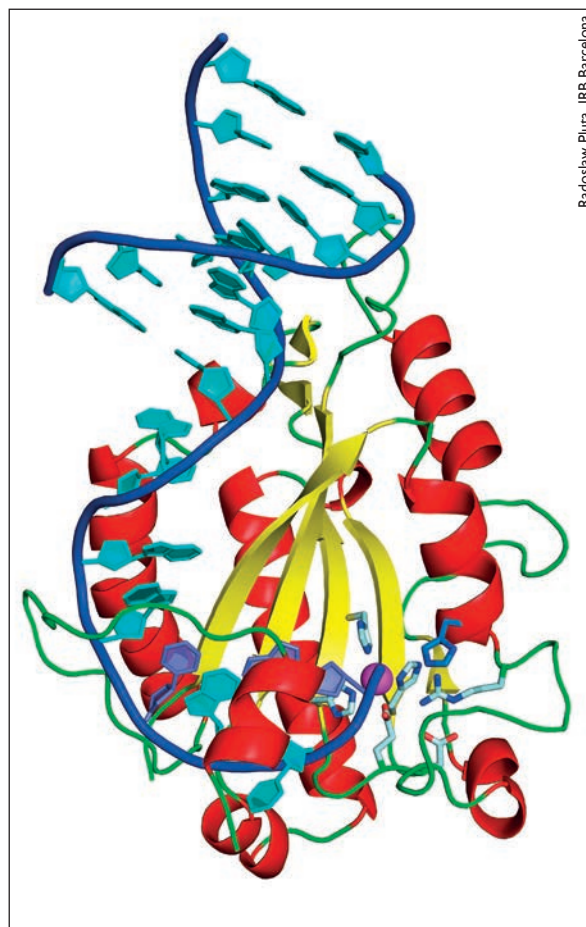
The biological bypass constitutes a significant step forward in the development of novel biological treatments for patients with severe coronary artery disease. A new blood test biomarker was also discovered, making it possible to identify patients who are most likely to benefit from the new treatment.

The biological bypass was developed by Academy Professor Seppo Ylä-Herttuala's research group at the A.I. Virtanen Institute for Molecular Sciences of the University of Eastern Finland. At the Kuopio University Hospital Heart Centre, Professor Juha Hartikainen was responsible for the trial.

• doi: 10.1093/eurheartj/ehx352

### Researchers identify the component that allows a lethal type of bacteria to spread resistance to antibiotics

Antibiotic resistance of the bacterium *Staphylococcus aureus* is responsible for 11,300 deaths a year in the United States alone – a figure that corresponds to half of all deaths caused by gram-positive resistant bacteria in that country. Such high mortality is related to the speed at which the bacterium acquires resistance to antibiotics. A study performed at the Institute for Research in Biomedicine (IRB Barcelona) and involving the collaboration of



Tridimensional structure of the protein relaxase bound to a DNA piece. Histidine, which is essential to cut the DNA and transfer it, is shown in blue (bottom right)

the Centro de Investigaciones Biológicas (CIB-CSIC) in Madrid has identified the key component of the machinery that *S. aureus* uses to acquire and transfer genes that confer resistance to antibiotics. The work has been published this week in the Proceedings of the National Academic of Sciences (PNAS).

“The battle against bacteria – particularly in the hospital setting where they are a major threat – implies understanding how genes are transferred to adapt to a changing environment. For example, when they are treated with new antibiotics,” explains the head of the study and IRB Barcelona group leader Miquel Coll, also a CSIC researcher, who studies horizontal gene transfer from a structural biology perspective.

“Horizontal gene transfer confers bacteria with an extraordinary capacity to evolve and adapt rapidly – a capacity that humans do not have for example,” says Coll. One of these pathways is called conjugation, a pro-

cess by which two bacteria join and one of them transfers a piece of DNA called plasmid to the other. “A plasmid is a small piece of circular DNA that holds very few genes, often including those for antibiotic resistance and it takes only a few minutes to be passed between bacteria,” he explains.

Horizontal gene transfer involves machinery in which the relaxase, an enzymatic protein, is a key component. Thanks to the 3D resolution of the structure of the complex formed by the relaxase with a fragment of the plasmid DNA, the researchers have identified that an amino acid histidine is a pivotal element in the DNA processing and thus in the transfer and the spread of resistance.

“What we have discovered is that the relaxase of diverse strains of *S. aureus* differs because it uses an amino acid

that is not used by any other relaxase that we know of,” explains the first author of the study, Radoslaw Pluta, former “la Caixa” PhD student at IRB Barcelona, and currently a postdoctoral researcher at the International Institute of Molecular and Cell Biology in Warsaw, Poland.

Histidine is the catalytic residue that allows the relaxase to cut DNA, bind to it, and stretch one of the two strands and take it into the receptor bacterium, where the strand replicates to form a double strand of the plasmid again. This new plasmid now holds the resistance genes and the machinery to transfer them to another bacterium. The scientists indicate that this catalytic histidine is present in the relaxases of 85% of the strains of *Staphylococcus aureus*.

To test whether histidine is decisive in horizontal gene transfer, researchers in Manuel Espinosa's group at the CIB-CSIC, who participated in the study, replaced it by

Radoslaw Pluta, IRB Barcelona





a different amino acid and confirmed that it prevents transfer in culture dishes.

The mutation of histidine does not kill that bacterium but rather prevents gene transfer. How could this mechanism be exploited to fight infections? “I don’t know,” says Coll, “but we now know more details about a lethal bacterium and this may pave the way to the development of molecules to prevent the spread of resistant strains.”

Coll explains that hospital infections are the most difficult types to tackle. “We are in a race that we always lose because when a new antibiotic is brought out, resistance quickly emerges and spreads,” he describes. The scientist adds that the list of antibiotics for hospital use is “too” short. Apart from the difficulty involved in developing new antibiotics, Coll also comments on another obstacle impeding advancement. “There is little investment because the pharmaceutical industry has other priorities. While this is perfectly valid, resources from the public and private sectors should be pooled.”

This work has involved the collaboration of Modesto Orozco’s group, also at IRB Barcelona, which has performed the theoretical studies to validate the chemical reaction between the plasmid DNA and the protein via histidine. The structural resolution of the complex formed by the protein and the DNA has been achieved using data obtained by X-ray diffraction at the European synchrotron in Grenoble.

• doi: 10.1073/pnas.1702971114

### Study identifies essential genes for cancer immunotherapy

A new study identifies genes that are necessary in cancer cells for immunotherapy to work, addressing the problem of why some tumours don’t respond to immunotherapy or respond initially but then stop as tumour cells develop resistance to immunotherapy.

The study, from the US National Cancer Institute (NCI), was led by Nicholas Restifo, M.D., a senior investigator with NCI’s Center for Cancer Research, with coauthors from NCI; Georgetown University, Washington D.C.; the Broad Institute of MIT and Harvard University, Cambridge, Massachusetts; New York University, New York City; and the University of Pennsylvania, Phila-

delphia. It was published online in *Nature* on 7 August 2017.

“There is a great deal of interest in cancer immunotherapy, especially for patients who have metastatic cancer,” said Dr Restifo. “The response to immunotherapy can be fantastic, but understanding why some patients don’t respond will help us improve treatments for more patients.”

Cancer immunotherapy relies on T cells, a type of cell in the immune system, to destroy tumours. Dr Restifo and his colleagues have previously shown that the infusion of large numbers of T cells can trigger complete regression of cancer in patients. They and others have also shown that T cells can directly recognize and kill tumour cells.

However, some tumour cells are resistant to the destruction unleashed by T cells. To investigate the basis for this resistance, the researchers sought to identify the genes in cancer cells that are necessary for them to be killed by T cells.

Working with a melanoma tumour cell line, the researchers used a gene editing technology called CRISPR that “knocks out,” or stops the expression, of individual genes in cancer cells. By knocking out every known protein-encoding gene in the human genome and then testing the ability of the gene-modified melanoma cells to respond to T cells, they found more than 100 genes that may play a role in facilitating tumour destruction by T cells.

Once the team identified these “candidate” genes, they sought additional evidence that these genes play a role in susceptibility to T cell-mediated killing. To this end, they examined data on “cytolytic activity,” or a genetic profile that shows cancer cells are responding to T cells, in more than 11,000 patient tumours from The Cancer Genome Atlas, a collaboration between NCI and the National Human Genome Research Institute. They found that a number of the genes identified in the CRISPR screen as being necessary for tumour cells to respond to T cells were indeed associated with tumour cytolytic activity in patient samples.

One such gene is called APLNR. The product of this gene is a protein called the apelin receptor. Although it had been suspected to contribute to the development of

some cancers, this was the first indication of a role in the response to T cells. Further investigation of tumours from patients resistant to immunotherapies showed that the apelin receptor protein was nonfunctional in some of them, indicating that the loss of this protein may limit the response to immunotherapy treatment.

Shashank Patel, Ph.D., the first author of the study, said the results show that “many more genes than we originally expected play a vital role in dictating the success of cancer immunotherapies.”

The researchers wrote that this gene list could serve as a blueprint to study the emergence of tumour resistance to T cell-based cancer therapies. Dr Restifo noted that if this set of genes is validated in clinical trials, then this data could eventually lead to more effective treatments for patients.

### Vaccine shows protection against gonorrhoea

Exposure to the meningococcal group B vaccine during a New Zealand mass vaccination campaign was associated with a reduced likelihood of contracting gonorrhoea, compared with unvaccinated people, according to a new study of more than 14,000 people published in *The Lancet*. This is the first time that a vaccine has shown any protection against gonorrhoea, and may provide a new avenue for vaccine development.

If the effect is confirmed in other currently available and similar meningococcal group B vaccines, administering the vaccine in adolescence could result in significant declines in gonorrhoea, which has increasingly become drug resistant.

The importance of a vaccine candidate that may have even a moderate effect on reducing rates of infection is highlighted in a new report by *The Lancet Infectious Diseases* journal which urges global policy action to address sexually transmitted infections (STIs).

So far, efforts to develop a vaccine against gonorrhoea have been unsuccessful despite more than a century of research. Four vaccine candidates have reached clinical trial stage but none have been effective. However, population data suggests there is a decline in gonorrhoea immediately after the use of



the outer membrane vesicle (OMV) meningococcal group B vaccine in Cuba, New Zealand, and Norway.

Despite the two diseases being very different in terms of symptoms and mode of transmission, there is an 80-90% genetic match between the *Neisseria gonorrhoeae* and *Neisseria meningitidis* bacteria, providing a biologically plausible mechanism for cross-protection.

The researchers note that because of the variability of different strains of *N. gonorrhoeae* and *N. meningitidis* bacteria, the effect of the vaccine might vary depending on the strain. And being co-infected with chlamydia slightly reduced the effectiveness of the vaccine.

### Herpes virus study in mice leads to potential broad-spectrum antiviral

After herpesviruses infect a cell, their genomes are assembled into specialized protein structures called nucleosomes. Many cellular enzyme complexes can modulate these structures to either promote or inhibit the progression of infection. Scientists studying how one of these complexes (EZH2/1) regulated herpes simplex virus (HSV) infection unexpectedly found that inhibiting EZH2/1 suppressed viral infection. The research group, from the National Institute of Allergy and Infectious Diseases (NIAID) at the National Institutes of Health, then demonstrated that EZH2/1 inhibitors also enhanced the cellular antiviral response in cultured cells and in mice.

Once a person has been infected with a herpesvirus, the virus persists in a latent form, sometimes reactivating to cause recurrent disease. Two-thirds of the global population are infected with HSV-1, and at least 500 million are infected with HSV-2, according to the World Health Organization. These viruses cause a range of diseases and conditions from oral cold sores to genital lesions to serious eye infections that can lead to blindness. In infants who acquire the infection from their mothers, HSV can cause neurological and developmental problems. People infected with HSV also have an enhanced risk of acquiring or transmitting human immunodeficiency virus (HIV). Treatment usually involves anti-

viral drugs that interfere with viral replication, but new approaches to combat these infections are needed.

The NIAID group demonstrated that EZH2/1 inhibitors not only suppressed HSV infection, spread, and reactivation in mice, but also suppressed human cytomegalovirus, adenovirus, and Zika virus infections in cell culture using human primary fibroblast cell lines. These authors suggest that EZH2/1 inhibitors have considerable potential as broad-spectrum antivirals.

• doi: 10.1128/mBio.01141-17 (2017)

### New imaging technique overturns longstanding textbook model of DNA folding

How can six and half feet of DNA be folded into the tiny nucleus of a cell? Researchers have developed a new imaging method that visualizes a very different DNA structure, featuring small folds of DNA in close proximity. The study reveals that the DNA-protein structure, known as chromatin, is a much more diverse and flexible chain than previously thought. This provides exciting new insights into how chromatin directs a nimbler interaction between different genes to regulate gene expression, and provides a mechanism for chemical modifications of DNA to be maintained as cells divide.

For decades, experiments suggested a hierarchical folding model in which DNA segments spooled around 11 nanometer-sized protein particles, assembled into rigid fibres that folded into larger and larger loops to form chromosomes. However, that model was based on structures of chromatin in vitro after harsh chemical extraction of cellular components.

Now, researchers at the Salk Institute, La Jolla, California, funded by the NIH Common Fund, have developed an electron microscopy technique called ChromEMT that enables the 3D structure and packing of DNA to be visualized inside the cell nucleus of intact cells. Contrary to the longstanding text book models, DNA forms flexible chromatin chains that have fluctuating diameters between five and 24 nanometers that collapse and pack together in a wide range of configurations and concentrations.


The newly observed and diverse array

of structures provides for a more flexible human genome that can bend at varying lengths and rapidly collapse into chromosomes at cell division. It explains how variations in DNA sequences and interactions could result in different structures that exquisitely fine tune the activity and expression of genes.

“This is groundbreaking work that will change the genetics and biochemistry textbooks,” remarks Roderic I. Pettigrew, Ph.D., M.D., director of the National Institute of Biomedical Imaging and Bioengineering (NIBIB), which administered the grant. “It’s an outstanding example of how constantly improving imaging techniques continue to show the true structure of everything from neuronal connections in the brain to the correct visualization of gene expression in the cell. It reveals how these complex biological structures are able to perform the myriad intricate and elaborate functions of the human body.”

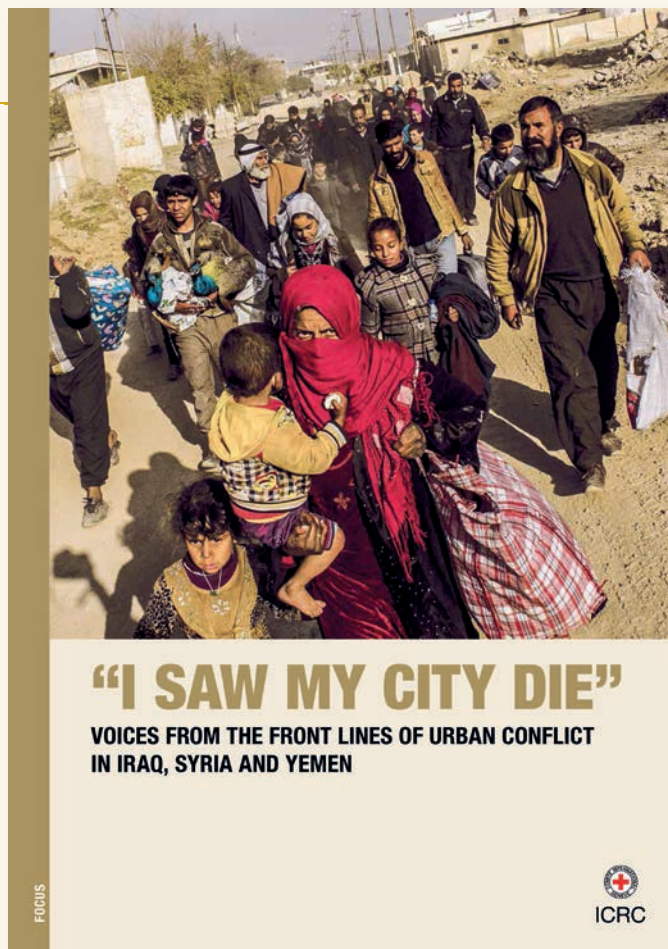
“We identified a fluorescent small molecule that binds specifically to DNA and can be visualized using advanced new 3D imaging methods with the electron microscope,” explained Clodagh O’Shea, Ph.D., the leader of the Salk group, associate professor and Howard Hughes Medical Institute Faculty Scholar. “The system enables individual DNA particles, chains and chromosomes to be visualized in 3D in a live, single cell. Thus, we are able to see the fine structure and interactions of DNA and chromatin in the nucleus of intact cells.”

The researchers believe their discovery dovetails with their research on how tumour viruses and cancer mutations change a cell’s DNA structure and organization to cause uncontrolled cell growth. It could enable the design of new drugs that manipulate the structure and organization of DNA to make a tumour cell ‘remember’ how to be normal again or impart new functions that improve the human condition.

“To see the human genome in all of its 3D glory is the dream of every biologist. Now, we are working to design probes that will allow us to also see the proteins that bind to the DNA to turn genes on and off. We will then be able to view an actual gene in action,” concluded O’Shea. 



# ICRC issues a special report on civilian casualties of urban warfare



In June the International Committee of the Red Cross (ICRC) issued a hard-hitting report ‘I Saw My City Die’.

The report reveals five times more civilians die in offensives carried out in cities than in other battles. It also found that between 2010 and 2015, nearly half of all civilian war deaths worldwide occurred in Syria, Iraq and Yemen, the main focus countries of the report.

It opens with this introduction: “War is back in cities. This new report from the ICRC vividly shows how we are witnessing a profound change in the history of armed

conflict which sees towns and cities locked in entrenched patterns of urban warfare for years at a time. Government forces and non-State armed groups are fighting street-to-street in a mix of aerial bombardment, artillery, smart weapons, infantry assault, suicide bombing, car bombs and improvised explosive devices. Civilians are in the middle of it all.”

The report gives an important voice to those civilians caught in the crossfire. It enables them to tell of their shocking, horrendous ordeals.

It also provides recommendations to

prevent and alleviate the suffering in this urban warfare that has engulfed Iraq, Syria and Yemen.

“Over the past three years, our research shows that wars in cities accounted for a shocking 70% of all civilian deaths in Iraq and Syria,” said the ICRC’s Regional Director for the Middle East, Robert Mardini. “This illustrates just how deadly these battles have become. This is all the more alarming as new offensives get underway in cities like Raqqa in Syria, or intensify in Mosul, Iraq. A new scale of urban suffering is emerging, where no one

## Yemen facts

The population of Yemen is 27 million people. An estimated:

- 14 million people are food insecure. 7 million people are severely food insecure.
- 3.3 million people are acutely malnourished.
- 14 million people lack access to adequate quantities of safe water or sanitation services.
- 14 million people lack adequate healthcare, and only 45% of health facilities are functioning.
- Over 160 health structures were attacked since 2015 and reported to the ICRC.
- The price of medicine is beyond the reach of average citizens.

The conflicts in these countries have resulted in internal displacement and migration levels unprecedented since WWII. More than 17 million Iraqis, Syrians and Yemenis have fled their homes. And these battles risk becoming even more protracted if real political solutions are not found soon.

# ICRC president issues urgent plea to end war in Yemen

Peter Maurer, president of the International Committee of the Red Cross issued this statement:

I am leaving Yemen profoundly concerned for the plight of its people. The cholera outbreak remains alarming. With the rainy season approaching, we expect more than 600,000 cases by the end of the year. This is unprecedented.

This outbreak is manmade. It is a direct consequence of more than two years of warfare. The health care system has collapsed, with people dying from easily-treatable chronic diseases. Key services like garbage disposal have ceased to function, as I saw all too clearly in Taiz.

Unless the warring parties improve their respect of the laws of war, I am afraid we must expect more epidemics in the future.

Yemenis are resilient people, but how much more must they resist? We have seen, in Syria and elsewhere, how two years of conflict turns into six, ten. Yemen's fate can be different, but I see few signs of hope. The suffering of its people only grows in intensity. I've met families forced to make impossible choices about whether to buy bread, water or medicine for their children.

Thousands of people have been detained by parties to the conflict, languishing in prison unable to contact their loved ones. Yesterday, some of their families protested outside our offices in Sana'a, demanding answers. Their wellbeing is our priority, but to help them we must be allowed to visit detainees.

I've seen for myself this week how war is destroying cities, communities and families.



Peter Maurer, ICRC president

This, then, is an urgent plea for behaviours to change. It is imperative that parties to the conflict stop the attacks on hospitals, and electricity and water plants. Otherwise, more tragedy will ensue.

The warring parties, including coalition states, should take concrete steps, now, to alleviate the situation. They must

- Stop holding humanitarian action hostage to political ends. Instead, facilitate the flow of aid - and essential supplies like medicine - into and across Yemen

- Guarantee access for humanitarian agencies to the most vulnerable populations
- Give the ICRC regular access to all conflict-related detainees. We received encouraging commitments from both sides this week, and hope these will materialize in the weeks to come.

- Ease import restrictions so economic activity can resume

Moreover, others providing support to the warring parties in Yemen have the responsibility for making sure the laws of war are respected.

Humanitarian funding is more needed than ever. But the international community must go a step further. It must actively seek out solutions to this enormous crisis, and wield influence over the behaviour of warring parties as a matter of urgency.

The ICRC has doubled its Yemen budget this year to over US\$100 million. We will continue to fight cholera and do all we can to help the most vulnerable people in Yemen. I call on others to step up their efforts and do likewise. The people I met this week in Yemen are counting on us to come to their aid. Let us prove to them

and nothing is spared by the violence.”

The research findings are based on preliminary analysis of battle trends and data over the past three years in Iraq and Syria. The report includes testimony from residents in Syria's Aleppo, Iraq's Mosul and Yemen's Taiz, and expert analysis. It vividly illustrates the effects of siege warfare, the use of explosive weapons and the extensive damage caused to key infrastructure.

The conflicts in these countries have resulted in internal displacement and migration levels unprecedented since WWII. More than 17 million Iraqis, Syrians and Yemenis have fled their homes. And these battles risk becoming even more protracted if real political solutions are not found soon. Wars in cities are so devastating because of the way in which they are being fought. Armed parties are failing to distinguish between military objectives and civilian infrastructure – or worse, they are using or directly targeting them.

“It's beholden on those with power to act. Warring sides must realise the full

impact the fighting has on the people they ultimately hope to govern. Will the victors be able to keep the peace if people feel they have respected neither the law nor the basic humanity of local citizens? The consequences of this violence will resonate for generations and there is the very real danger that cities experiencing these conflicts will simply act as incubators for further violence in the future,” said Mardini. “States supporting parties to conflict must also do their utmost to restrain their allies and ensure better respect for international humanitarian law. And once the guns fall silent, it is local people and organisations which must play a full part in the rebuilding of the communities.”

The report also considers Lebanon's 15-year civil war and examines the lessons Beirut can offer to help ensure the recovery of urban communities after such overwhelming and protracted violence.

 Download 'I Saw My City Die'  
<http://tinyurl.com/yc8hz3f6>

It's beholden on those with power to act. Warring sides must realise the full impact the fighting has on the people they ultimately hope to govern. Will the victors be able to keep the peace if people feel they have respected neither the law nor the basic humanity of local citizens? The consequences of this violence will resonate for generations and there is the very real danger that cities experiencing these conflicts will simply act as incubators for further violence in the future.



# Cholera count reaches 500,000 in Yemen

The total number of suspected cholera cases in Yemen this year hit the half a million mark by mid-August, according to the WHO. Nearly 2000 people have died since the outbreak began to spread rapidly at the end of April.

The overall caseload nationwide has declined since early July, particularly in the worst affected areas. But suspected cases of the deadly waterborne disease continue to rage across the country, infecting an estimated 5000 people per day.

The spread of cholera has slowed significantly in some areas compared to peak levels but the disease is still spreading fast in more recently affected districts, which are recording large numbers of cases.

Yemen's cholera epidemic, currently the largest in the world, has spread rapidly due to deteriorating hygiene and sanitation

conditions and disruptions to the water supply across the country. Millions of people are cut off from clean water, and waste collection has ceased in major cities.

A collapsing health system is struggling to cope, with more than half of all health facilities closed due to damage, destruction or lack of funds. Shortages in medicines and supplies are persistent and widespread and 30,000 critical health workers have not been paid salaries in nearly a year.

"Yemen's health workers are operating in impossible conditions. Thousands of people are sick, but there are not enough hospitals, not enough medicines, not enough clean water. These doctors and nurses are the backbone of the health response – without them we can do nothing in Yemen. They must be paid their wages so that they can continue to save lives," said Dr Tedros Adhanom

Ghebreyesus, WHO Director-General.

WHO and partners are working around the clock to set up cholera treatment clinics, rehabilitate health facilities, deliver medical supplies, and support the national health response effort.

More than 99% of people sick with suspected cholera who can access health services are surviving. Furthermore, nearly 15 million people are unable to get basic healthcare.

"To save lives in Yemen today we must support the health system, especially the health workers. And we urge the Yemeni authorities – and all those in the region and elsewhere who can play a role – to find a political solution to this conflict that has already caused so much suffering. The people of Yemen cannot bear it much longer – they need peace to rebuild their lives and their country," said Dr Tedros. MEH

# WHO calls for funding to fight measles in Somalia

As millions of people in Somalia remain trapped in a devastating cycle of hunger and disease, WHO and health partners are working with national health authorities to save lives and reach the most vulnerable with essential health services.

The WHO issued a statement on 16 August saying it urgently requires US\$6.8 million to scale up its response activities in Somalia and conduct a measles immunization campaign for 4.2 million children in November 2017. As of the statement date, no funding had been received.

More than two years of insufficient rainfall and poor harvests have led to drought, food insecurity and a real risk of famine. Malnutrition, mass displacement as a result of the drought, and lack of access to clean water and sanitation have created ideal conditions for infectious disease outbreaks.

"Somalia is facing one of the worst humanitarian crises in the world. Millions of people, already on the brink of famine, are now at risk of rapidly spreading infectious diseases like cholera and measles. Normally, these diseases are easy to treat and prevent, but they can turn deadly when people are living in

overcrowded spaces and are too weak to fight off infection," said Dr Ghulam Popal, WHO Representative in Somalia.

## Cholera

Drought has led to a lack of clean water and the largest cholera outbreak in the last 5 years, with more than 57,000 cases and 809 cumulative deaths reported as of 31 July 2017. Health partners, together with national health authorities, scaled up its efforts to respond to this event by setting up cholera treatment centres in affected districts and providing support in water and sanitation to prevent the spread of the disease. In March, WHO and partners conducted Somalia's first national oral cholera vaccination campaign, and successfully reached over 450,000 vulnerable people. Due to ongoing efforts, the number of cholera cases in Somalia has declined, from 13,656 cases of acute watery diarrhoea/cholera in May 2017 to 11,228 cases in June 2017.

## Measles

Somalia is also facing its worst measles outbreak in 4 years, with over 14,823 suspected cases reported in 2017 (as of 31 July), compared to 5000–10,000 cases per year since 2014. The situation is especially critical

for millions of under-vaccinated, weak and hungry children who are more susceptible to contracting infectious diseases. More than 80% of those affected by the current outbreak are children under 10 years of age.

In early 2017, WHO and partners, in collaboration with national health authorities, vaccinated almost 600,000 children aged 6 months to 5 years for measles in hard-to-reach and hotspot areas across the country. Despite these efforts, the transmission of measles continues, compounded by the ongoing pre-famine situation, continued mass displacement, and undernourished children living in unhygienic conditions.

## Campaign planned

In order to contain the outbreak, a nationwide campaign is planned for November 2017 to stop transmission of the disease, targeting 4.2 million children. The campaign will also intensify efforts to strengthen routine immunization and reach unvaccinated children to boost their immunity. As shown by the response to the cholera outbreak, with the right interventions, health authorities are confident that similar success may be seen in controlling the measles outbreak. MEH

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# Attacks on health care

## Q&A with the WHO

Health care is under attack. The lack of respect for the sanctity of health care and for international humanitarian law is alarming. Patients are shot in their hospital beds; medical personnel are threatened, intimidated or attacked; vaccinators are shot; hospitals are bombed. The World Health Organisation answers questions about the indiscriminate attacks on healthcare.

### What are attacks on health care?

We consider attacks on health care to be any act of verbal or physical violence or obstruction or threat of violence that interferes with the availability, access and delivery of curative and/or preventive health services during emergencies.

Attacks on health can include bombings, explosions, looting, robbery, hijacking, shooting, gunfire, forced closure of facilities, violent search of facilities, fire, arson, military use, military takeover, chemical attack, cyberattack, abduction of health care workers, denial or delay of health services, assault, forcing staff to act against their ethics, execution, torture, violent demonstrations, administrative harassment, obstruction, sexual violence, psychological violence and threat of violence.

### What are the consequences of attacks on health care?

Every attack on health care has a domino effect. Such attacks not only endanger health care providers; they also deprive people of urgently needed care when they need it most. And while the consequences of such attacks are as yet largely undocumented, they are presumed to be significant – negatively affecting short-term health care delivery as well as the longer-term health and well-being of affected populations, health systems, the health workforce, and ultimately our global public health goals.

Think of the years of education and experience lost with the early and tragic death of each health care worker. Think about the time and resources and dedication it takes to develop one doctor. Think of the resources required to rebuild one hospital. We cannot accept these losses as normal.



A bombed hospital in Syria

### What information do we have on attacks on health care?

There is no publicly available source of consolidated information on attacks on health care in emergencies. For 2014 and 2015, WHO consolidated available data on individual attacks from open sources and found:

- 594 reported attacks in 19 countries facing emergencies
- 959 deaths, 1561 injuries
- 63% against health care facilities; and 26% against health care workers
- 62% of the attacks intentionally targeted health care.

While we recognize that these numbers are not comprehensive, they are a first attempt to provide a consolidated global view of attacks on health care in emergency settings and they serve to highlight the alarming frequency of attacks over the past two year.

### Is there sufficient reporting of attacks on health care?

We believe there is considerable under reporting--most likely due to limited awareness of the possibility, means and use of reporting, perceptions of the usefulness of reporting, limited resources and time, fear of reporting, complexity and limitations of existing reporting systems, lack of standardized definitions for use in data collection, and cultural perceptions of violence.

### What additional information do we need?

We need a more standardized approach to gathering and sharing information on attacks on health care and their consequences to health service delivery so that the information that is being collected is comparable. The most significant knowledge gap is the consequences of

attacks on health care delivery, on the health of affected populations, on health systems, on the health workforce, and on longer-term public health. This is a priority for data collection moving forward.

Quantitative and qualitative information would help us. A combination of quantitative and qualitative information will help us to understand the extent and nature of the problem and to identify and implement concrete actions to reduce the risk and impact of attacks during emergencies.

#### **Where is WHO with developing methods for data collection as per WHA Resolution 65.20?**

WHO has developed and tested a new method in some locations; however it is not yet ready for publication. WHO aims to collect and share data on attacks on health care in emergency settings as part of its standard package of information collection and analysis within the new emergency programme. This will depend largely on the resources and capacities available to WHO going forward.

#### **What can be done to stop attacks on health care?**

Priority actions include the following:


- Gather and consolidate comparable data; establish national registries
- Document the consequences of attacks to health care delivery and public health
- Establish national legislation to uphold International Humanitarian Law
- Implement risk reduction measures, including through WHO's Safe Hospitals Programme
- Engage communities in protecting health care
- Inform emergency response plans with security risk analysis
- Document and apply good practices, including the recommendations of ICRC's Health Care in Danger (HCiD) project
- Promote and apply ethical principles in health care delivery
- Speak out and advocate with zero-tolerance

#### **What about the new Security Council Resolution 2286?**

The Security Council 2286 that was unanimously adopted on May 3rd sends a strong message around the world that health care must be protected during conflict.

At the same time, we must remember that this is only part of the solution. We must remember that violence to health care is not only in conflict settings. Remember the health care workers who have been killed while working to eradicate the crippling disease of polio, or those who died from violence during the Ebola response. We also must think beyond the "wounded and sick" to all those who need health care – women giving birth and children needing vaccinations.

#### **What is WHO doing about attacks on health care?**

WHO is gathering and sharing information; advocating to build momentum for change; and helping to identify and promote good practice to reduce the risk of attacks. 



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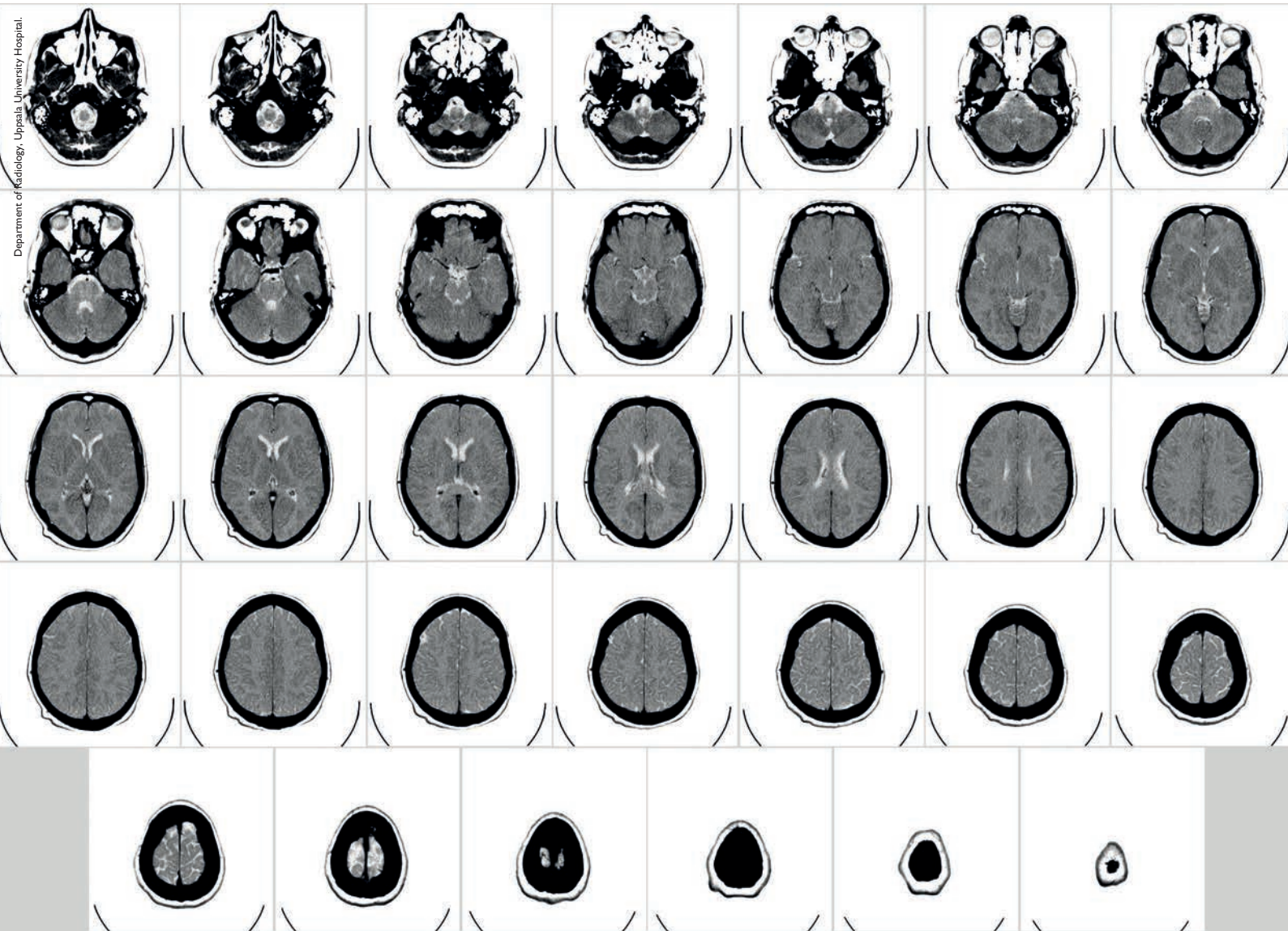
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CT scans of human brain base of skull to top

# Researchers hope new biomarkers will lead to potentially life-saving sports pitch-side test for brain injury

Researchers at the University of Birmingham have identified inflammatory biomarkers which indicate whether the brain has suffered injury.

The team, led by Professor Antonio Belli, at the University's College of Medical and Dental Sciences, now hopes

to use these new biomarkers to develop a test which can be used on the side of a sports pitch or by paramedics to detect brain injury at the scene of an incident.

Dr Lisa Hill, of the Institute of Inflammation and Ageing at the University of Birmingham, said: "Traumatic brain

injury (TBI) is the leading cause of death and disability among young adults and, according to the World Health Organization, by 2020 TBI will become the world's leading cause of neurological disability across all age groups.

"Early and correct diagnosis of traumatic

# Heading a football causes instant changes to the brain

Researchers from the University of Stirling have explored the true impact of heading a football, identifying small but significant changes in brain function immediately after routine heading practice.

The study from Scotland's University for Sporting Excellence published in *EBio-Medicine* is the first to detect direct changes in the brain after players are exposed to everyday head impacts, as opposed to clinical brain injuries like concussion.

A group of football players headed a ball 20 times, fired from a machine designed to simulate the pace and power of a corner kick. Before and after the heading sessions, scientists tested players' brain function and memory.

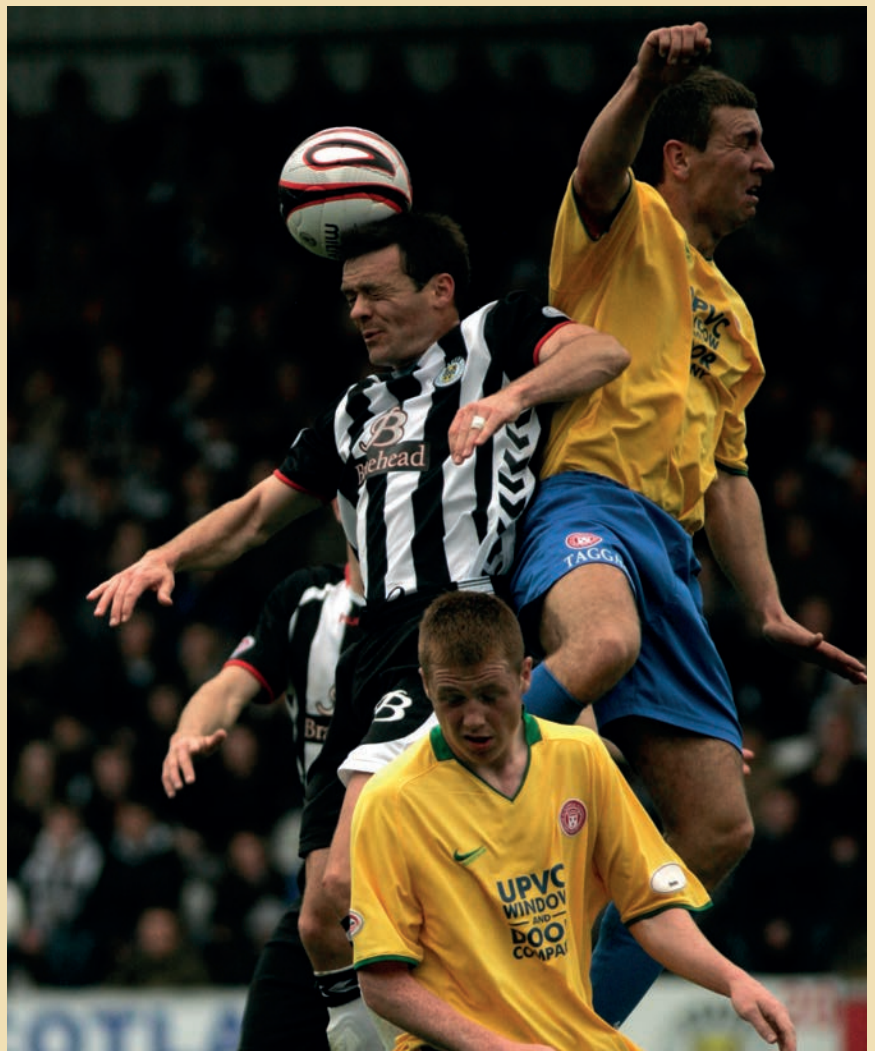
Increased inhibition in the brain was detected after just a single session of heading. Memory test performance was also reduced by between 41% and 67%, with effects normalising within 24 hours.

Whether the changes to the brain remain temporary after repeated exposure to a football and the long-term consequences of heading on brain health, are yet to be investigated.

Played by more than 250 million people worldwide, the 'beautiful game' often involves intentional and repeated bursts of heading a ball. In recent years the possible link between brain injury in sport and increased risk of dementia has focussed attention on whether football heading might lead to long term consequences for brain health.

Cognitive neuroscientist Dr Magdalena Ietswaart from Psychology at the University of Stirling, said: "In light of growing concern about the effects of contact sport on brain health, we wanted to see if our brain reacts instantly to heading a football. Using a drill most amateur and professional teams would be familiar with, we found there was in fact increased inhibition in the brain immediately after heading and that performance on memory tests was reduced significantly.

"Although the changes were temporary, we believe they are significant to



brain health, particularly if they happen repeatedly as they do in football heading. With large numbers of people around the world participating in this sport, it is important that they are aware of what is happening inside the brain and the lasting effect this may have."

Dr Angus Hunter, Reader in Exercise Physiology in the Faculty of Health Sciences and Sport, added: "For the first time, sporting bodies and members of the public can see clear evidence of the risks associated with repetitive impact caused by heading a football.

"We hope these findings will open up new approaches for detecting, monitor-

ing and preventing cumulative brain injuries in sport. We need to safeguard the long-term health of football players at all levels, as well as individuals involved in other contact sports."

In the study, scientists measured levels of brain function using a basic neuroscience technique called Transcranial Magnetic Stimulation (TMS). The findings from this study, funded by the NIHR Brain Injury Healthcare Technology Cooperative (HTC) are the first to show the TMS technique can be used to detect changes to brain function after small, routine impacts.

• doi: 10.1016/j.ebiom.2016.10.029

brain injury is one of the most challenging aspects facing clinicians.

"Being able to detect compounds in the

blood which help to determine how severe a brain injury is would be of great benefit to patients and aid in their treatment.

"Currently, no reliable biomarkers exist to help diagnose the severity of TBI to identify patients who are at risk of



developing secondary injuries that impair function, damage other brain structures and promote further cell death.

“Thus, the discovery of reliable biomarkers for the management of TBI would improve clinical interventions.”

Inflammatory markers are particularly suited for biomarker discovery as TBI leads to very early alterations in inflammatory proteins.

In this novel study published in *Scientific Reports*, blood samples were taken from 30 injured patients within the first hour of injury prior to the patient arriving at hospital.

Subsequent blood samples were taken at intervals of four hours, 12 hours and 72 hours after injury. These blood samples were then screened for inflammatory biomarkers which correlated with the severity of the injury using protein detection methods.

In the laboratory, the team used a panel of 92 inflammation-associated human proteins when analysing the blood samples, which were screened simultaneously.

The serum biomarkers were analysed from patients with mild TBI with extracranial injury, severe TBI with extracranial injury and extracranial injury only and all groups were compared to a control group of healthy volunteer patients.

The results identified three inflammatory biomarkers, known as CST5, AXIN1 and TRAIL, as novel early biomarkers of TBI.

CST5 identified patients with severe TBI from all other cohorts and, importantly, was able to do so within the first hour of injury.

AXIN1 and TRAIL were able to discriminate between TBI and uninjured patient controls in under an hour.

Dr Valentina Di Pietro, also of the Institute of Inflammation and Ageing at the University of Birmingham, said: “Early and objective pre-hospital detection of TBI would support clinical decision making and the correct triage of major trauma.


“Moreover, the correct diagnosis of TBI, which is one of hardest diagnosis to make in medicine, would allow clinicians to implement strategies to reduce secondary brain injury at early stage, for example, by optimising blood and oxygen delivery to the

brain and avoiding manoeuvres that could potentially increase intracranial pressure.

“In addition, this has potential implications for drug development, as novel compounds could be given immediately after injury and potentially commenced

at the roadside, if there was sufficient confidence in the diagnosis of TBI.

“We conclude that CST5, AXIN1 and TRAIL are worthy of further study in the context of a pre-hospital or pitch-side test to detect brain injury.”

• doi: 10.1038/s41598-017-04722-5 

## Competitive football players have superior vision, study suggests

The visual abilities of competitive football players are substantially better than those of healthy non-athletes, according to the first-ever comprehensive assessment of visual function in English Premier League players, published in *Science and Medicine in Football*.

Average visual clarity, contrast sensitivity, and near-far quickness of competitive footballers (both elite and intermediate) were significantly better than those of non-athletes. However, results showed there was no difference in visual function between the elite and intermediate players.

Interestingly, defensive players displayed faster near-far quickness than offensive players. According to the researchers, this visual function may be particularly helpful to defenders who are responsible for ensuring that the ‘offside trap’ is not broken and typically have to quickly switch their attention, and therefore eye gaze, between several opponents in near and far locations.

In the study, researchers from Liverpool John Moores University in the UK recruited 49 elite male players from an English Premier League football club as well as 31 intermediate male players (university level). They examined visual functions that are considered critical to sport performance in players of different skill levels and playing positions using the Nike SPARQ Sensory Station.

The assessments included visual clarity (ability to see detail at a given distance), contrast sensitivity (ability to detect an object against a background), near-far quickness (ability to change eye gaze and attention between near and far distances), and target capture. The researchers then compared these data to those from a study of 230 healthy non-athletic men and women using the same apparatus.

The study highlights the importance of good vision in football and the potential for gaining a competitive edge through vision support and training. However, the authors stress the limitations of the study and the need for further investigation to consider the specific visual demands of player position and the role for regular eye examinations.

According to the Professor Bennett: “While these findings add to the growing evidence that a good level of vision could be important in dynamic invasion sports, future studies need to determine the precise nature of the relationship with on-field performance.”

• doi: 10.1080/24733938.2017.1330552



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Interview

# Expert arthroscopic surgery at Belhoul Specialty Hospital

Middle East Health speaks to **Dr Dhaval Sagala**, Specialist Orthopaedic Surgeon at Belhoul Specialty Hospital, Dubai about his specialty and orthopaedic surgery in general.

**Middle East Health:** Please tell us about your specialty areas of surgery?

**Dr Dhaval Sagala:** I specialize in treatment of Sports injuries and shoulder problems.

**MEH:** Can you give us some background about how you gained experience in these specialties? And where you have worked?

**DS:** I had my training through various fellowships and observorships, mainly in Pune, India; Singapore and; Seoul, South Korea. I have worked in many hospitals with reputed surgeons of India and South Korea. I mainly practiced in Ahmedabad, India before I started working in Dubai.

**MEH:** In Dubai – what sport injuries do you mostly treat?

**DS:** The most common sports injuries I treat in Dubai are ligament injuries of the knee, Tennis Elbow, tendon ruptures of the heel and shoulder dislocations.

**MEH:** Why are these types of injuries more common?

**DS:** These injuries are usually the result of either acute trauma (such as a football accident) or repeated micro trauma (such as Tennis Elbow). The main reason these injuries occur is that these sports people start playing without adequate warm-up and stretching beforehand, as well as incorrect training and ignorance about safety precautions. I call them 'weekend warriors' – in other words those who just enter the sportsground without adequate preparations on weekends or after office work.

**MEH:** What are the main challenges you find in treating these injuries?

**DS:** The main challenges I commonly

encounter is to educate the patients about the nature of their injury, the available treatment options and the need for a proper rehabilitation program after any surgery. Most patients find themselves on such a tight schedule that they cannot have a proper rest and exercise program after surgery and hence don't achieve satisfactory results after surgery.

**MEH:** Can you tell us about working at Belhoul Specialty Hospital – the team you work with / the professionalism of the assistants?

**DS:** As a surgeon, I expect three things: Operation Room discipline; availability of full armamentarium and trained staff for any surgical work to be successful. Fortunately, I am working at a hospital [Belhoul Specialty Hospital] which has undoubtedly the perfect combination of all these three things. The operating theatre staff are well trained, sincere and caring. A successful surgery is not just dependent on the expertise of the surgeon, but also on the contributions of trained assistants, the operating theatre environment and the professionalism of all involved.

**MEH:** Can you tell us about the specialised equipment you use in surgery?

**DS:** Looking at my specialty, which is shoulder and arthroscopic surgery: Shoulder surgery requires the most advanced equipment namely, a beach chair positioning operating theatre table, arm-holding spider, and so on. Similarly, arthroscopic surgery requires a specialized visualization system – camera, full HD medical monitor, arthroscope and precision tools.

For shoulder surgery, the patient is placed



Dr. Dhaval Sagala

I call them 'weekend warriors' – in other words, those who just enter the sportsground without adequate preparations on weekends or after office work.

in a beach chair position for surgery which is not possible with routine operating theatre tables. The arm-holding spider is a specialised, flexible arm-holding device, which allows the surgeon to place the arm in the required position during surgery. For arthroscopic surgery, the surgeon needs to have good visualization of the interior of the joint, which is only possible if you have a good camera, HD monitor and good arthroscope. In a nutshell, this equipment is like an extension of the surgeon's hands, and the better quality they are, the smoother will be the surgery. Fortunately, Belhoul Specialty Hospital has the best available in the market. **MEH**

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# Minimally invasive anterior column reconstruction in spinal adult degenerative deformity

By Mr Robert Lee  
Consultant Spinal Surgeon

Spinal adult degenerative deformity encompasses a wide range of pathologies including spondylolisthesis (slip of one vertebra on another), scoliosis (sideways curvature of the spine) and positive sagittal balance (unable to stand upright due to flattening of the curves in the spine). Often all three of these conditions can present in one patient. Patients present with severe back and in particular leg pain due to degeneration of the intervertebral discs leading to compression of the nerves and 'sciatica'.

Adult scoliosis is very different from the children's population as children have flexible curves and no nerve compression. In contrast adult curves are stiffer and harder to correct. Also, due to loss of the disc height and morphology, the spine loses its natural lumbar curve, flats out and patients stoop forward.

Standard operative techniques include osteotomies of the spine where the vertebra is broken in two to correct the deformity and the spine is fused with pedicle screws and rods. This carries high complication rates including nerve damage, non-union and in rare cases, paralysis.

Newer surgical strategies address the source of the problem, realising that it is the disc and not the vertebra that is the problem. The discs can be removed and replaced with cages to restore the natural curve of the spine and indirectly decompress the nerves.

The Spinal Unit at the Royal National Orthopaedic Hospital (RNOH) is the biggest spinal department in the UK, dealing with these complex adult deformities on a regular basis.

Mr Robert Lee, consultant spinal surgeon and director of the minimally



Mr Robert Lee in surgery

invasive fellowship program at RNOH, uses minimally invasive lateral interbody cages to address these deformities rather than the traditional osteotomy techniques. Via a small incision in the flank of the abdomen, multiple cages can be inserted to correct the curvature of the spine and indirectly decompress the nerves. This technique is called anterior column reconstruction.

Over 100 patients have had this procedure, with minimal blood loss and low rates of complications. The initial six-month to two-year results were presented at an international conference last year. Mr Lee also uses special planning software to plan and simulate the surgery as well as computer navigation technology to insert his pedicle screws posteriorly dramatically reducing the rate of screw malposition.

“At RNOH, we are at the forefront of innovative spinal techniques. Using special software, we can analyse the patient's deformity and plan the surgery. The use of minimal invasive anterior column reconstruction and computer-navigated spinal surgery has greatly reduced patient complications with excellent early patient outcomes,” says Mr Lee.

- The Royal National Orthopaedic Hospital is involved in a clinical study looking at the safety of the lateral access technique using a special type of retractor system.

■ For more information please contact the Royal National Orthopaedic Hospital Private Patient Unit:  
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# Blood results help to predict fitness improvements in older marathon runners

Endurance sport has a beneficial impact on physical and mental performance and this can be seen in blood test results. In collaboration with the Health and Prevention Center of the Healthcare Institution for City of Vienna employees, a group of researchers from the biobank

at MedUni Vienna has now shown, in a study conducted with older marathon runners, that these laboratory data could be used in the opposite way to predict future changes in fitness. This information can be used to optimise individual training programmes.

The generally beneficial effects of endurance sport upon the health of older people has long been known. In the APSOEM Marathon Study, which has been running since 2009, MedUni Vienna's biobank has already demonstrated that the cognitive ability



and mental state of older marathon runners aged >60 are significantly better than those of comparable age groups who do not engage in any endurance sport. The data gathered in this study have now been used for a further study to investigate whether specific blood parameters can be used in the opposite way to predict future changes in fitness.

The biobank of MedUni Vienna and Vienna General Hospital is a central service facility dedicated to the storage

of human tissue, cell material and body fluids for more in-depth diagnosis, academic research projects and clinical tests, as well as working-up samples by way of a medical service.

Since older people have greater potential for improving their fitness than younger people, a follow-up study conducted by a research group headed by doctor and molecular biologist Helmuth Haslacher from MedUni Vienna, in collaboration with Robert Winker's team from the Health

and Prevention Center of the Healthcare Institution for City of Vienna employees, took blood samples from 47 marathon runners before an ergometer test, in order to carry out laboratory tests to determine levels of analytes, including inflammatory markers, muscle and liver parameters.

Ergometer tests were repeated after an interval of three years and approximately two thirds of the athletes showed a decline in fitness since the initial test. In fact, it was possible to use the

# Athletes' symptom anxiety linked to risk of injury

The anxiety experienced by elite athletes over illness symptoms is linked to the risk of being injured during competition and should be taken seriously, according to a study carried out at the IAAF World Championships in Athletics 2015. The way in which the symptoms progress and the nature of the sporting activity also influence the risk of injury.

"Elite athletes know their own bodies extremely well. If an athlete becomes anxious about injury or illness, this is a reliable indicator of the degree of seriousness. We have seen this also in previous studies. An athlete cannot lie to himself or herself," says Professor Toomas Timpka of the Athletic Research Center, Department of Medicine and Health Sciences at Linköping University, one of the researchers who conducted the study.

In a study published in the *British Journal of Sports Medicine*, an international team of researchers led by Linköping University, Sweden, has investigated factors that predict the risk of injury or illness during competition. A second study by the team published in the same journal has investigated heat stress in athletes competing in the IAAF World Championships in Athletics 2015. Fifty countries took part, and around

300 athletes completed a questionnaire detailing their health status one month before the world championships began. The researchers subsequently registered new injuries and illnesses that arose during the competition period.

Athletes who stated that they had been anxious about symptoms of illness before the competition had a five times higher risk of suffering injury during it. Anxiety about symptoms of injury, in contrast, was not clearly linked with an increased risk of injury.

"We were surprised that the results were so clear in this study among top-flight athletes. We recommend that the teams include a clinical psychologist, thus enabling the athletes to talk openly about their anxiety for illness or injury when preparing for competitions. It is important that the athletes do not conceal any injuries from their trainers or doctors," says Prof Timpka.

Symptoms that increased gradually before competition were more closely linked with the risk of injury during competition. The risk in this case was three times higher than the risk for other athletes. Prof Timpka believes that injuries that arise from overuse and for which the symptoms increase gradually may deceive athletes.



Professor Toomas Timpka of the Athletic Research Center, Department of Medicine and Health Sciences at Linköping University


"The athlete has time to change the way in which he or she views the symptoms, and does not experience the same increase in anxiety. Anxiety-arousing signals do not have as strong an impact on athletes who have had problems for a long period. This makes it important to keep a close eye on such athletes," says Prof Timpka.

Athletes competing in endurance sports had a ten times greater risk of injury or illness during the world championships than those competing in other types of sporting activity. This confirms the findings of previous research.

In the second study, the researchers

earlier blood results as a basis for predicting who had lost fitness by the time of the follow-up examination, whose fitness level had remained the same and whose had even improved. It was therefore demonstrated that blood tests can be useful for predicting future changes in fitness resulting from endurance training.

The next step for the study group will be to carry over the findings from the marathon runners to larger groups and other types of sport to find a future application for the research results. One possibility would be to develop an app for checking fitness.

• doi: 10.1371/journal.pone.0177174 

Athletes who stated that they had been anxious about symptoms of illness before the competition had a five times higher risk of suffering injury during it.

examined how athletes prepared to compete at high temperature and high humidity, and determined how many were affected by exertional heat illness (EHI).

“From a physiological point of view, carrying out sporting activity in such environmental conditions is not optimal. But it’s not easy to distinguish between ill-health caused by heat stress and the normal consequences of maximum physical exertion in these conditions. The study shows that methods are required to be able to diagnose dangerous EHI during major competitions,” says Prof Timpka.

The research has received financial support from the Swedish Research Council for Sport Science and the International Association of Athletics Federations (IAAF), among others. Researchers in several countries have participated in the research, including researchers from Linköping University in Sweden, the Aspetar Orthopaedic and Sports Medicine Hospital in Qatar, and the Université de Lyon in France.

• doi: 10.1136/bjsports-2016-096580 

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# Hand surgery at the Neuro Spinal Hospital, Dubai

The hand is one of the finest structures in the human body and it is important in everyday life. What would we do without hands? They help us to feel the world, to eat, to write. Artists use hands to play music, to paint or sculpt.

If you look at your hand, even during simple motion, you can see how precise the motion is, how sensitive the fingers are, how many structures are involved in hand function. It is a complicated structure built of bones, tendons, muscles, ligaments, nerves, vessels and skin. Every element is vital for hand function.

The hand surgeon treats all structures of the hand. This surgeon sees the hand as a whole and tries to maintain its function. That is why hand surgery is a combination of many specialties like orthopedic surgery which deals with bone fractures, joints, ligaments and tendon injuries; neurosurgery which deals with nerve problems; vascular surgery for repairing vessels; and plastic surgery which is needed to treat skin problems and deformity of the hand. The hand surgeon combines all this knowledge

to make hand recovery as successful as possible.

A person with hand pain or malfunction should visit a hand surgeon. There are many common conditions that can be easily treated with many available methods.

Many severe deformations and limitations of hand function can be treated nowadays with surgery. Surgeons are able to remove contractures, replace missing tendons, reconstruct ligaments and nerves to regain good function of the hand.

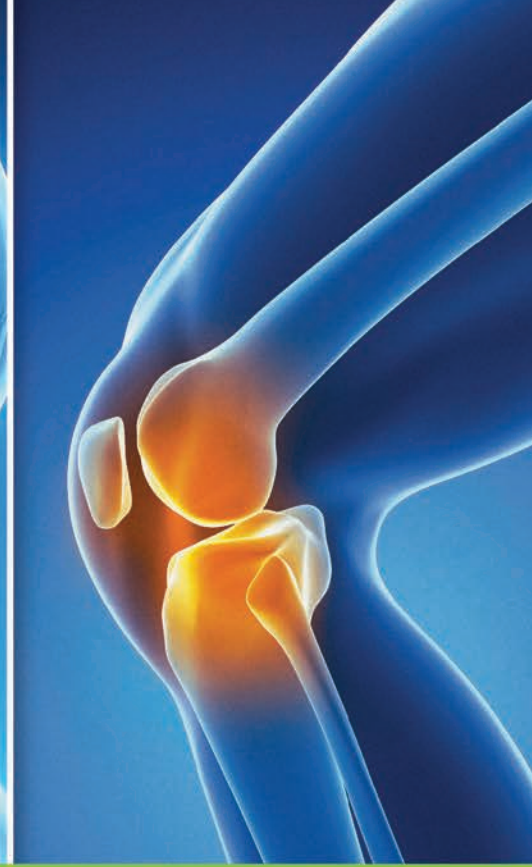
At the Neuro Spinal Hospital, Dubai, conditions such as arthritis of the joints in the hand can be treated with implants. Surgeons are able to replace even small joints of the hand in order to give the patient pain free motion and function.

Hand surgery is also needed for some typical conditions like fractures and tendon ruptures, because they have to be treated a little differently than, for example, a fracture of the leg. Fixing hand fractures requires more precision and usually earlier and longer physiotherapy. There must be close cooperation between the hand surgeon and hand physiotherapist.



Dr Kasia Papiez, Hand and Orthopedic Surgeon, Neuro Spinal Hospital, Dubai

However, sometimes surgery is not necessary. For example, in some cases hand pain is due to tendon inflammation. Unfortunately, patients are often afraid of hand surgery, so they suffer for months without seeing a doctor. But for these diagnoses, they can often be treated with a simple injection. The injection is usually done with a small needle under ultrasound guidance so it is very precise and the medication works in the exact location of the pain. **MEH**



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- Hand Surgery
- Neurosurgery Clinic
- Peripheral Nerve Surgery
- Neurology Clinic
- Rehabilitation and Physiotherapy
- Diagnostic and Interventional Radiology





The surgeons at work in the OR suite

# Transoral thyroidectomy offers a scarless alternative

A surgical team from the University of Chicago Medicine led by Drs. Raymon Grogan and Zhen Gooi was the first in the Midwest and the fourth in the United States to remove diseased thyroid or parathyroid glands – located at the front of the neck, an inch or two below the chin – using an approach that leaves no visible scar.

The standard thyroid operation has long been performed through a two-inch or longer opening in the neck, known as a transverse-collared incision. This leaves a permanent, obvious scar. The new transoral approach, developed by a surgeon in Bangkok, Thailand, was designed to hide the scar. Instead, surgeons make the incision inside the mouth, at the crease between the gums and the lower lip.

“No one but your dentist will see this, and most dentists will not notice,” said Raymon Grogan, MD, assistant professor of surgery and director of the endocrine surgery research program at the University

of Chicago. “Once the incisions have healed, patients cannot see them.”

## **Minimally invasive, cosmetically appealing**

For nearly a decade, surgeons have been searching for a more cosmetically appealing way to remove a diseased or dysfunctional thyroid gland. Surgeons have tested various approaches, using minimally invasive tools such as laparoscopy or the surgical robot. Some approached the thyroid through an incision in the armpit. Others entered through the back of the neck, or through the breast.

“These approaches were imaginative, but not an improvement,” Dr Grogan noted. “They were difficult to perform and they still left a visible scar, just not on the neck. They often resulted in more pain and complications than the traditional approach.” In the end, they were less appealing than the operation they were designed to replace.

The pioneer of the scar-free oral

approach used by Dr Grogan was Thai surgeon Angkoon Anuwong, MD, of the Police General Hospital, Siam University, in Bangkok. In much of Asia, visible scars, especially on the face or neck, are stigmatized. So Dr Anuwong, as well as surgeons in Japan and China, explored novel ways to hide their incisions.

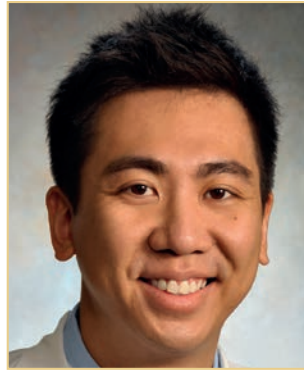
The most appealing alternative was the trans-oral endoscopic thyroidectomy vestibular approach (TOETVA). Dr Anuwong performed the first such procedure in Thailand in 2013. He now reports having performed more than 500.

## **The procedure**

Dr Grogan and University of Chicago surgical colleague Zhen Gooi, MD, who specializes in head and neck tumors, spent two full days observing and videotaping Dr Anuwong’s approach in January 2017. In February and early March, back at the University of Chicago, they honed



Raymon Grogan, MD



Zhen Gooi, MD



Sheri Caine

their skills. They performed their first case, removal of a small thyroid cancer, on March 8. One week later they used the same approach to operate on a dysfunctional parathyroid gland.

The operation begins in the oral vestibule – the space where the inside of the lower lip meets the gums. The surgeon makes three small incisions. The biggest is 10 millimeters long (less than half an inch), to accommodate a light and a miniature video camera. The other two, five-millimeter slits on either side, are for laparoscopic surgical instruments.

The surgeon inserts the instruments and camera through these ports, then tunnels under the skin, past the chin and an inch or two into the neck to reach the thyroid, which is beneath the skin and a flap of muscle.

“From that point on, this is the same anatomy that you see during an open thyroid operation,” Dr Grogan said. “It allows for excellent visualization, maybe better than the open approach, and provides a lot of mobility for the instruments.”

Next, they isolate the thyroid, place it in a small “endobag”, and remove it through the 10mm incision. Larger specimens can be broken into pieces and removed. Finally, they close all three incisions with stitches. Patients are allowed to eat meals the next day.

Complication rates of this operation are rare and comparable to open surgery. There is “no increase in infection rates”, Dr Gooi said. The most common complications are injury to the laryngeal nerve, which controls the vocal cords (seen in about 1% of cases), and injury to the parathyroid glands, which regulate calcium levels (about 1%). Most patients with those complications recovered within two months.

“Keep in mind,” Dr Grogan added, “almost all the data on this procedure comes from one surgeon in Thailand. But this seems to be the

I would be the most discriminating critic of all – and I’m thrilled with how it looks. There’s zero way anyone could tell I had surgery.

approach we have all long been searching for and finally figured out.”

**“There’s zero way anyone could tell I had surgery”**

It worked as planned for Dr Grogan’s first patient, Sheri Caine, a high school physics teacher from Oak Forest, Illinois. She had been diagnosed with a small thyroid cancer. Dr Grogan explained the options to her: the traditional method, which he had done hundreds of times, or the scarless approach. He made it clear that this would be his first such case. She opted for TOETVA.

“The scar mattered to me,” she explained. “It would be a lifelong daily reminder that I had cancer. I’m only 32. I didn’t want every photograph, every time I looked in the mirror, to remind me that I had cancer.”

Caine admitted she was “a little apprehensive about being his first case”, but it didn’t seem like a big deal to her. If there was a problem, he could revert to the traditional approach.

“Plus, I knew there would be extra people there for a first case, taking care, paying attention. I assumed I would get amazing care, which I did.”

Caine woke up to a good outcome and a pleasant surprise: an email from Texas Tech University informing her she had been accepted to their PhD program in STEM education. A follow-up email confirmed a significant scholarship.

She went home the next day. She still had some slight bruising, but that was



The incision in the process of healing



Sheri Caine, two-weeks post-op shows no scar

easily covered by makeup. Within a few days there was “a little bit of numbness under my chin”, she said, “but no swelling, no nothing, no problem”.

“I would be the most discriminating critic of all,” she added, “and I’m thrilled with how it looks. There’s zero way anyone could tell I had surgery.”

• To learn more about the University of Chicago Medicine, please contact the Office of International Programs office by: visiting <http://international.uchospitals.edu> emailing [international.services@uchospitals.edu](mailto:international.services@uchospitals.edu) or calling +1-773-702-0506.





Operating Room nurses at Cleveland Clinic Abu Dhabi prepare to assist in cleft palate surgery for the Operation Smile event.

# ‘Operation Smile’ performs life-changing surgeries at Cleveland Clinic Abu Dhabi

In the Year of Giving, 186 staff volunteer their time

Operation Smile, the charity committed to providing thousands of free operations to people suffering from cleft lips and palates, came to Cleveland Clinic Abu Dhabi at the end of July.

Up to 20 children and adults received transformative surgery from Operation Smile UAE at Cleveland Clinic Abu Dhabi on July 28 and 29. Operation Smile is a charity committed to providing thousands of free operations to people suffering from cleft lips and palates. The hospital made

two operating rooms available to the charity’s medical volunteers, along with food and other supplies.

After appealing for volunteers to assist with its first UAE mission, Operation Smile said that 186 staff from Cleveland Clinic Abu Dhabi stepped forward, more than twice the number needed.

“From the first time we came to Cleveland Clinic Abu Dhabi, we were overwhelmed by the offers of help. It’s been really heartwarming,” said Morag

Cromey-Hawke, executive director of Operation Smile in the UAE. “Everyone we came across from management downwards wanted to get involved to the extent that we have almost more support than we can use.”

The foundation Operation Smile UAE (OSUAE) was established in January 2011 under the patronage of HH Shaikha Aljazia Saif Mohd Al Nahyan, Wife of HH Sheikh Abdulla Bin Zayed Al Nahyan, Minister of Foreign Affairs and

## The Autism Rocks support centre opens in Dubai

Autism Rocks, the UK-based charity known for its exclusive collaborations with stars to raise awareness around autism through music, has opened an Autism Rocks support centre in Dubai Healthcare City. The pioneering facility offers a space in which a carefully selected team of world-class therapists can support children on the autism spectrum and their families to improve their quality of life, enhance their long term outcomes and reduce the fear and uncertainty common with the diagnosis.

The centre will provide gold standard, multidisciplinary therapy services to children on the autism spectrum and their families. This includes; Applied Behavioural Analysis (teaching children the skills they need to interact with their environment, speech therapy (teaching children how to speak), occupation therapy (helping children develop the skills they need to be successful at school, home and play) and psychology. Importantly, as well as one-to-one direct support, the centre will offer training to teachers and parents to help them learn evidence-based methods that address challenging situations as they arise in real life.

According to the Dubai Autism Centre, the prevalence of autism has increased in the UAE over the years, a trend that has also been witnessed in other countries.



Claudia Sidoli, Director of Autism Rocks support centre said: “Autism Rocks’ journey to date has been a big success. This is an important day in the development of the brand. Most people know about our music events and we wanted to take our project to the next level with the opening of the Autism Rocks Support Centre to raise significant awareness and offer gold standard therapy.

“As we celebrate the Year of Giving, we are fortunate to open in the UAE, a country that has been passionate about supporting individuals with disabilities over the past few years. We have a strong culture of giving back instilled in

the community, a legacy that has been inspired by the UAE’s Founding Father Sheikh Zayed Bin Sultan Al Nahyan. This commitment has been translated with recent initiatives such as the Autism Awareness month last April.”

Autism Rocks was established in 2014 by Sanjay Shah. Since its inception, it has hosted a series of successful events featuring some of the biggest stars from the music industry in various cities around the world. The Autism Rocks Arena opened its doors in Dubai in 2016, giving a home to the initiative in the UAE. It has played host to some of the biggest musical stars in the world. **MEH**

International Cooperation, and works to provide cleft lip and cleft palate repair surgeries for children and adults all over the world. In addition to raising funds to perform the surgeries, OSUAE works to recruit medical volunteers and raise awareness about the condition.

While the foundation has supported operations around the world, this is the first time it has had access to the world-class facilities at Cleveland Clinic Abu Dhabi.

“Often when we run an Operation Smile mission overseas, the facilities we get to use are quite basic and still the children and the parents are so grateful,” Cromey-Hawke said. “Being able to use a facility like Cleveland Clinic Abu Dhabi for our mission is an absolute dream for our patients and our volunteers.”

Every three minutes a child somewhere in the world is born with a cleft palate. In some countries, one in 10 will die before their first birthday. Many of the children who survive live their lives in shame, hiding their faces because of this tragic deformity.

Operation Smile was founded on the belief that no child should suffer or die because of a facial deformity. Internationally, since its founding in 1982, Operation Smile has provided more than 200,000 free surgeries to children and young adults around the world and over two million comprehensive healthcare evaluations.

Ann Williamson, Chief Clinical & Nursing Officer, Cleveland Clinic Abu Dhabi, said: “It is fitting that in the UAE

Year of Giving, Cleveland Clinic Abu Dhabi has been able to assist Operation Smile in transforming people’s lives through surgery. We’ve been very pleased to see so many hard-working nurses and team-members from the hospital volunteer their time for this initiative.”

Cleveland Clinic Abu Dhabi spent months preparing to host the event and ensuring that Operation Smile patients receive the same outstanding levels of care as all other Cleveland Clinic Abu Dhabi patients. Cleveland Clinic Abu Dhabi volunteers participating in Operation Smile include: 21 Operating Room nurses, 32 nurses specializing in pre- and post-operative care, two surgeons, two anesthesia physicians, nine technicians and a number of non-clinical staff. **MEH**



# Mediclinic Middle East selects InterSystems to support culture of excellence



Mediclinic Middle East (MCME), one of the largest private healthcare groups in the UAE, is implementing InterSystems TrakCare, a unified healthcare information system. The solution will provide all MCME hospitals and clinics in the UAE with an online, secure, electronic medical record (EMR). This will give the group's care providers the clinical and administrative information they require about each patient at any given time.

TrakCare will support the MCME medical staff in their decision-making, while creating more opportunities to offer patients an enhanced experience and seamless care journey. TrakCare will also help clinicians and administrators to manage costs and maintain efficiencies by streamlining care processes, eliminating duplicate tests, expediting billing, and

maximizing the use of resources.

TrakCare's advanced interoperability will enable MCME to align with the UAE Health authorities' plans for a Health Information Exchange (HIE). The HIE platform will connect public and private systems, so patient records may be easily accessible across the Emirate by authorized individuals.

"At Mediclinic, we believe in putting science and innovation at the heart of our approach," said Donna Lunn, Chief Information Officer, Mediclinic Middle East. "Our goal is to provide outstanding facilities, with best in class solutions, reinforced by sound medical expertise. To enable a culture of excellence across all our facilities, we selected InterSystems TrakCare as it is best suited to help us achieve our goals. In doing so, our operations will be

well-placed to achieve automation while strengthening our stance as the leading healthcare provider in the UAE."

"By selecting TrakCare, MCME will be the largest private healthcare provider group to deploy a unified international healthcare information system across all its hospitals and clinics in the UAE," said Michel Amous, InterSystems Managing Director for Middle East, Italy, and India. "Top private healthcare providers like Mediclinic have always been looking at ways to transform care delivery and enable a culture of excellence. They aim at utilizing advanced technology to automate and improve upon clinical and operational processes. By providing timely access to comprehensive data presented in a meaningful way, TrakCare will help MCME achieve their goals." ■ MEH



**Mediclinic Middle East** is part of Mediclinic International, a private hospital group founded in 1983 that today has three operating platforms: in Southern Africa (South Africa and Namibia); Switzerland and the United Arab Emirates. The Group also has a 29.9% shareholding in Spire Healthcare, a UK-based healthcare group with 38 hospitals. The foundation of Mediclinic International lies in the application of rigorous science to improve the lives of patients, through the use of state-of-the-art treatments and technologies to care for patients in an evidence-based environment.

In 2016, Mediclinic Middle East, whose primary customer base is in Dubai, merged with Al Noor Hospitals Group, whose primary customer base is in Abu Dhabi. The combined Group operates six hospitals and more than 20 clinics with over 700 inpatient beds across the United Arab Emirates.



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# Emrill FM develops intensive cleaning training programme by JCI standard

Emrill Services LLC, one of the largest facilities management (FM) companies in the UAE with over 7,000 personnel, has successfully developed an intensive facilities management (FM) training programme to ensure compliance with Joint Commission International (JCI) – accreditation cleaning standards at clinics and hospitals in the UAE.

JCI provides the basis for accreditation of clinics and hospitals throughout the world, supplying organisations with the information needed to pursue or maintain patient safety, performance and improvement.

JCI accreditation is considered the gold standard in global healthcare.

Emrill holds the facilities management soft services and MEP contract for 10 Mediclinic clinics across the UAE, including the flagship Dubai Mall clinic.

Developing the structured training programme by JCI standard resulted from the following industry needs:

## The challenge:

Emrill was presented with a major challenge: how to ensure all cleaning and FM soft services at Mediclinic locations throughout UAE remain compliant to JCI accreditation standards. As part of its accreditation process, Mediclinic needed to ensure its suppliers complied with JCI standards, including its facilities management partner.

## The solution:

Together with Mediclinic, Emrill developed an intensive, FM training programme with real-life videos as the medium to ensure compliance with JCI standards.

The initial one week programme comprised of intensive familiarisation tours by Mediclinic personnel, specific clinical-area training, classroom and video training, and on-going supervision to ensure the proper maintenance of



Marc Daly, Head of Operations at Emrill



active work areas. Assessment of trained staff was conducted by JCI-accredited Mediclinic staff as part of an interview process requiring all cleaning staff to correctly respond to a series of questions and scenarios in the following situations:

- Code Yellow
- Bio hazards spill
- Water dispenser hygiene
- Hand hygiene
- Personal Protective Equipment

## The outcome:

To date, the programme has been successful and 52 Emrill staff have been trained and passed the final JCI interview process by JCI auditors.

The success of this programme relies on an intensive training and safety-first approach to ensure standards are maintained for the protection of all clinical staff and patients alike, while reducing the ever-present risk of cross-contamination.

Camelia Akkela, Manager - Quality & Nursing at Mediclinic Middle East commented: “Mediclinic Middle East prides itself on creating a safe and comfortable atmosphere for its patients, visitors and staff. As an outsourced service provider, Emrill, through their commitment, ability

Our people continue to make significant contributions beyond their day job, like taking accountability in events such as a fire, JCI audits and so on. Delivering a great patient experience is at the heart of everything we do.

to coordinate with the nursing team and other team members, and manage duties efficiently, provides vital housekeeping support to Mediclinic Middle East’s network of clinics. Emrill helps us serve our patients in the best way we can, comply with the rules of regulatory bodies and occupational health and safety, and achieve the required international accreditation standards.”

Marc Daly, Head of Operations at Emrill commented: “In 2016 we took significant strides towards a step change in consistency, compliance and patient experience. Our people continue to make significant contributions beyond their day job, like taking accountability in events such as a fire, JCI audits and so on. Delivering a great patient experience is at the heart of everything we do.”

Emrill has positioned itself as a specialist in healthcare sector FM services and is now offering its JCI standard cleaning services to a range of healthcare facilities and hospitals throughout the UAE. MEM





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It is advisable to talk to your doctor if you have any symptoms of urinary incontinence, as usually there are simple treatments that help you with the problem.

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# Sheikh Hamdan bin Rashid Award allocates Dh2m to fund 10 research projects

The Sheikh Hamdan bin Rashid Award for medical sciences has allocated Dh2 million to fund 10 scientific projects at the United Arab Emirates University, University of Sharjah, New York Abu Dhabi University, and Dubai Health Authority.

The award brings the total number of projects funded since its establishment in 1999 to 132.

Abdullah bin Souqat, the executive director of Sheikh Hamdan bin Rashid Award for medical sciences conveyed his gratitude to H.H. Sheikh Hamdan bin Rashid Al Maktoum, Deputy Ruler of Dubai, the UAE Minister of Finance and the patron of the Award for his continuous support of the sciences, scientists and scientific research.

He noted that the award plays an important role in healthcare research in the UAE and added that it was the first local entity to



contribute funding to medical research at the local level.

The research projects were selected based on their ability to advance healthcare in the UAE.

The following studies were selected:

1. Identification of a genetic and molecular basis for hearing loss in two UAE affected families – Dr Abdul-Aziz Tlili, Department of Applied Biology, College of Medicine, University of Sharjah.
2. Genetic and transcriptomic analysis of hyperlipidemia in Emirati patients with type 1 diabetes mellitus using saliva and blood samples – Dr Bashair Mohamed Mussa, Basic Medical Sciences Department, College of Medicine, University of Sharjah.
3. Novel molecular biomarkers of genitourinary, breast & gynecological malignancies in a United Arab Emirates population – Dr Alia Saeed Albawardi, College of Medicine and Health Sciences, United Arab Emirates University.
4. Investigation of Cardio-vascular risk predictions using joint modelling of longitudinal biomarkers and time-to-event data – Dr Abderrahim Oulhaj from, Institute of Public Health, College of Medicine and Health Sciences, United Arab Emirates University.
5. Examination of breastfeeding self-efficacy, infant feeding methods, and perinatal mental health among women in the United Arab Emirates: A Cohort Study – Dr Hadia Radwan, Department of Clinical Nutrition and Dietetics, College of Health Sciences, University of Sharjah.
6. The effects of extended higher dose of vitamin D supplement on endothelial dysfunction in adult middle-aged obese and vitamin D3 deficient individuals in a UAE population – Dr Adel Bahgat Elmoselhi, Basic Medical Sciences Department, College of Medicine, University of Sharjah.
7. Prevalence and risk factors of atopy among Emiratis – Dr Suleiman Mohammad Suleiman Eisa Al-Hammadi, Department of Pediatrics, College of Medicine and Health Sciences, United Arab Emirates University.
8. Effect of melatonin on glucose levels in diabetes mellitus type 2: a randomized controlled cross-over trial – Dr Bilal Ahmed, Dubai Diabetes Center, UAE.
9. The effects of glucose deprivation on cellular respiration and bioenergetics in murine brain tissue – Dr Narchi Hassib, Department of Pediatrics, College of Medicine and Health Sciences, United Arab Emirates University.
10. Study on molecular mechanisms of sanguinary induced necroptosis in human colorectal cancer, a path to developing better anticancer therapeutics – Professor Galadari Sehamuddin, Biology Department, New York Abu Dhabi University. MEM

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# Scientists reveal source of human heartbeat in 3D

A pioneering new study is set to help surgeons repair hearts without damaging precious tissue.

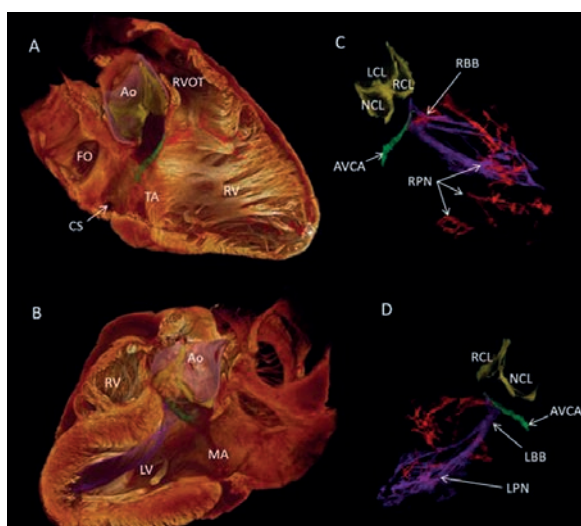
A team of scientists from Liverpool John Moores University (LJMU), The University of Manchester, Aarhus University and Newcastle University, have developed a way of producing 3D data to show the cardiac conduction system – the special cells that enable our hearts to beat – in unprecedented detail. The findings were published in *Scientific Reports*.

The new data in this study gives them a much more accurate framework than previously available for computer models of the heartbeat and should improve our ability to make sense of troublesome heart rhythms like atrial fibrillation. The data reveals exactly where the cardiac conduction system is in a normal heart. For example, it shows just how close it runs to the aortic valve.

Professor Jonathan Jarvis who is based at the LJMU School of Sport and Exercise Sciences explained: “The 3D data makes it much easier to understand the complex relationships between the cardiac conduction system and the rest of the heart. We also use the data to make 3D printed models that are really useful in our discussions with heart doctors, other researchers and patients with heart problems.

“New strategies to repair or replace the aortic valve must therefore make sure that they do not damage or compress this precious tissue. In future work we will be able to see where the cardiac conduction system runs in hearts that have not formed properly. This will help the surgeons who repair such hearts to design operations that have the least risk of damaging the cardiac conduction system.”

Co-author Dr Halina Dobrzynski, who is based in The University of Manchester’s



3D heart scan



3D heart model

Cardiovascular Division, has been working on the anatomy of the cardiac conduction system for 20 years. She says: “This is just the beginning. The British Heart Foundation is supporting my group to visualise this system in 3D from aged and failing hearts. With my research assistant Andrew Atkinson and working with Professor Jonathan Jarvis, Robert Stephenson and others, we will produce families of data from aged and failing hearts in 3D.”

### How this works

Soaking post-mortem samples in a solution of iodine, means soft tissue such as the heart can absorb X-rays and become visible


With modern X ray scanners, scientists can make detailed 3D images. In the best images, they can even see the boundaries between single heart cells, and detect in which direction they are arranged. Within the heart, there is a special network called the cardiac conduction system that generates and distributes a wave of electrical activity stimulating the heart muscle to contract. This system makes

sure that the various parts of the heart contract regularly and in a coordinated way, a bit like a team of rowers in a boat race. If the system is damaged, and one part of the heart contracts out of time with the rest, then the heart does not pump so efficiently.

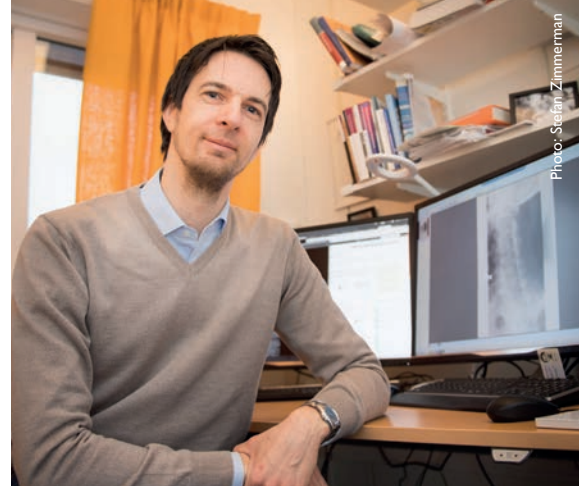
This research was also in collaboration with the Visible Heart Laboratory, University of Minnesota, Minneapolis, USA; National Institute of Legal Medicine, Bucharest, Romania and Auckland Bioengineering Institute, University of Auckland, Auckland, New Zealand

Micro-CT scanning was carried out using the Nikon Metris XTEK 320 kV Custom Bay and Nikon XTEK XTH 225 kV systems at the Manchester X-Ray Imaging Facility, University of Manchester.

The paper, ‘High resolution 3-Dimensional imaging of the human cardiac conduction system from microanatomy to mathematical modelling,’ was published in *Scientific Reports*.

• doi: 10.1038/s41598-017-07694-8 

# Can Artificial Intelligence analyse X-rays as well as doctors?



Max Gordon, assistant consultant in orthopaedics at Danderyd Hospital and researcher at Karolinska Institutet in Sweden.

Many jobs, medical and otherwise, might one day be performed using artificial intelligence. According to a new study in *Acta Orthopaedica* by researchers at Karolinska Institutet in collaboration with the Royal Institute of Technology and Danderyd Hospital in Sweden, self-learning programmes can already find fractures with the same accuracy as orthopaedists.

Assessing radiographs requires a great deal of expertise and time, with the results very much depending on the doctor. However, artificial intelligence (AI) can simplify and standardise the work considerably, according to Max Gordon, assistant consultant in orthopaedics at Danderyd Hospital and researcher at Karolinska Institutet in Sweden, who has published a study on how radiographs can be read using computers trained in fracture recognition.

“Our study shows that AI networks can make assessments on a par with human specialists, and we hope that we’ll be able to achieve even better results with high-res X-ray images,” says Dr Gordon.

AI-facilitated image analysis had its major breakthrough in 2012, when the

algorithm that astounded the computer world was compared to a human three-times worse at recognising objects in pictures from the internet. In only three years, it was at human level and by 2016 it was twice as good. This made Dr Gordon think about how the technique could be used in the fields of orthopaedics and radiograph analysis.

In the present study, the researchers had existing AI image-recognition algorithms go through a total of 256,000 radiographs of hands, wrists and ankles from the Danderyd Hospital archives. The computer was trained how to identify fractures in two thirds of the radiographs under the guidance of the researchers and then was left to independently analyse the remaining images, which were thus completely new to the AI programme. Two consultants simultaneously analysed the same radiographs.

The team found that the computer and the doctors made equally accurate analyses given the same image resolution, both finding the presence of a fracture in over 80% of the cases.

The AI programme, which is inspired by the learning processes of the human brain, has the potential to be even better at its job if it has access to greater amounts of data. The researchers have therefore begun a follow-up study based on Danderyd Hospital’s entire orthopaedic archive of over a million high-resolution radiographs.

“AI can lead to a more uniform classification and a common standard in radiograph analysis,” says Dr Gordon. “If we can go back to our digital archives, we’ll also be able to do extensive research on survival, the development of disease and work capacity – studies that have been impossible to do owing to the amount of data to process.”

#### • Reference:

“Artificial intelligence for analyzing orthopedic trauma radiographs: Deep learning algorithms - are they on par with humans for diagnosing fractures?”, Jakob Olczak, Niklas Fahlberg, Atsuto Maki, Ali Sharif Razavian, Anthony Jilert, André Stark, Olof Sköldenberg, Max Gordon. *Acta Orthopaedica*, 3 July 2017. [MEH](#)

## 3D visualisation of the pancreas – new tool in diabetes research

Umeå University researchers have created datasets that map the three-dimensional distribution and volume of the insulin-producing cells in the pancreas. The wealth of visual and quantitative information may serve as powerful reference resource for diabetes researchers. The Umeå researchers are now publishing their datasets in *Scientific Data*, which is a Nature Research journal for scientifically valuable collections of research data with high reuse potential.

The hormone insulin – which is needed to regulate the blood sugar levels of the

body – is produced by the pancreas and plays a key role in the development of diabetes. Insulin-producing cells are organised in the so-called Islets of Langerhans (or pancreatic islets), which are scattered by the thousands in the pancreas. In diabetes research, it is often important to study the quantity and distribution of insulin-producing cells. At present, such studies are generally based upon analyses of chosen cross-sections of pancreatic tissue. These in turn form the basis for attempting to gain an overall picture of the pancreas.

“However, such analyses only provide limited information and are often ridden with relatively large margins of error since the conclusions are based only on two-dimensional data,” says Ulf Ahlgren, professor in molecular medicine at Umeå University, Sweden, and in charge of the publications.

Ahlgren and his research colleagues at the Umeå Centre for Molecular Medicine (UCMM) have previously developed new methods to create three-dimensional images of the insulin cell distribution in intact pancreas based on so-called optical projection ▶



## Imaging – X-ray

tomography (OPT). This technique in many ways bears resemblance to a medical CT scanner, but instead of x-rays it uses regular light.

“We believe that the current publication represents the most comprehensive anatomical and quantitative description of the insulin cell distribution in the pancreas. By making these datasets accessible to other researchers, the data will be available for use as a powerful tool for a great number of diabetes studies. Examples may include planning of stereological analyses, in the development of non-invasive imaging techniques or various types of computational modelling and statistical analyses,” says Ahlgren.

The datasets consist of tomographic and 3D images. The datasets also include information on the individual volume of the Islets of Langerhans and their 3D coordinates and appearance throughout the entire pancreas in both healthy mice and obese mice, at different ages. The obese mice used in the study have a mutation that make them prone to develop obesity and diabetes.

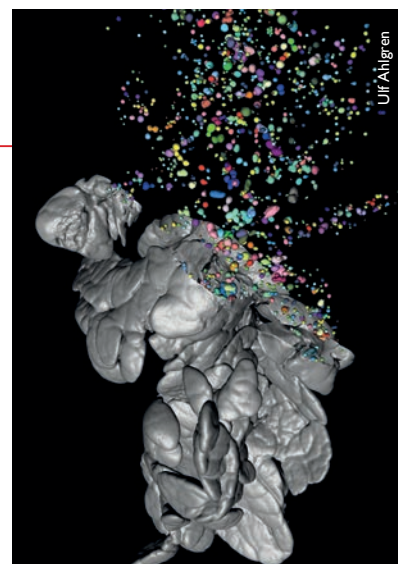
The datasets highlight that islets differ in size and quantity within, and between, the various lobes of the pancreas. According to the research team, this emphasises that the

pancreas should not be seen as a homogenous organ when experimental diabetes researchers study the insulin-producing Islets of Langerhans.

### Visualising changes in the Islets of Langerhans

The datasets presented in Scientific Data form the basis of another recently published study in Scientific Reports. In that study, the researchers used the 3D data to identify changes in the Islets of Langerhans in the obese mice. This animal model is often used to study initial metabolic changes that can lead to the development of type 2 diabetes. With the help of their refined techniques, the researchers could show that these mice to a great extent develop lesions in the Islets of Langerhans, manifesting as cyst-like structures. The study shows that these lesions are caused by internal bleeding as a consequence of an increased blood flow and instability of the blood vessels.

“Obese mice have been described in thousands of publications. But the large prevalence of such internal islet lesions have never before been identified and visualised,” says Ahlgren.



The image, created with OPT, shows the pancreas of a healthy mouse. The individual pancreatic islets have been colour-coded and their exact volume and 3D-coordinates can be precisely determined throughout the pancreas. The exocrine pancreatic tissue (in grey) has partly been digitally removed.

The researchers now want to study if similar intra-islet lesions also form in other models of type 2 diabetes and in humans, and if these may contribute to the diabetic phenotype.

The studies have been funded with support from the Swedish Research Council, the Kempe Foundations, the EU (Marie Curie ITN, “European Training Network for Excellence in Molecular Imaging in Diabetes”) and Umeå University.

• doi: 10.1038/sdata.2017.31

## Conferences & Expos

### Annual Radiology Meeting

5-7 November 2017

Dubai International Convention & Exhibition Centre

## Leading speakers to talk at radiology meeting

The Annual Radiology Meeting (ARM) is the first specialized and dedicated conference and exhibition for radiology and diagnostic imaging to take place in Dubai. ARM is organized by INDEX Conferences and Exhibitions Organisation, member of INDEX Holding, in collaboration with the Radiology Society of the Emirates. The event will take place from 5-7 November 2017 at Dubai International Convention & Exhibition Centre.


The Annual Radiology Meeting in UAE is held under the patronage of His Highness Sheikh Hamdan bin Rashid Al Maktoum,

Deputy Ruler of Dubai, Minister of Finance & President of Dubai Health Authority, and is supported by European Society of Radiology, and UAE India Business Council.

ARM is expected to attract more than 40 leading speakers from the region and the world. The conference agenda features 24 scientific sessions that will enlighten the attendees on various aspects of radiology and imaging, creating a great platform for knowledge exchange amongst conference participants and professionals in the field.

The conference will discuss topics like: Body Imaging, Cardiac Imaging, Chest

Imaging, Interventional Imaging, Musculoskeletal Imaging, Neuroradiology, Pediatric Imaging, Women Imaging and Radiography. In addition to that, the conference this year will feature two new parallel discussions – the breast-imaging summit and a dedicated radiographers’ session.

The exhibition is expected to play host to more than 50 leading companies in the field of radiology and diagnostic imaging to showcase their cutting-edge equipment and most recent medical devices used in the field. ARM 2017 is also expected to attract 2,000 visitors and participants over the three days. 





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**THE MOBILITY TO**  
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Sometimes, care needs to come to the patient. As we offer 100% wireless possibilities with our X-ray detectors, workflow and our mobile X-ray device AeroDR X30, we are able to provide full flexibility. Both our detectors and ultrasound system Sonimage HS1 are portable. Therefore, they are an ideal tool for point-of-care use.

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# Strangers in their own countries



■ By **Mohamed Bali**  
Executive Director, MSF regional  
branch office in UAE

The loss of a house, livelihood and possessions is a narrative that has become distressingly familiar in recent years. Every day headlines tell us of the many millions who have left their country in search of safety, sanctuary and freedom. But what of those who remain within their own borders, but are displaced? They too, are worthy of our attention and care.

Unlike refugees, there is no international day to mark the plight of internally displaced people (IDPs). While they remain within their own borders, they have been forced from their homes and communities, and often into camps with poor living conditions and a lack of access to essential services. These people are strangers in their own countries, with little recourse but to accept their circumstances, and they go largely unrecognised and unlamented by the international community.

The lack of compassion is hard to accept, so too is the lack of urgency. At the end of 2015, there were more than 40 million people internally displaced worldwide – the



Tal Abyad, Syria. Two men hug each other, tears in their eyes, during a funeral.

highest figure ever recorded. This is a global issue, and we must respond to it as such.

As of 2016, almost a third of the entire Syrian population was internally displaced. For many, the option of fleeing or obtaining refugee status has ceased to exist.

The plight of IDPs in Syria is perhaps seen more clearly through the lens of medical care. In 2012, MSF established a hospital in Atma, on the border with Turkey. Initially, this was a trauma hospital, and catered to those in need of treatment following armed conflict, aerial bombardments and the collapse of buildings. But in 2013, the hospital became a surgical facility specialising in burn care. The majority of these burns were not sustained in skirmishes however, but the result of poor living conditions – many

simply do not have access to adequate heating or cooking facilities, this coupled with a shortage of clean, refined fuel has resulted in an enormous number of burn injuries. In 2016 alone, 2,613 people were treated for burn wounds in Atma, less than 10% of these injuries were a direct result of violence. Some 75% of all patients treated were women and children.

The situation on the Jordanian border is little better, where tens of thousands of would-be refugees have languished in the mile-long strip of no-man's land between Syria and Jordan. With a distinctive raised barrier of sand, this area is known as the berm. For more than a year, between 60 and 70 thousand people have resided there, refused entry to Jordan due to security concerns, but unable to retreat into Syria


with any hope of safety. Humanitarian groups are denied access and some are using industrial cranes to deliver food and supplies over barriers and fences to those in makeshift camps beyond the berm.

Sadly, Syria is not the only country where the wars of today will curtail the futures of many. In Anbar province, Iraq – both Ramadi and Fallujah were ‘liberated’ from the so-called Islamic State (IS) more than a year ago. Yet the citizens who fled the fighting still live in tents and makeshift shelters, unable to go home for fear of the many improvised explosive devices and booby traps left behind by IS. Even with security and safety, the IDPs of Fallujah and Ramadi remain without adequate services or medical care. In Amriyat Al Fallujah IDP camp, MSF has set up a clinic to provide medical assistance for physical injuries, but also for psychological healthcare.

It is telling that mental healthcare services are expanding in Iraq – for those whose lives have consisted of survival, and fleeing war since 2003, the outlook is bleak. Recent reports and testimonies force us to consider difficult questions – how, when a child cries for home, should an IDP parent answer? How, when so many are growing up without essential services, education and nutrition, can children expect a safe, happy and successful future?

The 1951 refugee convention confers refugee status on someone who “owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear is unwilling to avail himself of the protection of that country...” This status outlines the right to safety, as well as economic and social rights, rights that states are obliged to grant – at least in theory.

In contrast to the protection refugees should receive, IDPs do not constitute a distinct legal category and therefore do not benefit from any specific protection under international law. And, in a political climate that places less and less value on the lives and prosperity of refugees, even with laws enshrined to protect them – what assistance can an IDP expect?

IDPs around the globe need and deserve our recognition and compassion. This is not a problem that can be remedied overnight, but it is clear that the international community must urgently respond to the needs. Needs like sustained access to medical care, guaranteed and lasting protection from violence and the need for hope, hope that one day, they may be able to live in a place they call home. 



Tal Abyad, Syria. Ismael at the grave of Hout, his friend and cousin, who died in combat less than 48 hours before.



Ain Issa camp shelters around 8000 displaced people, mainly from Tabqa and Raqqa areas.



Ain Issa camp: Children play in the camp. Most of them come from Tabqa and Raqqa areas.

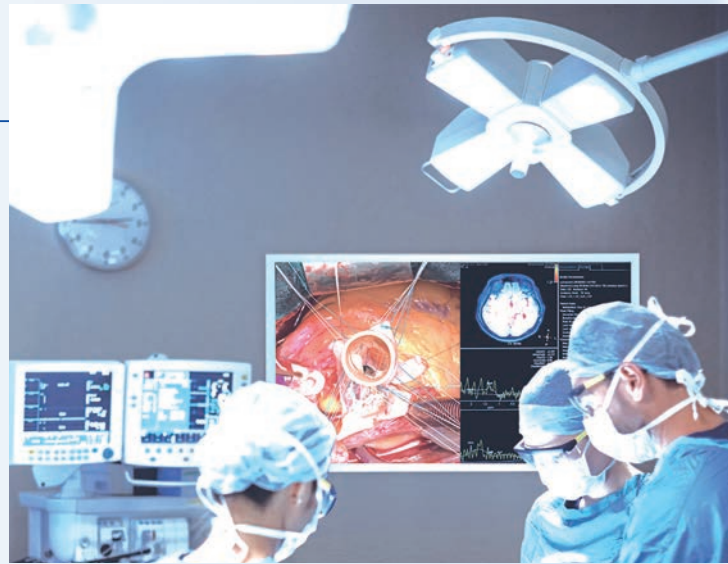
## MSF regional branch office in UAE

MSF has been in the UAE since 1992, under the patronage of His Excellency Sheikh Nahyan Bin Mubarak Al Nahyan and is a member of International Humanitarian City (IHC). MSF's work in the UAE includes support for medical humanitarian assistance and operations in Iraq, Syria, Jordan, Turkey, Yemen and Lebanon. In addition, MSF UAE is the primary logistical hub providing medical assistance to people based in Afghanistan, which remains one of MSF's largest operational programmes, with 2,303 full-time staff and 366,000 outpatient consultations held in 2015.

● Visit: [www.msf-me.org](http://www.msf-me.org)



# Advantech Kostec medical monitors, designed for operating precision and diagnostic confidence



Aiming to provide the best medical image quality, Advantech Kostec medical monitors are designed for high-quality imaging with various sizes of full high definition (Full HD) and 4K ultra-high definition (UHD) resolution monitors. With DICOM Part 14 standard and 14-bit LUT Grayscale support, the KT-Series medical monitors ensure precise representation of grayscale images. Utilizing Backlight Levelling Technology (BLT), they maintain their brightness at the previously calibrated maximum luminance level (L<sub>max</sub>), and consistently match the Just Noticeable Difference (JND) level for image quality at each luminance step; thereby reducing backlight warm-up time and extending the lifetime of the monitor. Hybrid Gamma Encoding (HGE) technology will meet the demands for simultaneous monitor of colours and monochrome images on the same screen, which is very important for doctor reviews

in the OR room environment. Besides outstanding image quality, Kostec medical monitors are equipped with a variety of analogue and digital interfaces, offering wide selection of connectivity to display images from various image sources. This characteristic allows users to continue using their legacy equipment without having to put additional expense into the hardware upgrade.

## Surgical monitors


Keeping pace with the advances of endoscopic video cameras and meeting the needs for more assortment in size and function, Advantech Kostec has launched a 27" and a 32" 4K UHD monitors, 32" FHD monitors, and a variety of large-sized 4K UHD monitors to build up a full range of surgical display solution for OR system integrators.

Advantech Kostec surgical monitors come

in widescreen sizes ranging from 27" to 55", with flexible customization options that can be easily configured. With their innovative slim design, KT-Series medical monitors offer multiple I/O ports, which make them an excellent solution for doctor reviews anywhere in the hospital.

## Diagnostic monitors

KT-D190 is typically for radiology applications, including Pixelworks DNX (Digital Natural Expression) technology. KT-D190 is 19" inches wide and can be easily placed without occupying too much space. A built-in front sensor, hidden behind the front bezel, allows the monitor to measure brightness levels and read colour temperatures for automated self-calibration to the DICOM Part 14 standard.

● Visit the Advantech website for detailed product information on Kostec medical monitors. <http://select.advantech.com/advantech-kostec/en-us/> 

## Key features

- **Full HD/4K**  
Various sizes of full definition (Full HD) and 4K ultra-high definition (UHD) resolution monitors.
- **Brightness Leveling Technology (BLT)**  
BLT is a luminance auto sensing technology, it maintains brightness at the previously calibrated maximum luminance (L<sub>max</sub>), consistently providing Just Noticeable Difference (JND) levels
- **12-/14-bit LUT Grayscale**  
12-/14-bit LUT grayscale is ideal for human eye recognition at the level of Just Noticeable Difference (JND), enabling accurate imaging performance and precision diagnosis.
- **DICOM Part 14 Compliant**  
The grayscale values of each monitor are compliant with the DICOM Part 14 standard which provides the most accurate and consistent image quality over time.
- **Multi-Modality**  
With widescreen high resolution formats and multiples I/O ports, KT-series of displays are excellent solutions for multi-tasking reviews in various medical applications.
- **Sub-division Uniformity Control (SUC) (for diagnostic only)**  
SUC technology, sub-dividing the screen into multiple areas and gray-scaling in each area, is the best way to achieve backlight luminance and chromaticity uniformity without sacrificing intensity.
- **Built-in Front Sensor (for diagnostic only)**  
A built-in Front Sensor (BFS) hidden behind the front bezel is designed to measure brightness and red color temperatures for automated self-calibration.

## Upright MRI comes to the Middle East

American Upright MRI will be the first facility in the Middle East equipped with the Upright Multi-Position MRI, manufactured by FONAR Corporation USA. We (American Upright MRI) are proud to make Dubai, UAE the first home and Flagship of this cutting-edge, American technology which fills a void in diagnostic MRI services in the Middle East, to provide a luxurious, comfortable experience for patients. We aim to educate and inform specialty physicians of the superior quality and diagnostic value of a weight-bearing MRI scan. When they see the difference of the 'True Picture' of the spine under the force of gravity they can make better assessments and provide more certainty in their clinical decisions.

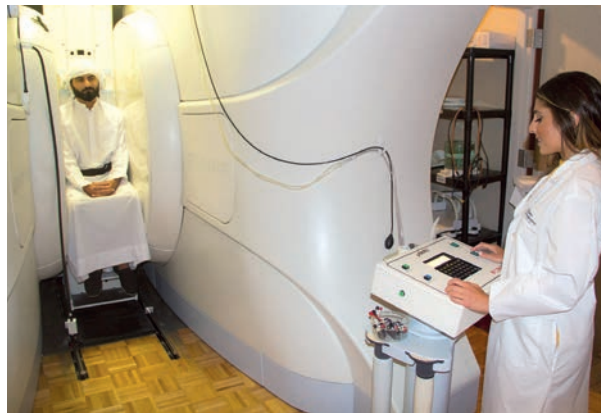
### Specifications:

The Fonar Upright MRI, also known as the Stand-Up MRI, is the most non-claustrophobic whole-body MRI scanner. It has the following specifications:

- 0.6 Tesla field strength
- Iron-frame electromagnet weighing 113 tons
- Front-open and top-open magnet design
- Magnetic poles are on the left and right of the patient
- Horizontal (transaxial) magnetic field orientation
- 18-inch (46 cm) pole-to-pole, horizontal gap

### Medical Specialties for which it can be used:

- Weight-bearing studies of the human anatomy
- Unrestricted range-of-motion for flexion, extension, rotation and lateral bending



- Brain scans with the patient upright (vertical)
- Patient positioning plays a critical role in detecting clinically significant pathology
- Multi-positional capabilities for positional MRI
- The medical specialties include:
  - o Neurosurgeons
  - o Orthopedic surgeons
  - o Rheumatologists
  - o Neurologists
  - o Pediatricians
  - o Plastic Surgeons
  - o Bariatric/Diabetic/Obesity studies
  - o Gynecologists
  - o Sports Physicians

### Benefits

The unique physical configuration of the UPRIGHT MRI makes it the world's most patient-friendly MRI and the only MRI that can scan patients in any position, allowing

it to detect problems that may be underestimated or completely missed by other types of MRI.

- The only *true* Open MRI
- The most non-claustrophobic whole-body Open MRI.
- Walk in, stand or sit for the scan.
- An unprecedented degree of patient comfort because there is an unobstructed view of the scanner room from inside the magnet. There is nothing in front of the patient's face. You can watch TV while you are doing your scan.
- Movable, trans-polar stabilization bars to enhance patient comfort and stability during multi-positional scans such as flexion, extension, rotation and lateral bending.
- 'Whisper Gradients' for quiet scans
- The machine can accommodate large patients over 215kg.
- The machine can scan children without sedation.

■ For more information, visit: <http://aumri.ae>

## Konica Minolta introduces advanced AeroDR HD detector

Areas of interest are not always easily visible. Only when you zoom in you are able to make the right diagnosis. Konica Minolta introduces its most sophisticated digital X-ray detector: the AeroDR HD detector with the highest resolution and sensitivity enabling the highest image quality and lower radiation doses. With 100µm pixel size, it displays micro structures and increases the visibility of the bone trabecular. Not only is the edge of the bone clearer, there is also no pixel shape when zooming in. The lightweight and robust structure makes it easy to handle in your daily clinical routine. When details matter, you can rely on Konica Minolta.

■ For more information, visit: [www.konicaminolta.com](http://www.konicaminolta.com)





# DARPA awards contracts for implantable tech to connect the brain and digital world

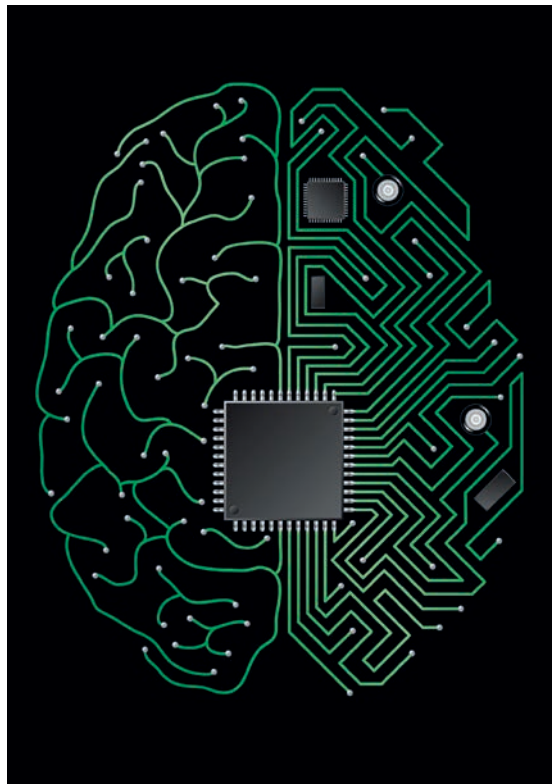
The US Defense Advanced Research Projects Agency – with the rather dystopian-sounding acronym, DARPA – has awarded contracts to five research organizations and one company that will support their Neural Engineering System Design (NESD) program to develop an implantable neural system able to provide precision communication between the brain and the digital world.

Specifically, they are looking to develop high-resolution neural interface technologies that can be used for sensory restoration. Four of the teams will focus on vision and two will focus on aspects of hearing and speech.

The implantable neural interface will convert the electrochemical signalling used by neurons in the brain into the ones and zeros that constitute the language of information technology, and do so at far greater scale than is currently possible. The work has the potential to significantly advance scientists' understanding of the neural underpinnings of vision, hearing, and speech and could eventually lead to new treatments for people living with sensory deficits.

“The NESD program looks ahead to a future in which advanced neural devices offer improved fidelity, resolution, and precision sensory interface for therapeutic applications,” said Phillip Alvelda, the founding NESD Program Manager. “By increasing the capacity of advanced neural interfaces to engage more than one million neurons in parallel, NESD aims to enable rich two-way communication with the brain at a scale that will help deepen our understanding of that organ’s underlying biology, complexity, and function.”

Although the goal of communicating



with one million neurons sounds lofty, Alvelda noted, “A million neurons represents a minuscule percentage of the 86 billion neurons in the human brain. Its deeper complexities are going to remain a mystery for some time to come. But if we’re successful in delivering rich sensory signals directly to the brain, NESD will lay a broad foundation for new neurological therapies.”

The program’s first year will focus on making fundamental breakthroughs in hardware, software, and neuroscience, and testing those advances in animals and cultured cells. Phase II of the program calls for ongoing basic studies, along with progress in miniaturization and integration,

with attention to possible pathways to regulatory approval for human safety testing of newly developed devices.

The NESD call for proposals laid out a series of specific technical goals, including development of an implantable package that accounts for power, communications, and biocompatibility concerns. Part of the fundamental research challenge will be developing a deep

understanding of how the brain processes hearing, speech, and vision simultaneously with individual neuron-level precision and at a scale sufficient to represent detailed imagery and sound. The selected teams will apply insights into those biological processes to the development of strategies for interpreting neuronal activity quickly and with minimal power and computational resources.

“Significant technical challenges lie ahead, but the teams we assembled have formulated feasible plans to deliver coordinated breakthroughs across a range of disciplines and integrate those efforts into end-to-end systems,” Alvelda said. MEH

# Agenda

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

Event	Date / City	Contact
<b>■ September 2017</b>		
1st GCC Patient Experience Summit	18 - 19 September 2017 Abu Dhabi, U.A.E.	<a href="https://fleming.events/en/events/pharma/gcc-patient-experience-summit">https://fleming.events/en/events/pharma/gcc-patient-experience-summit</a>
8th Arab Diabetes Forum	20-22 September, 2017 Cairo, Egypt	<a href="http://www.arabicdiabeticforum.com">www.arabicdiabeticforum.com</a>
International Conference on Fungal Diseases & Control	25 - 27 September, 2017 Dubai, UAE	<a href="http://www.fungalinfections.conferenceseries.com">www.fungalinfections.conferenceseries.com</a>
11th Global Ophthalmologists Annual Meeting	25 - 27 September, 2017 Dubai, UAE	<a href="http://annualmeeting.conferenceseries.com/ophthalmologists">http://annualmeeting.conferenceseries.com/ophthalmologists</a>
10th World Pediatric Congress	28 - 29 September, 2017 Dubai, UAE	<a href="http://www.pediatriccongress.conferenceseries.com/">www.pediatriccongress.conferenceseries.com/</a>
23rd World Nurse Practitioner Conference	28 - 29 September, 2017 Dubai, UAE	<a href="http://nursepractitioner.nursingconference.com/middleeast">http://nursepractitioner.nursingconference.com/middleeast</a>
<b>■ October 2017</b>		
7th International Conference and Exhibition on Traditional & Alternative Medicine	3 - 6 October, 2017 Dubai, UAE	<a href="http://www.traditionalmedicine.conferenceseries.com">www.traditionalmedicine.conferenceseries.com</a>
UAE Cancer Congress	5-7 October 2017 Dubai, UAE	<a href="http://www.uaecancercongress.ae">www.uaecancercongress.ae</a>
The Fifth Clinical Congress & AACE Annual Gulf Chapter Meeting	5-7 October, 2017 Dubai, UAE	<a href="http://am.aacegulf.org">http://am.aacegulf.org</a>
3rd World Congress on Climate Change and Global Warming	16 - 17 October, 2017 Dubai, UAE	<a href="http://www.climatechange.conferenceseries.com/asiapacific">www.climatechange.conferenceseries.com/asiapacific</a>
4th International Conference on Rhinology and Otology	18 - 20 October, 2017 Dubai, UAE	<a href="http://www.otolaryngology.conferenceseries.com">www.otolaryngology.conferenceseries.com</a>
8th Emirates Cardiac Society Conference	19-21 October, 2017 Dubai, UAE	<a href="http://ecs-acc.com">http://ecs-acc.com</a>
Abu Dhabi Advanced Rheumatology Review Course	21-23 October 2017 Abu Dhabi, UAE	<a href="http://adarrc.org">http://adarrc.org</a>
14th Global Obesity Meeting	23 - 24 October, 2017 Dubai, UAE	<a href="http://www.obesitymeeting.conferenceseries.com">www.obesitymeeting.conferenceseries.com</a>
10th International Conference on Neuropharmacology and Neuropharmaceuticals	23 - 24 October, 2017 Dubai, UAE	<a href="http://www.neuro.pharmaceuticalconferences.com/middleeast/">www.neuro.pharmaceuticalconferences.com/middleeast/</a>
Dubai Nutrition	26-28 October 2017 Dubai, UAE	<a href="http://www.dubainutrition.ae">www.dubainutrition.ae</a>
2017 ISAM (International Society of Addiction Medicine) Conference: Addiction Medicine New Frontier	26 - 20 October, 2017 Abu Dhabi, UAE	<a href="http://www.isam2017abudhabi.ae">www.isam2017abudhabi.ae</a>





# Agenda

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

Event	Date / City	Contact
<b>■ November 2017</b>		
2nd Gulf Congress of Clinical Microbiology and Infectious Diseases	1 - 4 November 2017 Bahrain	<a href="http://gccmid.org/">http://gccmid.org/</a>
Geriatrics Summit	2-3 November 2017 Dubai, UAE	<a href="http://www.geriatricssummit.org">www.geriatricssummit.org</a>
8th Global Obesity Conference	14 – 15 November, 2017 Dubai, UAE	<a href="http://www.obesitymeeting.conferenceseries.com">www.obesitymeeting.conferenceseries.com</a>
8th World Congress on Healthcare and Medical Tourism	17 – 18 November, 2017 Dubai, UAE	<a href="http://www.healthcare.global-summit.com/middleeast/">www.healthcare.global-summit.com/middleeast/</a>
Emirates Dermatology Conference	17-19 November 2017 Abu Dhabi, UAE	<a href="http://conference.edsuae.com/">http://conference.edsuae.com/</a>
5th International Conference on Physiotherapy	27 – 28 November, 2017 Dubai, UAE	<a href="http://www.physiotherapy.conferenceseries.com">www.physiotherapy.conferenceseries.com</a>
International Conference on Cancer Diagnostics	27 – 28 November, 2017 Dubai, UAE	<a href="http://www.cancerdiagnostics.conferenceseries.com/middleeast">www.cancerdiagnostics.conferenceseries.com/middleeast</a>
22nd Global Vaccines & Vaccination Summit	30 November- 1 December, 2017 Dubai, UAE	<a href="http://www.vaccines.global-summit.com/middleeast">www.vaccines.global-summit.com/middleeast</a>
<b>■ December 2017</b>		
World Vaccine Summit and Expo	4-6 December, 2017 Dubai, UAE	<a href="http://worldvaccinesummit.com/">http://worldvaccinesummit.com/</a>
Global Cancer Meet and Expo	4-6 December, 2017 Dubai, UAE	<a href="https://globalcancermeet.com">https://globalcancermeet.com</a>
Emergency Medicine	6-9 December 2017 Dubai, UAE	<a href="http://www.esemconference.ae">www.esemconference.ae</a>
29th World Psychiatrist Meet	7-9 December, 2017 Dubai, UAE	<a href="http://psychiatrist.conferenceseries.com">http://psychiatrist.conferenceseries.com</a>
Gulf Obesity Surgery	7-9 December, 2017 Dubai, UAE	<a href="http://www.goss2017.com">www.goss2017.com</a>
25th Global Diabetes Summit and Medicare Expo	11 – 12 December, 2017 Dubai, UAE	<a href="http://www.diabetesexpo.com/middleeast">www.diabetesexpo.com/middleeast</a>
10th International Conference on Gastroenterology	14 – 15 December, 2017 Dubai, UAE	<a href="http://www.gastroenterology.conferenceseries.com/asiapacific">www.gastroenterology.conferenceseries.com/asiapacific</a>
7th International Society of Nephrology	13-16 December, 2017 Dubai, UAE	<a href="http://www.nephrology.emanuae.com">www.nephrology.emanuae.com</a>



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