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Middle East HEALTH

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January - February 2019

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New study shows lack of sleep doubles risk of heart disease

Cost of Climate Change

Health impact of climate change costs more than meeting Paris accord goals, says WHO

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


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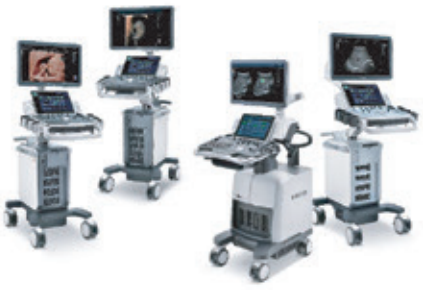

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Progress

Welcome to 2019. We wish all our readers and advertisers a year filled with good health, happiness and prosperity.

With *Middle East Health* now in its 5th decade of publication, it's fascinating to reflect on how healthcare in the region has grown from rather humble beginnings some four decades ago to the dynamic and technology-driven industry that it is now. Of course, technology would be of no use without talented and professional people at the helm – the doctors, the administrators and the nurses, whose praises are too often unsung. So, in this issue we sing their praises with an article from the recent World Innovation Summit for Health (WISH) held in Doha, which highlighted the important role nurses play in healthcare – often behind the scenes. As Sultana Afdhal, CEO of WISH, noted at the summit: "Nurses have a unique perspective when it comes to observing advancements in medical treatment, and in providing dedicated care to those who are suffering. It is therefore crucial that the healthcare sector capitalizes on this unrivalled knowledge and develops pathways for nursing professionals to become leaders in the field."

A key focus of our first issue each year is cardiology and this year we look at a series of recent studies on sleep – too much of it or too little – and how this can be a risk factor for cardiac disease. For example, one study showed that middle-aged men who sleep five hours or less per night have twice the risk of developing a major cardiovascular event during the following two decades than men who sleep seven to eight hours.

In every issue we curate important news and research in healthcare. One particular story that has made waves around the world recently is the birth in China of the first genetically modified humans. The controversial research has caused outrage in the science community. We look briefly at the research and some of the reaction to it.

The World Health Organisation delivered an important document at the recent climate change conference in Katowice, Poland, which calls for countries to account for health in all cost-benefit analyses of climate change mitigation. The paper points out that the cost of the impact on health of climate change is greater than the cost of meeting the Paris Agreement goals, so that moving to cleaner and more sustainable choices for energy supply, transport and food systems effectively pays for itself. Read about this in this issue.

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Update from around the region

Cleveland Clinic Abu Dhabi welcomes first residents

Cleveland Clinic Abu Dhabi has welcomed its first residents as part of its ongoing plans to transform physician education in the region and boost the number of Emirati physicians practicing in the country.

Designated as an advanced teaching facility by the Department of Health, eight UAE national doctors began their residencies at Cleveland Clinic Abu Dhabi in September. They joined the hospital following a rigorous selection process, with close to 500 applications for just eight open positions across internal medicine, general surgery, and ophthalmology.

"Cleveland Clinic Abu Dhabi's residency program is a significant milestone in our mission to develop the next generation of UAE national caregivers. Over the next few years, we plan to significantly expand the number of residencies we offer, providing more opportunities for Emirati physicians. Patients will benefit from seeing practitioners from their own culture, who have deeper insights into the social and cultural contexts of medicine, something that furthers the quality of care delivered," said Dr Sawsan Abdel-Razig, Director of Medical Education at Cleveland Clinic Abu Dhabi.

Residencies provide an opportunity for physicians to specialize in their chosen field of medicine under the supervision and guidance of a fully qualified physician. Upon completing their residency, physicians are able to practice medicine independently. Current residency programs offered are between are four and five years long, depending on the specialty.

The onboarding of its initial cohort of residents is the first step in a larger plan to transform medical education in Abu Dhabi. The hospital has plans to expand its offering as well as begin offering fellowships in subspecialties of medicine and surgery.

During their residencies, the doctors are continually assessed based on the six core competencies set by the Accreditation Council for Graduate Medical Education International (ACGME-I), These competencies include medical knowledge, patient care, practice-based learning, professionalism, systems-based practice, interpersonal skills and communication. Through the programs, residents are gradually given increased levels of responsibility with the ultimate goal of producing competent, safe, and independently practicing clinicians.

"We strive to educate our residents about what it means to be a caregiver in a 'Patients First' organization. In addition to the evidence-based medical practice, our physician residents will be immersed in the Cleveland Clinic Abu Dhabi way, with a strong commitment to patient experience, research, and patient safety," said Dr Murat Tuzcu, Chair of the Academic Office at Cleveland Clinic Abu Dhabi.

Julphar to launch wearable insulin delivery device in GCC

Julphar, one of the largest pharmaceutical manufacturers in the Middle East and Africa, has signed an exclusive distribution agreement with medical technology company Valeritas Holdings to bring its V-Go Wearable Insulin Delivery device to the GCC.

The device is an all-in-one, wearable insulin delivery option for patients with diabetes. The device is a simple, affordable, all-in-one basal-bolus insulin delivery option for patients with diabetes that is worn like a patch and can eliminate the need for taking multiple daily shots.

Under the terms of the agreement, Julphar will have the rights to promote, market and sell the product to diabetes clinics and patients in the GCC. Julphar will be responsible for all sales, marketing, customer support and distribution activities in the region while Valeritas will retain responsibility for product development, regulatory approval, quality management and manufacturing.

Commenting on the announcement, Jerome Carle, General Manager of Julphar, said: "The prevalence of diabetes in the GCC is among the highest in the world. As a leader in the manufacture of insulin, Julphar has a responsibility to not only raise awareness of the risk factors but to provide effective solutions.

"We are always exploring new, innovative and affordable options such as mobile tech, wearables and other tools, so partnering with Valeritas to bring the wearable V-Go to the region made perfect sense. The high-tech device will help empower diabetes sufferers to take control of their condition and manage their own day-to-day care."

With today's announcement, Valeritas now has V-Go® distribution agreements in place covering 14 countries and territories. In addition to the Middle East countries, executed distribution agreements include Australia, Austria, the Czech Republic, Germany, Italy, Puerto Rico, Slovenia, and New Zealand. Separately, Valeritas recently announced it has started the process to gain regulatory approval for V-Go® in China.

John Timberlake, CEO and President of Valeritas, said: "For many patients with diabetes around the world, being able to adhere to a daily insulin routine of multiple injections using insulin pens and syringes is a significant challenge. Valeritas has consistently demonstrated in clinical studies that patients who switched from injection therapy to the wearable V-Go significantly lowered blood glucose and used less insulin.

UAE MoHAP meets Chinese delegation

The UAE Ministry of Health and Prevention recently met with a Chinese delegation to discuss mutually beneficial cooperation in the use of technological innovations such as artificial intelligence (AI) in the health care sector.

The Ministry was represented by Dr Hussein Abdul Rahman Rand, Assistant Undersecretary for Centers and Health Clinics, and Dr Issa Al Mansouri, Director of the Undersecretary Office and Director of the International Health Relations, while the Chinese delegates were headed by Liu Xia, Vice Mayor of Wuxi City. Samer Al-Hallaq, Regional Director of AstraZeneca Middle East, was also present in the gathering.

The meeting followed the Ministry's visit to Innovation Center of AstraZeneca - Shanghai in May 2018 led by Dr Mohammad Salim Al Olama, Undersecretary

of the Ministry of Health and Prevention. During the visit, the Ministry learned about the latest innovations in China's health care industry and its AI use in keeping with the latest international developments in health services.

Dr Rand discussed opportunities to strengthen both countries' collaboration in addressing chronic diseases such as asthma, heart illness, and diabetes as the two parties vowed to keep abreast of the latest global health care developments. The Ministry is currently working towards integrating the latest technologies into the UAE's health system to prevent the spread of diseases in local society and deliver comprehensive and integrated services in innovative and sustainable ways. He also pointed out that the UAE has taken the lead in providing world-class medical services in the region thanks to its advanced health infrastructure, modern legislative system, and continuous investments in human capital in the medical field.

The Chinese delegation praised the UAE for its commendable achievements and pioneering experience in the medical field. Vice Mayor Liu expressed his commitment to jointly work with the Ministry of Health and Prevention to optimize the use of AI and other innovations in the health industry according to the highest international standards.

RCSI, MBRU sign MOU to advance healthcare education in UAE

The Royal College of Surgeons in Ireland (RCSI) Dubai, an international leader in healthcare education, and Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU), Dubai Healthcare City Authority's academic arm, signed a Memorandum of Understanding (MOU) in December that highlights their joint efforts to support healthcare professionals through high-quality education, continuing professional development, research and innovation.

RCSI and MBRU have a long-standing friendship, strategic partnership and are continuously cultivating their relationship through joint initiatives such as the "Women in Leadership program", which caters to women from a range of disciplines and backgrounds every year, and the "MBRU Leadership Development program".

The MOU signing coincided with RCSI's Masters Conferring Ceremony during which 25 of MBRU's leadership team were

recognized for completing RCSI's Leadership Development Program.

Professor Ciaran O'Boyle, Director of the RCSI Institute of Leadership said: "The potential collaboration between two leading health science institutions will bring innovative and dynamic improvements across various elements and disciplines within the UAE healthcare."

Commenting on the MOU signed, Dr Amer Sharif, Vice Chancellor MBRU, said: "We have worked with friends in RCSI for many years and it's truly an honor to finally have this partnership formalized and taken to the next level. RCSI and MBRU share a common purpose to serve humanity, and we hope through this MOU to continue the work that we started to enhance health, research and medical education locally, regionally and internationally."

Qatar's World Innovation Summit for Health sees capacity participation

Nearly 2,200 healthcare experts participated in the 2018 edition of the World Innovation Summit for Health (WISH), an initiative of Qatar Foundation (QF). With Qatar National Convention Centre hosting a capacity crowd of local and international healthcare experts, innovators, entrepreneurs, policymakers, and ministers, this year's summit, held on November 13-14, was the largest to date.

The World Innovation Summit for Health (WISH) is a global healthcare community dedicated to capturing and disseminating the best evidence-based ideas and practices.

Sultana Afdhal, CEO, WISH, said: "We were pleased not only with the high level of attendance at WISH 2018, but also with the amount of engagement taking place between delegates – both during formal panel discussion sessions and informally throughout the summit.

"I was particularly delighted to have the opportunity to showcase the role Qatar is playing in encouraging innovation in healthcare to the gathered global healthcare experts, and to welcome senior representatives of the World Health Organization (WHO) to the summit for the first time, namely Dr Matshidiso Moeti, the director of the WHO Africa region, and Dr Ahmed Al Mandhari the newly-appointed director of the WHO Eastern Mediterranean region, which is the region that covers Qatar."

"With the support of QF, WISH will continue to be at the heart of the global exchange of knowledge, innovation and fruitful collaborations relating to healthcare. Between now and our next summit in 2020, we look forward to working with local and international partners to take the learnings from WISH 2018 and play our part in building a healthier world."

Delegates at WISH 2018 represented more countries – 116 – than ever before, and this year also saw an increase in the number of expert panels to 22, covering areas such as health in conflict settings, maternal health, healthy cities, design in health, viral hepatitis, and artificial intelligence.

WISH 2018 keynote speeches were delivered by Mary Robinson, former President of Ireland and chairperson of 'The Elders', who focused on the effects of climate change on health; David Miliband, President of the International Rescue Committee, who talked about the importance of eradicating child malnutrition from conflict-ridden regions of the world; and swimmer Michael Phelps, the world's most decorated Olympian, who encouraged open and stigma-free communication about mental health.

Dr Tedros Adhanom Ghebreyesus, Director General of the World Health Organization (WHO), and Jimmy Carter, 39th President of the United States, shared video messages of special appreciation and encouragement with summit participants.

Global Summit on Circulatory Health calls for improved access to essential medicines

On 4-5 December 2018, the 3rd Global Summit on Circulatory Health was held in Dubai. The summit brought together international, continental and national organizations and leaders in health, academia, civil society and the private sector to drive action on the timely issue of access to essential medicines and technologies.

The case for improved access to essential medicines is compelling – nearly 2 billion people lack access to essential medicines, an estimated 100 million end up living on US$10.90 or less a day because they have to pay for health care, and another 800 million people spend at least 10% of their household budgets to pay for health care.

Convened under the leadership of Professors Salim Yusuf, Martin McKee and David Wood, the 3rd Global Summit began by taking stock of the main challenges in ensuring access to medicines, including limited investments in health, fragmented supply chains, low quality or falsified medicines, and inconsistent national, regional and international action.

Against those persistent challenges, the Global Summit participants and speakers shared pragmatic and innovative solutions, such as procurement pools for essential medicines and block chain technology to improve supply chains and serve the most vulnerable populations.

The Summit concluded with a Call to Action to align the solutions put forward during the event with the World Health Organization's Roadmap on Access to Medicines and Vaccines in a position paper on access to essential cardiovascular medicines that will be published in the first quarter of 2019. The position paper will build on the key areas for action that emerged from the Summit:

1. Mobilizing additional government funding for essential medicines and technologies;
2. Advocating for the inclusion of essential cardiovascular medicines on WHO's Prequalification Program;
3. Promoting voluntary licensing for access to new cardiovascular medicines;
4. Standardizing competencies of and increasing transparency in national selection committees of essential medicines;
5. Strengthening procurement models and supply chains with feedback from communities and patients;
6. Ratifying and implementing legislation against substandard and falsified medicines. MEH

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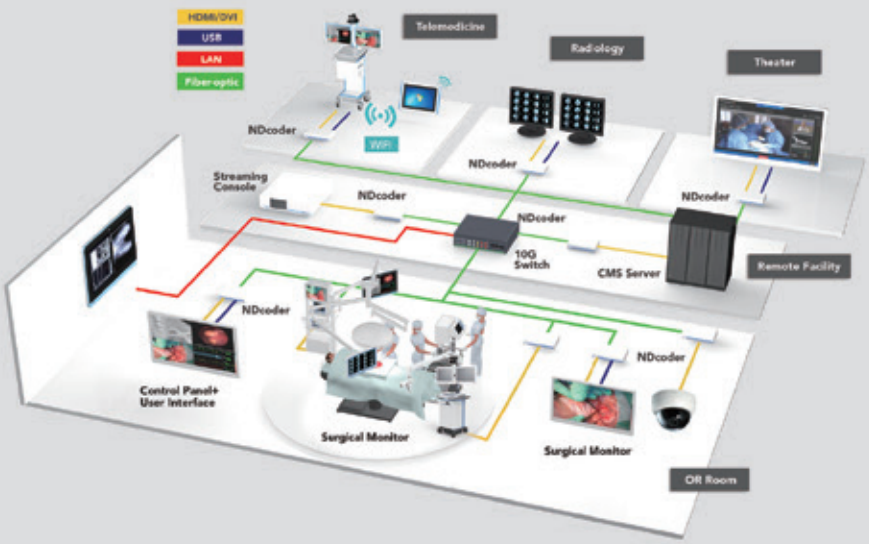

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Update from around the globe

Major milestone for UK with sequencing of 100,000 whole genomes in NHS

The 100,000 Genomes Project, led by Genomics England in partnership with NHS England, has reached its goal of sequencing 100,000 whole genomes from NHS patients, according to the British Health Secretary, Matt Hancock.

As a result the UK has become the first nation in the world to apply whole genome sequencing at scale in direct healthcare, as well as providing access to high quality de-identified clinical and genomic data for research aimed at improving patient outcomes.

The 100,000 Genomes Project has delivered life-changing results for patients with one in four participants with rare diseases receiving a diagnosis for the first time.

Sir John Chisholm, Chair of Genomics England, said: "At launch the 100,000 Genomes Project was a bold ambition to corral the UK's renowned skills in genomic science and combine them with the strengths of a truly national health service in order to propel the UK into a global leadership position in population genomics. With this announcement, that ambition has been achieved. The results of this will be felt for many generations to come as the benefits of genomic medicine in the UK unfold."

This ground-breaking programme was launched by then-Prime Minister David Cameron in 2012, with the goal of harnessing whole genome sequencing technology to uncover new diagnoses and improved treatments for patients with rare inherited diseases and cancer. The task was to make the UK a world leader within five years.

The 100,000 Genomes Project has delivered life-changing results for patients with one in four participants with rare diseases receiving a diagnosis for the first time, and providing potential actionable findings in up to half of cancer patients where there is an opportunity to take part in a clinical trial or to receive a targeted therapy.

To do this Genomics England worked with NHS England to create 13 NHS Genomic Medicine Centres (GMCs) to support the project, a state-of-the-art sequencing centre run by Illumina, and an automated analytics platform to return whole genome analyses to the NHS.

The project has laid the foundations for a NHS Genomic Medicine Service, which will provide equitable access to genomic testing to patients across the NHS from 2019.

Genomics England and NHS England expressed their gratitude to the 85,000 participants, 1,500 NHS staff, over 3,000 researchers, the National Institute for Health Research and the UK Government whose support and funding have been key to the success of this pioneering NHS transformation programme.

Commenting on the achievement, Hancock said: "Sequencing the 100,000th genome is a major milestone in the route to the healthcare of the future. From Crick and Watson onwards, Britain has led the world in this amazing technology. We do so again today as we map a course to sequencing a million genomes. Understanding the human code on such a scale is part of our mission to provide truly personalised care to help patients live longer, healthier and happier lives.

"I'm incredibly excited about the potential of this type of technology to unlock the next generation of treatments, diagnose diseases earlier, save lives and enable patients to take greater control of their own health."

Professor Mark Caulfield, Chief Scientist at Genomics England, said: "The sequencing of 100,000 whole genomes marks an extraordinary UK achievement that is transforming the application of genomics in our NHS. Genomics England will continue to analyse these genomes alongside life course clinical information to reveal answers for as many participants as possible and improve their NHS care. With the generous support of our participants, the NHS, the National Institute for Health Research and the Government we will continue to ensure the UK's global leadership in genomic healthcare."

Mandela100 event sees largest public-private partnership in global health

Leading philanthropists as well as the United States, African and European governments announced significant funding for healthcare at the Mandela100 star-studded festival in Johannesburg, South Africa in December.

Millions of dollars were raised to combat Neglected Tropical Diseases and Sightsavers at the Mandela100 concert in South African in December

Ambassador Deborah Birx, on behalf of the United States, made an historic commitment of $1.2 billion for Aids relief at the event. The funds will be channelled through PEPFAR (President's Emergency Plan for Aids Relief). It is the largest pledge the US government has made to HIV/AIDS.

Also at the event, more than US$150 million was funded to tackle neglected tropical diseases largely unknown in western countries, but which affect 1.5 billion people – or one in five in the world.

The $150m funding will unlock a total aid package worth many more times that sum thanks to the free donation of medicines from pharmaceutical companies. For every aid dollar invested in the distribution of medicines, $26 worth of donated drugs will be leveraged, making this the largest public-private partnership in global health.

NTDs such as blinding trachoma, river blindness and intestinal worms overwhelmingly affect the poorest and most marginalised people living in areas without running water or adequate sanitation. They stop children going to school and can rob adults of their most productive years of life. Great progress has been made in efforts against the diseases. Thanks to treatment, half a billion people no longer need interventions for NTDs. But one and a half billion are still in need of help.

The money announced at the festival will treat and protect some 300 million people from the effects of these diseases based on an average cost of delivering the necessary drugs of 50 US Cents per treatment.

Of the total announced at the festival, over $105m will be used to tackle blinding trachoma and infant mortality. Blinding trachoma is an extremely painful disease that causes eyelashes to turn inwards, scratching the eye with every blink.

The money will be used by the UK-based charity Sightsavers and a network of partners to support at least ten African countries in eliminating blinding trachoma as a public health problem and speed up progress against the disease in several other African nations.

Commenting on the initiative, Dr Caroline Harper, Chief Executive of Sightsavers, said: "It is within our grasp to stop trachoma in its tracks. We are getting closer to the finish line – but the job is not yet done. This persistent disease traps people in lives of intense pain and poverty. But it is treatable and preventable."

The Bill & Melinda Gates Foundation, which has been at the forefront of the fight against neglected tropical diseases for many years, announced a contribution of $17m to the World Health Organization in Africa over five years to fight the five most common neglected diseases on the African continent.

Of this, $17m, $11m is reserved for what the aid community calls 'match funding'. This means the Gates foundation will release the money if it is 'matched' (doubled) by another donor.

$5m has already been 'matched' by the government of Belgium. $6m is available for matching by other donors.

This money will help deliver medicines donated for free by pharmaceutical partners through support for a World Health Organization department called the Expanded Special Project for the Elimination of Neglected Tropical Diseases (ESPEN).

GSK to acquire TESARO for $5.1bn

GlaxoSmithKline has reached an agreement to acquire TESARO, an oncology-focused company based in Waltham, Massachusetts, for an aggregate cash consideration of approximately $5.1 billion.

GSK says the transaction will significantly strengthen GSK's pharmaceutical business, accelerating the build of their pipeline and commercial capability in oncology.

Emma Walmsley, CEO, GSK, said: "The acquisition of TESARO will strengthen our pharmaceuticals business by accelerating the build of our oncology pipeline and commercial footprint, along with providing access to new scientific capabilities. This combination will support our aim to deliver long-term sustainable growth and is consistent with our capital allocation priorities. We look forward to working with TESARO's talented team to bring valuable new medicines to patients."

TESARO is a commercial-stage biopharmaceutical company, with a major marketed product, Zejula (niraparib), an oral poly ADP ribose polymerase (PARP) inhibitor currently approved for use in ovarian cancer. PARP inhibitors are transforming the treatment of ovarian cancer, notably demonstrating marked clinical benefit in patients with and without germline mutations in a BRCA gene (gBRCA). Zejula is currently approved in the US and Europe as a treatment for adult patients with recurrent ovarian cancer who are in response to platinum-based chemotherapy, regardless of BRCA mutation or biomarker status.

Clinical trials to assess the use of Zejula in "all-comers" patient populations, as a monotherapy and in combinations, for the significantly larger opportunity of first

line maintenance treatment of ovarian cancer are also underway. These ongoing trials are evaluating the potential benefit of Zejula in patients who carry gBRCA mutations as well as the larger population of patients without gBRCA mutations whose tumours are HRD-positive and HRD-negative. Results from the first of these studies, PRIMA, are expected to be available in the second half of 2019.

GSK also believes PARP inhibitors offer significant opportunities for use in the treatment of multiple cancer types. In addition to ovarian cancer, Zejula is currently being investigated for use as a possible treatment in lung, breast and prostate cancer, both as a monotherapy and in combination with other medicines, including with TESARO's own anti-PD-1 antibody (dostarlimab, formerly known as TSR-042).

Hal Barron, Chief Scientific Officer and President, R&D, GSK, said: "Our strong belief is that PARP inhibitors are important medicines that have been under appreciated in terms of the impact they can have on cancer patients. We are optimistic that Zejula will demonstrate benefit in patients with ovarian cancer beyond those who are BRCA-positive as front-line treatment. We are also very excited that through this transaction, we will have the opportunity to work with an outstanding Boston-based oncology group with deep clinical development expertise and together we will explore Zejula's efficacy beyond ovarian cancer into multiple tumour types to help many more patients."

In addition to Zejula, TESARO has several oncology assets in its pipeline including antibodies directed against PD-1, TIM-3 and LAG-3 targets.

BRAIN initiative expands with more funding

The US National Institutes of Health has announced funding of more than 200 new awards, totalling over $220 million, through the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative.

The BRAIN initiative is an exciting trans-agency effort to arm researchers with revolutionary tools to fundamentally understand the neural circuits that underlie the healthy and diseased brain. Supported by the Congress through both the regular appropriations process and the 21st Century Cures Act, this brings the total 2018 support for the program to more than $400 million, which is 50% more than the amount spent in 2017. Many of the new awards explore the human brain directly.

"Brain diseases are some of the greatest mysteries in modern medicine. These projects will provide new tools and knowledge needed to discover answers for some of the most difficult neurological and neuropsychiatric disorders," said NIH Director Francis S. Collins, M.D., Ph.D.

Examples of these new awards include the creation of a wireless optical tomography cap for scanning human brain activity; the development of a noninvasive brain-computer interface system for improving the lives of paralysis patients; and the testing of noninvasive brain stimulation devices for treating schizophrenia, attention deficit disorders, and other brain diseases. All these awards can be found on the new NIH BRAIN Initiative website: <*www.braininitiative.nih.gov*>.

Through this expanded program, more than 100 research institutions received awards to support the projects of upwards of 500 investigators representing fields as diverse as engineering and psychology. Many of the awards fund the development of new tools and technologies to capture a dynamic view of brain circuits in action, including the development of self-growing biological electrodes for recording brain activity and the creation of an indestructible hydrogel system to help map neural circuits.

"New tools to map the brain deepen our understanding of how circuit activity relates to behaviour, said Joshua A. Gordon, M.D., Ph.D., director of NIH's National Institute of Mental Health. "The BRAIN Initiative is laying the foundation for improved ways to target brain circuits disrupted in brain disorders."

Launched in 2013, the BRAIN Initiative is a large-scale effort to accelerate neuroscience research by equipping researchers with the tools and insights necessary for treating a wide variety of brain disorders, including Alzheimer's disease, schizophrenia, autism, epilepsy, and traumatic brain injury.

Since then, BRAIN Initiative-funded researchers have discovered a new type of human brain cell; mapped out the neural circuit activity that controls thirst and drinking and reactions to threats; tested theories about how a songbird brain uses feedback from sound while learning how to sing; engineered a sensor to monitor the neurotransmitter dopamine in real time; created a self-tuning deep brain stimulation device for treating Parkinson's disease; watched human brains make decisions; and located the neurons in the brain that control the pitch of our speech. In addition, researchers used a tool developed through the BRAIN Initiative, called Drop-seq, to investigate the effects of concussions on individual brain cells, which pointed to novel treatments.

The NIH BRAIN Initiative(r) is managed by 10 institutes whose missions and current research portfolios complement the goals of the BRAIN Initiative: National Center for Complementary and Integrative Health, National Eye Institute, National Institute on Aging, National Institute on Alcohol Abuse and Alcoholism, National Institute of Biomedical Imaging and Bioengineering, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institute on Drug Abuse, National Institute on Deafness and other Communication Disorders, National Institute of Mental Health, and National Institute of Neurological Disorders and Stroke.

Philips launches IntelliSpace Discovery Research platform

Philips Healthcare has launched IntelliSpace Discovery 3.0, a comprehensive, open platform to enable the development and deployment of Artificial Intelligence

assets in radiology which aims to support radiologists in their clinical and translational research.

Solutions that leverage AI have the potential to improve patient care and increase the efficiency of care delivery. However, there are challenges when it comes to introducing AI into healthcare clinical practice. Health systems are consistently faced with questions on how to collect and prepare high quality data, which methods of training and validating the tools are most appropriate, and how to deploy AI without disruption. Philips combines AI and other technologies with knowledge of the clinical and operational context in which they are used – a people-centered approach called 'adaptive intelligence' – to develop integrated solutions that adapt to the needs of healthcare providers.

IntelliSpace Discovery is already a proven research platform, used by more than 50 hospitals and academic institutions worldwide, for the development of radiology applications for rendering, segmentation, and quantification.

With the introduction of IntelliSpace Discovery 3.0 the platform now provides research applications and tools for radiologists to aggregate, normalize and anonymize data, which can be visualized and annotated to 'train' and validate deep learning algorithms. They can then easily deploy these algorithms as plug-in apps into the research workflow to analyze new datasets and help facilitate clinical research in radiology, oncology, neurology and cardiology.

"We use IntelliSpace Discovery to bring our research activities to the next level. Everybody is talking about Artificial Intelligence. We are making our own deep learning AI algorithms," said Professor David Maintz, Head of the Department of Radiology of the University Hospital Cologne in Germany.

Jeroen Tas, Chief Innovation & Strategy Officer, Philips, said: "Together with our customers we're enabling research in adaptive intelligence with the goal to create solutions that augment healthcare professionals and improve patient care and efficiencies of care delivery, both inside and outside of the hospital. AI is the connective tissue to seamlessly integrate data and technology to enable precision diagnosis." MEH

the laboratory

Medical research news from around the world

Research brings personalised medicine to treat leukaemia one step closer

Scientists at the University of Birmingham have revealed the roles that different types of gene mutations play in causing blood cancers in a study that was the culmination of a decade's research.

The findings of the team, led by Professor Constanze Bonifer and Professor Peter Cockerill of the University of Birmingham's Institute of Cancer and Genomic Studies, mean doctors are now one step closer to being able to provide tailored and targeted treatment specific to individual patients – increasing their chances of survival.

The team, funded by blood cancer research charity Bloodwise, has spent the last 10 years carrying out a painstaking global analysis of the cells of patients diagnosed with acute myeloid leukaemia (AML), the results of which are published 12 November 2018 in *Nature Genetics*.

AML is an aggressive cancer of the white blood cells, called myeloid cells, which normally function to fight bacterial infections and eliminate parasites from the body.

By picking apart the mutated cells in AML patients and gathering big data on each of them, the researchers were able to study the basic building blocks that control the production of these abnormal cells.

This step-by-step process, carried out in collaboration with Professor Mike Griffiths and his team at the West Midlands Regional Genetics Laboratory at Birmingham Women's and Children's NHS

Foundation Trust, identified the main trigger points where critical mutations feed through to other genes that control the cells' identity and behaviour.

Lead author Professor Constanze Bonifer said: "In acute myeloid leukaemia, genes are targeted by mutations that encode either master regulators controlling cell identity or factors transmitting signals through the cell, therefore the normal process of turning genes on or off is defunct.

"Our research found that, when this happens, the cells step sideways from their normal developmental programme and speed out of control.

"Crucially, AML cells from patients with the same types of mutations always take the same route when they head off in the wrong direction.

"Our analyses of each of the pathways that the cells took when developing into cancer identified key points in the cell that could be used in the future to target and develop new drugs to treat each type of AML in a different way."

Co-lead author Professor Peter Cockerill said: "Doctors in Birmingham are already testing AML patients for the many different mutations that cause AML. However, now they know which genes are the most important for each type of AML.

"This means that personalised medicine will one day become a reality for blood cell cancers, which will see a different drug being given to treat each form of AML, creating personalised treatment for each cancer patient depending on the mutation that has caused their disease."

Dr Alasdair Rankin, Director of Research at Bloodwise, said: "Although a handful of targeted drugs have recently become available for people with acute myeloid leukaemia, they only help a small number of people.

"We need to be smarter about matching the right treatment to the right person if we want to boost survival rates for AML, especially if there are already drugs out there that can help.

"These landmark research findings will act as a blueprint for how to tackle this, and could even help with the delivery of personalised medicine in mainstream healthcare in the future."

This study comes after research, by the same team at the University of Birmingham in collaboration with Professor Olaf Heidenreich's team at Newcastle University, was published in October 2018 in *Cancer Cell*, which focussed on just one type of DNA mutation in AML to study a single pathway to cancer development.

- **doi**: 10.1038/s41588-018-0270-1

Synthetic bacteria with expanded genetic code evolve extreme heat tolerance

In recent years, scientists have engineered bacteria with expanded genetic codes that produce proteins made from a wider range of molecular building blocks, opening up a promising front in protein engineering.

Now, Scripps Research scientists have shown that such synthetic bacteria can evolve proteins in the laboratory with enhanced properties using mechanisms that might not be possible with nature's 20 amino acid building blocks.

Exposing bacteria with an artificially expanded genetic code to temperatures at which they cannot normally grow, the researchers found that some of the bacteria evolved new heat-resistant proteins that remain stable at temperatures where they would typically inactivate. The researchers reported their findings in the *Journal of the American Chemical Society (JACS)*.

Virtually every organism on earth uses the same 20 amino acids as the building blocks to make proteins – the large molecules that carry out the majority of cellular functions. Peter Schultz, PhD, the senior author of the JACS paper and president and CEO of Scripps Research, pioneered a method to reprogram the cell's own protein biosynthetic machinery to add new amino acids to proteins, termed non-canonical amino acids (ncAAs), with chemical structures and properties not found in the common 20 amino acids.

This expanded genetic code has been used in the past to rationally design proteins with novel properties for use as tools to study how proteins work in cells and as new precision-engineered drugs for cancer. The researchers now asked whether synthetic bacteria with expanded genetic codes have an evolutionary advantage over those that are limited to 20 building blocks – is a 21 amino acid code better than a 20 amino acid code from an evolutionary fitness perspective?

"Ever since we first expanded the range of amino acids that can be incorporated in proteins, much work has gone into using

these systems to engineer molecules with new or enhanced properties," says Schultz. "Here, we've shown that combining an expanded genetic code with a laboratory evolution one can create proteins with enhanced properties that may not be readily achievable with nature's more limited set."

The scientists started by tweaking the genome of *E. coli* so that the bacteria could produce the protein homoserine o-succinyltransferase (*met*A) using a 21 amino acid code instead of the common 20 amino acid code. An important metabolic enzyme, metA dictates the maximum temperature at which *E. coli* can thrive. Above that temperature, *met*A begins to inactivate and the bacteria die. The researchers then made mutants of *met*A, in which almost any amino acid in the natural protein could be replaced with a 21st non-canonical amino acid.

At this point, they let natural selection – the central mechanism of evolution – work its magic. By heating the bacteria to 44 degrees Celsius – a temperature at which normal *met*A protein cannot function, and as a consequence, bacteria cannot grow – the scientists put selective pressure on the bacteria population. As expected, some of the mutant bacteria were able to survive beyond their typical temperature ceiling, thanks to possessing a mutant *met*A that was more heat stable – all other bacteria died.

In this way, the researchers were able to drive the bacteria to evolve a mutant metA enzyme that could withstand temperatures 21 degrees higher than normal, nearly twice the thermal stability increase that people typically achieve when restricted to mutations limited to the common 20 amino acid building blocks. The researchers then identified the specific genetic sequence change that resulted in the mutant metA and found it was due to the unique chemical properties of one of their noncanonical amino acids that laboratory evolution exploited in a clever way to stabilize the protein.

"It's striking how making such a small mutation with a new amino acid not present in nature leads to such a significant improvement in the physical properties of the protein," says Schultz. "This experiment raises the question of whether a 20 amino acid code is the optimal genetic code – if we discover life forms with expanded codes will they have an evolutionary advantage?"

• **doi**: 10.1021/jacs.8b07157

Patients with rare natural ability to suppress HIV shed light on potential functional cure

Researchers at Johns Hopkins have identified two patients with HIV whose immune cells behave differently than others with the virus and actually appear to help control viral load even years after infection. Moreover, both patients carry large amounts of virus in infected cells, but show no viral load in blood tests. While based on small numbers, the data suggest that long-term viral remission might be possible for more people.

A report of the findings was published online 20 September 2018 in the *Journal of Clinical Investigation Insight*.

"One of our patients was infected nearly 20 years ago, spent a few years on antiretroviral therapy, then stopped ART and has been 'virus-free' for more than 15 years. Our findings suggest that early treatment with ART can reset a patient's immune system to the point where the virus can be controlled even when ART is discontinued," says Joel N. Blankson, M.D., Ph.D., professor of medicine at the Johns Hopkins University School of Medicine and last author of the study. "Understanding how this occurs could lead to a "functional cure" for HIV-infected patients," adds Blankson.

HIV infects so-called CD4+ T cells of the immune system and uses those cells to replicate and generate more virus. During early stages of infection, another type of immune cell – CD8+ T cells – identifies and kills HIV-infected CD4+ T cells. Typically, however, the virus replicates so rapidly that, ultimately, CD8+ T cells are not able to keep up and themselves die off.

For this study, the researchers have been following two HIV-infected men who had undetectable levels of HIV in their routine testing. One is a so-called elite suppressor, who carries a genetic marker on his immune cells that enables the body to naturally keep viral levels low, with no treatment; the other patient is a so-called post-treatment controller, who took ART for a few years before stopping 15 years ago and does not carry any protective genetic markers.

As part of the patients' regular visits over the years, blood is collected for testing viral load. From these blood samples, the researchers separated out the CD4+ T cells. Both patients had high numbers of HIV-infected CD4+T cells despite no measurable viral load in their blood — an unusual characteristic for any HIV-infected patient who is capable of controlling the virus.

Previously, evidence of a large viral reservoir in CD4+ T cells was thought to be a barrier to HIV eradication because reservoirs contain copies of the virus that are able to replicate and spread. However, this didn't seem to be happening in these patients, and the researchers then examined further to determine why.

Having collected samples from these patients over the years, the researchers isolated virus from the controller, sequenced the genetic material and found that the virus from 2010 and two samples collected six months apart in 2017 were identical. This result was surprising, as typically when HIV replicates it tends to mutate as a natural evolution process that allows the strongest versions to propagate.

"The fact that the viruses were completely identical suggests that replication occurred through a process known as clonal expansion, where infected resting cells in the reservoir divide, leading to exact copies of all the viral genes being made," notes Blankson.

After establishing that these viruses were identical, the researchers then asked whether it was CD8+ T cells playing a role in somehow controlling the virus. The team isolated CD8+ T cells from each patient and mixed them with virus-infected CD4+ T cells from the same patient; they also mixed CD8+ T cells from other noncontroller patients with their own infected CD4+ T cells. They found that the controller's own CD8+ T cells were able to suppress that patient's virus, but noncontroller CD8+ T cells were not able to suppress their own virus. This sug-

gests that the controller CD8+ T cell behaviour was the key to why these patients had been able to maintain undetectable viral loads for an extended period of time despite large numbers of infected CD4+ T cells.

"We believe this is the first time that an HIV-specific CD8+ T cell response has been shown in a post-treatment controller," says Rebecca T. Veenhuis, Ph.D., a research associate at the Johns Hopkins University School of Medicine. "The results suggest that a functional cure can occur despite a large viral reservoir."

Study suggests myelin thickness changes dynamically to regulate transmission speed of neurons

The transmission speed of neurons fluctuates in the brain to achieve an optimal flow of information required for day-to-day activities, according to a US National Institutes of Health study. The results, appearing in PNAS, suggest that brain cells called astrocytes alter the transmission speed of neurons by changing the thickness of myelin, an insulation material, and the width of gaps in myelin called nodes of Ranvier, which amplify signals.

"Scientists used to think that myelin could not be thinned except when destroyed in demyelinating diseases, such as multiple sclerosis," said R. Douglas Fields, Ph.D., senior author and chief of the Section on Nervous System Development and Plasticity at NIH's Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD). "Our study suggests that under normal conditions, the myelin sheath and structure of the nodes of Ranvier are dynamic, even in adults."

The brain is composed of neurons, which have extensions called axons that can stretch for long distances. Axons are wrapped by layers of myelin, which serve as insulation to increase the speed of signals relayed by neurons. Gaps between segments of myelin are called nodes of Ranvier, and the number and width of these gaps can also regulate transmission speed.

"Myelin can be located far from the neuron's synapse, where signals originate," said NICHD's Dipankar Dutta, Ph.D., the lead author of the study. "We wanted to understand how myelin, and the cells that regulate it, help synchronize signals that come from different areas of the brain."

The researchers focused their attention on perinodal astrocytes, which frequently touch nodes of Ranvier throughout the brain. In experiments using mice and rats, the researchers found that these astrocytes regulate adhesion molecules that connect myelin to axons. When these molecules are cut by the enzyme thrombin, myelin detaches from the axon, layer by layer.

The researchers blocked the ability of perinodal astrocytes to regulate thrombin and observed thinner myelin sheaths and wider nodes of Ranvier. In turn, these changes reduced the signal speeds of neurons by approximately 15%, which was enough to impair reflexes of mice in a vision-based test.

The findings suggest that astrocytes, by regulating signal speeds, play an important role in how the brain processes information. Furthermore, the researchers propose that blocking thrombin may help stabilize myelin. Thrombin inhibitors are already approved by the US FDA for other uses, and the study team is currently testing their idea in a mouse model of multiple sclerosis.

- **doi**: 10.1073/pnas.1811013115 (2018)

Novel antibacterial drugs developed at University of Eastern Finland

Researchers at the University of Eastern Finland have developed novel antibacterial compounds, focusing on the role of LsrK kinase. LsrK kinase is a protein involved in bacterial communication. In a new study published in *ChemMedChem*, the researchers explore LsrK kinase as a target in antibacterial drug design.

In the era of increased antibiotic resistance, it is necessary to focus on developing new antibacterial agents. Rising resistance alarms us following the traditional mechanisms of antibiotics for drug development. Addressing this, the INTEGRATE consortium focused on validating novel targets that can be used in future antibacterial drug development. Quorum sensing (QS) is a process of bacterial communication involved in the host colonization, virulence factors production, biofilm formation and infection establishment. Consequently, the investigation of quorum quenching and inhibiting agents, which would interfere with the production and processing of QS mediators, has become a new strategy for developing antivirulence agents.

QS is mediated by signalling molecules called autoinducers (AI) in a population density dependent manner. The AI-2 signalling molecule is, derived from precursor 4,5-dihydroxy-2,3-pentanedione (DPD), involved in both intraspecies as well as in interspecies communication. LsrK is a kinase involved in the phosphorylation of AI-2 molecules, which (i.e. the phosphorylated form of AI-2) further regulates the QS pathway. Thus, inhibiting LsrK can lead to quorum sensing inactivation and interfere with the pathogenesis.

There were no reported inhibitors or protein structure of LsrK. Thus, University of Eastern Finland researchers initiated the drug design efforts by modelling the LsrK protein structure using computational methods. The modelled protein structure was used for the screening of the compound library available at the Institute for Molecular Medicine Finland. The prioritized hits were tested in experimental assays for LsrK inhibition at the University of Helsinki. This study resulted in two primary hits, which were further confirmed by an analogue based approach. This analogue approach resulted in four more hits of micromolar activity against LsrK.

The identified LsrK inhibitors through this study are the first class of LsrK inhibitors reported to date. These hits will be further optimized to achieve high affinity and function as useful tools for improving our understanding towards inhibition of LsrK in the AI-2 pathway and its significance as a potential antivirulence strategy. Considering the limited knowledge about LsrK structure, the study offers a great overview of the behaviour of the protein and a perfect starting point to better understand the protein-substrate dynamics and how to interfere with it. MEH

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We offer personalized medicine where specialists use your genetic makeup to help select the best course of therapy, targeting the specific characteristics unique to the cancer. Our experts at the NCI-designated Dan L Duncan Comprehensive Cancer Center at Baylor St. Luke's Medical Center offer the latest innovations in cancer treatment—many of which stem from our own internationally recognized research. That's our answer to cancer.

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More than 90% of world's children breathe polluted air

Every day around 93% of the world's children under the age of 15 years (1.8 billion children) breathe air that is so polluted it puts their health and development at serious risk. Tragically, many of them die: WHO estimates that in 2016, 600,000 children died from acute lower respiratory infections caused by polluted air.

A new WHO report on Air pollution and child health: Prescribing clean air examines the heavy toll of both ambient (outside) and household air pollution on the health of the world's children, particularly in low- and middle-income countries. The report was launched on the eve of WHO's first ever Global Conference on Air Pollution and Health in Geneva in November.

It reveals that when pregnant women are exposed to polluted air, they are more likely to give birth prematurely, and have small, low birth-weight children. Air pollution also impacts neurodevelopment and cognitive ability and can trigger asthma, and childhood cancer. Children who have been exposed to high levels of air pollution may be at greater risk for chronic diseases such as cardiovascular disease later in life.

"Polluted air is poisoning millions of children and ruining their lives," says Dr Tedros Adhanom Ghebreyesus, WHO Director-General. "This is inexcusable. Every child should be able to breathe clean air so they can grow and fulfil their full potential."

One reason why children are particularly vulnerable to the effects of air pollution is that they breathe more rapidly than adults and so absorb more pollutants.

They also live closer to the ground, where some pollutants reach peak concentrations – at a time when their brains and bodies are still developing.

Newborns and young children are also more susceptible to household air pollution in homes that regularly use polluting fuels and technologies for cooking, heating and lighting

"Air Pollution is stunting our children's brains, affecting their health in more ways than we suspected. But there are many straight-forward ways to reduce emissions of dangerous pollutants," says Dr Maria Neira, Director, Department of Public Health, Environmental and Social Determinants of Health at WHO.

"WHO is supporting implementation of health-wise policy measures like accelerating the switch to clean cooking and heating fuels and technologies, promoting the use of cleaner transport, energy-efficient housing and urban planning. We are preparing the ground for low emission power generation, cleaner, safer industrial technologies and better municipal waste management," she added.

Key findings:

- Air pollution affects neurodevelopment, leading to lower cognitive test outcomes, negatively affecting mental and motor development.
- Air pollution is damaging children's lung function, even at lower levels of exposures
- Globally, 93% of the world's children under 15 years of age are exposed to ambient fine particulate matter (PM2.5) levels above WHO air quality guidelines, which include the 630 million children under 5 years of age, and 1.8 billion children under 15 years
- In low- and middle-income countries around the world, 98% of all children under 5 are exposed to PM2.5 levels above WHO air quality guidelines. In comparison, in high-income countries, 52% of children under 5 are exposed to levels above WHO air quality guidelines
- More than 40% of the world's population – which includes 1 billion children under 15 - is exposed to high levels of household air pollution from mainly cooking with polluting technologies and fuels
- About 600,000 deaths in children under 15 years of age were attributed to the joint effects of ambient and household air pollution in 2016
- Together, household air pollution from cooking and ambient (outside) air pollution cause more than 50% of acute lower respiratory infections in children under 5 years of age in low- and middle-income countries.
- Air pollution is one of the leading threats to child health, accounting for almost 1 in 10 deaths in children under five years of age.

WHO's First Global Conference on Air Pollution and Health, which opens in Geneva on Tuesday 30 October will provide the opportunity for world leaders; ministers of health, energy, and environment; mayors; heads of intergovernmental organizations; scientists and others to commit to act against this serious health threat, which shortens the lives of around 7 million people each year. Actions should include:

- Action by the health sector to inform, educate, provide resources to health professionals, and engage in inter-sectoral policy making.
- Implementation of policies to reduce air pollution: All countries should work towards meeting WHO global air quality guidelines to enhance the health and safety of children. To achieve this, governments should adopt such measures as reducing the over-dependence on fossil fuels in the global energy mix, investing in improvements in energy efficiency and facilitating the uptake of renewable energy sources. Better waste management can reduce the amount of waste that is burned within communities and thereby reducing 'community air pollution'. The exclusive use of clean technologies and fuels for household cooking, heating and lighting activities can drastically improve the air quality within homes and in the surrounding community.
- Steps to minimize children's exposure to polluted air: Schools and playgrounds should be located away from major sources of air pollution like busy roads, factories and power plants.

on the WEB Air pollution and child health: prescribing clean air
www.who.int/ceh/publications/air-pollution-child-health

WHO and partners launch new country-led response to reboot malaria control

Reductions in malaria cases have stalled after several years of decline globally,

according to the new *World malaria report 2018*. To get the reduction in malaria deaths and disease back on track, the World Health Organization (WHO) and partners are joining a new country-led response, launched 19 November 2018, to scale up prevention and treatment, and increased investment, to protect vulnerable people from the deadly disease.

For the second consecutive year, the annual report produced by WHO reveals a plateauing in numbers of people affected by malaria: in 2017, there were an estimated 219 million cases of malaria, compared to 217 million the year before. But in the years prior, the number of people contracting malaria globally had been steadily falling, from 239 million in 2010 to 214 million in 2015.

"Nobody should die from malaria. But the world faces a new reality: as progress stagnates, we are at risk of squandering years of toil, investment and success in reducing the number of people suffering from the disease," says Dr Tedros Adhanom Ghebreyesus, WHO Director-General. "We recognise we have to do something different now. So we are launching a country-focused and country-led plan to take comprehensive action against malaria by making our work more effective where it counts most – at local level."

In 2017, approximately 70% of all malaria cases (151 million) and deaths (274 000) were concentrated in 11 countries: 10 in Africa (Burkina Faso, Cameroon, Democratic Republic of the Congo, Ghana, Mali, Mozambique, Niger, Nigeria, Uganda and United Republic of Tanzania) and India. There were 3.5 million more malaria cases reported in these 10 African countries in 2017 compared to the previous year, while India, however, showed progress in reducing its disease burden.

Despite marginal increases in recent years in the distribution and use of insecticide-treated bed nets in sub-Saharan Africa – the primary tool for preventing malaria – the report highlights major coverage gaps. In 2017, an estimated half of at-risk people in Africa did not sleep under a treated net. Also, fewer homes are being protected by indoor residual spraying than before, and access to preventive therapies that protect pregnant women and children from malaria remains too low.

In line with WHO's strategic vision to scale up activities to protect people's health, the new country-driven "High burden to high impact" response plan has been launched to support nations with most malaria cases and deaths. The response follows a call made by Dr Tedros at the World Health Assembly in May 2018 for an aggressive new approach to jump-start progress against malaria. It is based on four pillars:

- Galvanizing national and global political attention to reduce malaria deaths;
- Driving impact through the strategic use of information;
- Establishing best global guidance, policies and strategies suitable for all malaria endemic countries; and
- Implementing a coordinated country response.

Catalyzed by WHO and the RBM Partnership to End Malaria, "High burden to high impact" builds on the principle that no one should die from a disease that can be easily prevented and diagnosed, and that is entirely curable with available treatments.

"There is no standing still with malaria. The latest World malaria report shows that further progress is not inevitable and that business as usual is no longer an option," said Dr Kesete Admasu, CEO of the RBM Partnership. "The new country-led response will jumpstart aggressive new malaria control efforts in the highest burden countries and will be crucial to get back on track with fighting one of the most pressing health challenges we face."

Targets set by the WHO Global technical strategy for malaria 2016–2030 to reduce malaria case incidence and death rates by at least 40% by 2020 are not on track to being met.

The report highlights some positive progress. The number of countries nearing elimination continues to grow (46 in 2017 compared to 37 in 2010). Meanwhile in China and El Salvador, where malaria had long been endemic, no local transmission of malaria was reported in 2017, proof that intensive, country-led control efforts can succeed in reducing the risk people face from the disease.

In 2018, WHO certified Paraguay as malaria free, the first country in the Americas to receive this status in 45 years. Three other countries – Algeria, Argentina and Uzbekistan – have requested official malaria-free certification from WHO.

India – a country that represents 4% of the global malaria burden – recorded a 24% reduction in cases in 2017 compared to 2016. Also in Rwanda, 436,000 fewer cases were recorded in 2017 compared to 2016. Ethiopia and Pakistan both reported marked decreases of more than 240,000 in the same period.

As reductions in malaria cases and deaths slow, funding for the global response has also shown a levelling off, with US$3.1 billion made available for control and elimination programmes in 2017 including $900 million (28%) from governments of malaria endemic countries. The United States remains the largest single international donor, contributing $1.2 billion (39%) in 2017.

To meet the 2030 targets of the global malaria strategy, malaria investments should reach at least $6.6 billion annually by 2020 – more than double the amount available now.

on the WEB WHO World malaria report 2018
www.who.int/malaria/publications/world-malaria-report-2018

Measles cases increase

Reported measles cases spiked in 2017, as multiple countries experienced severe and protracted outbreaks of the disease. This is according to a new report published 29 November 2018 by leading health organizations.

The spike in measles cases is attributed to a growing complacency about the danger of measles and an increasing trend against vaccination based on false information.

In 2017 there were an estimated 110,000 deaths related to the disease.

Using updated disease modelling data, the report provides the most comprehensive estimates of measles trends over the last 17 years. It shows that since 2000, over 21 million lives have been saved through measles immunizations. However, reported cases increased by more than 30% worldwide from 2016.

The Americas, the Eastern Mediterranean Region, and Europe experienced the greatest upsurges in cases in 2017, with the Western Pacific the only World Health Organization (WHO) region where measles incidence fell.

"The resurgence of measles is of serious concern, with extended outbreaks occurring across regions, and particularly in countries that had achieved, or were close to achieving measles elimination," said Dr Soumya Swaminathan, Deputy Director General for Programmes at WHO. "Without urgent efforts to increase vaccination coverage and identify populations with unacceptable levels of under-, or unimmunized children, we risk losing decades of progress in protecting children and communities against this devastating, but entirely preventable disease."

Measles is a serious and highly contagious disease. It can cause debilitating or fatal complications, including encephalitis (an infection that leads to swelling of the brain), severe diarrhoea and dehydration, pneumonia, ear infections and permanent vision loss. Babies and young children with malnutrition and weak immune systems are particularly vulnerable to complications and death.

The disease is preventable through two doses of a vaccine. For several years, however, global coverage with the first dose of measles vaccine has stalled at 85%. This is far short of the 95% needed to prevent outbreaks, and leaves many people, in many communities, susceptible to the disease. Second dose coverage stands at 67%.

"The increase in measles cases is deeply concerning, but not surprising," said Dr Seth Berkley, CEO of Gavi, the Vaccine Alliance. "Complacency about the disease and the spread of falsehoods about the vaccine in Europe, a collapsing health system in Venezuela and pockets of fragility and low immunization coverage in Africa are combining to bring about a global resurgence of measles after years of progress. Existing strategies need to change: more effort needs to go into increasing routine immunization coverage and strengthening health systems. Otherwise we will continue chasing one outbreak after another."

Responding to the recent outbreaks, health agencies are calling for sustained investment in immunization systems, alongside efforts to strengthen routine vaccination services. These efforts must focus especially on reaching the poorest, most marginalized communities, including people affected by conflict and displacement.

The agencies also call for actions to build broad-based public support for immunizations, while tackling misinformation and hesitancy around vaccines where these exist.

"Sustained investments are needed to strengthen immunization service delivery and to use every opportunity for delivering vaccines to those who need them," said Dr Robert Linkins, Branch Chief of Accelerated Disease Control and Vaccine Preventable Disease Surveillance at the U.S. Centers for Disease Control and Prevention (CDC) and Measles & Rubella Initiative Management Team Chair.

World leaders commit to improving primary health care with Astana Declaration

Countries around the globe signed the Declaration of Astana on 25 October last year, vowing to strengthen their primary health care systems as an essential step toward achieving universal health coverage. The Declaration of Astana reaffirms the historic 1978 Declaration of Alma-Ata, the first time world leaders committed to primary health care.

"Today, instead of health for all, we have health for some," said Dr Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization (WHO). "We all have a solemn responsibility to ensure that this declaration on primary health care enables every person, everywhere to exercise their fundamental right to health."

While the 1978 Declaration of Alma-Ata laid a foundation for primary health care, progress over the past four decades has been uneven. At least half the world's population lacks access to essential health services – including care for noncommunicable and communicable diseases, maternal and child health, mental health, and sexual and reproductive health.

The Declaration of Astana <*www.who.int/primary-health/conference-phc/declaration*>, makes pledges in four key areas: (1) make bold political choices for health across all sectors; (2) build sustainable primary health care; (3) empower individuals and communities; and (4) align stakeholder support to national policies, strategies and plans.

"Although the world is a healthier place for children today than ever before, close to 6 million children die every year before their fifth birthday mostly from preventable causes, and more than 150 million are stunted," said Henrietta Fore, UNICEF Executive Director. "We as a global community can change that, by bringing quality health services close to those who need them. That's what primary health care is about." MEH

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World's first genetically modified humans born in China

He Jiankui

A Chinese biophysics researcher rocked the scientific world on 26 November last year when he publicly announced he had carried out genetic editing on human embryos. His highly controversial research has resulted in the birth of the first known genetically modified humans and has been met by outrage from many quarters of the scientific community.

He Jiankui made the dramatic announcement in a Youtube video <*https://youtu.be/th0vnOmFltc*> before presenting his work at a summit in Hong Kong.

He, of the Southern University of Science and Technology in Shenzhen (the university said that He had been on unpaid leave since February 2018, and his research was conducted without their knowledge outside of their campus) used the powerful gene-editing tool, CRISPR/Cas9 to eliminate a gene called CCR5 in human embryos in vitro for seven couples in fertility treatment, before they were transferred into the women's uteruses. One couple in the trial gave birth to twin girls on November 8.

The CCR5 gene forms a protein doorway that allows HIV, the virus that causes AIDS, to enter a cell. By eliminating it, He hoped to render the offspring resistant to HIV.

The use of CRISPR technology to edit human embryos is ethically controversial – and banned in some countries – because changes to an embryo would be inherited by future generations and could eventually affect the entire human gene pool.

"We have never done anything that will change the genes of the human race, and we have never done anything that will have effects that will go on through the generations," David Baltimore, a biologist and former president of the California Institute of Technology, said in a statement. Baltimore was chairing the Second International Summit on Human Genome Editing in Hong Kong at the time of the He's announcement.

He presented his work (as yet unpublished) at the summit in Hong Kong. He explained the gene editing occurred during IVF. A single sperm was placed into a single egg to create an embryo. Then the gene editing tool was added.

He explained that when the embryos were 3 to 5 days old, a few cells were removed and checked for editing. Couples could choose whether to use edited or unedited embryos for pregnancy attempts. In all, 16 of 22 embryos were edited, and 11 embryos were used in six implant attempts before the twin pregnancy was achieved, He said.

He said tests suggest that one twin had both copies of the intended gene altered and the other twin had just one altered, with no evidence of harm to other genes, He said.

He told Associated Press in an interview: "I feel a strong responsibility that it's not just to make a first, but also make it an example. Society will decide what to do next."

Following He's announcement, Shenzhen City Medical Ethics Expert Board said it would begin an investigation of He's research.

Feng Zhang, one of the early CRISPR researchers issued a statement saying: "Although I appreciate the global threat posed by HIV, at this stage, the risks of editing embryos to knock out CCR5 seem to outweigh the potential benefits, not to mention that knocking out of CCR5 will likely render a person much more susceptible for West Nile Virus. Just as important, there are already common and highly-effective methods to prevent transmission of HIV from a parent to an unborn child.

"Given the current state of the technology, I'm in favour of a moratorium on implantation of edited embryos, which seems to be the intention of the CCR5 trial, until we have come up with a thoughtful set of safety requirements first.

"Not only do I see this as risky, but I am also deeply concerned about the lack of transparency surrounding this trial. All medical advances, gene editing or otherwise and particularly those that impact vulnerable populations, should be cautiously and thoughtfully tested, discussed openly with patients, physicians, scientists, and other community members, and implemented in an equitable way.

Zheng added that in 2015, the international research community issued a consensus document stating that it would be irresponsible to proceed with any germline editing without 'broad societal consensus about the appropriateness of the proposed application'.

Among many organisations condemning the research was that of the United States National Institutes of Health which issued a statement saying: "This work represents a deeply disturbing willingness by Dr He and his team to flout international ethical norms. The project was largely carried out in secret, the medical necessity for inactivation of CCR5 in these infants is utterly unconvincing, the informed consent process appears highly questionable, and the possibility of damaging off-target effects has not been satisfactorily explored.

"It is profoundly unfortunate that the first apparent application of this powerful technique to the human germline has been carried out so irresponsibly. The need for development of binding international consensus on setting limits for this kind of research has never been more apparent. Without such limits, the world will face the serious risk of a deluge of similarly ill-considered and unethical projects.

"Should such epic scientific misadventures proceed, a technology with enormous promise for prevention and treatment of disease will be overshadowed by justifiable public outrage, fear, and disgust."

Hong Kong newspaper *The South China Morning Post* reported 3 December that He was being kept under effective house arrest by Chinese authorities while investigations proceeded.

on the WEB He Jiankui's presentation at the Second International Summit on Human Genome Editing in Hong Kong *https://www.youtube.com/watch?v=pcGALqX_YD8*

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Health impact of air pollution costs more than cost of meeting Paris climate change goals

WHO's COP24 report calls for countries to account for health in all cost-benefit analyses of climate change mitigation

Meeting the goals of the Paris Agreement could save about a million lives a year worldwide by 2050 through reductions in air pollution alone. The latest estimates from leading experts also indicate that the value of health gains from climate action would be approximately double the cost of mitigation policies at global level, and the benefit-to-cost ratio is even higher in countries such as China and India.

A WHO report launched 5 December 2018 at the United Nations Climate Change Conference (COP24) in Katowice, Poland highlights why health considerations are critical to the advancement of climate action and outlines key recommendations for policy makers.

Exposure to air pollution causes 7 million deaths worldwide every year and costs an estimated US$ 5.11 trillion in welfare losses globally. In the 15 countries that emit the most greenhouse gas emissions, the health impacts of air pollution are estimated to cost more than 4% of their GDP. Actions to meet the Paris goals would cost around 1% of global GDP.

"The Paris Agreement is potentially the strongest health agreement of this century," said Dr Tedros Adhanom Ghebreyesus, Director-General of WHO. "The evidence is clear that climate change is already having a serious impact on human lives and health. It threatens the basic elements we all need for good health – clean air, safe drinking water, nutritious food supply and safe shelter – and will undermine decades of progress in global health. We can't afford to delay action any further."

The same human activities that are destabilizing the Earth's climate also contribute directly to poor health. The main driver of climate change is fossil fuel combustion which is also a major contributor to air pollution.

"The true cost of climate change is felt in our hospitals and in our lungs. The health burden of polluting energy sources is now so high, that moving to cleaner and more sustainable choices for energy supply, transport and food systems effectively pays for itself," says Dr Maria Neira, WHO Director of Public Health, Environmental and Social Determinants of Health. "When health is taken into account, climate change mitigation is an opportunity, not a cost."

Switching to low-carbon energy sources will not only improve air quality but provide additional opportunities for immediate health benefits. For example, introducing active transport options such as cycling will help increase physical activity that can help prevent diseases like diabetes, cancer and heart disease.

WHO's COP-24 Special Report: health and climate change provides recommendations for governments on how to maximize the health benefits of tackling climate change and avoid the worst health impacts of this global challenge.

It describes how countries around the world are now taking action to protect lives from the impacts of climate change – but that the scale of support remains woefully inadequate, particularly for the small island developing states, and least developed countries. Only approximately 0.5% of multilateral climate funds dispersed for climate change adaptation have been allocated to health projects.

Pacific Island countries contribute 0.03% of greenhouse gas emissions, but they are among the most profoundly affected by its impacts. For the Pacific Island countries, urgent action to address climate change is crucial to the health of their people and their very existence.

"We now have a clear understanding of what needs to be done to protect health from climate change – from more resilient and sustainable healthcare facilities, to improved warning systems for extreme weather and infectious disease outbreaks. But the lack of investment is leaving the most vulnerable behind," said Dr Joy St John, Assistant Director-General for Climate and Other Determinants of Health.

The report calls for countries to account

Holgar Link

> The true cost of climate change is felt in our hospitals and in our lungs. The health burden of polluting energy sources is now so high, that moving to cleaner and more sustainable choices for energy supply, transport and food systems effectively pays for itself.

for health in all cost-benefit analyses of climate change mitigation. It also recommends that countries use fiscal incentives such as carbon pricing and energy subsidies to incentivize sectors to reduce their emissions of greenhouse gases and air pollutants. It further encourages Parties to the United Nations Framework Convention on Climate Change (UNFCCC) to remove existing barriers to supporting climate-resilient health systems.

WHO is working with countries to:

- Assess the health gains that would result from the implementation of the existing Nationally Determined Contributions to the Paris Agreement, and the potential for larger gains from the more ambitious action required to meet the goals of limiting global warming to 2oC or 1.5oC.
- Ensure climate-resilient health systems, especially in the most vulnerable countries such as small island developing states (SIDS); and to promote climate change mitigation actions that maximize immediate and long-term health benefits, under a special initiative on climate change and health in SIDS, launched in partnership with the UNFCCC Secretariat and the Fijian Presidency of COP-23 and operationalized by the Pacific Islands Action Plan on Climate Change and Health.
- Track national progress in protecting health from climate change and gaining the health co-benefits of climate change mitigation measures, through the WHO/UNFCCC Climate and Health country profiles, currently covering 45 countries, with 90 due for completion by the end of 2019.

on the WEB COP24 special report: health and climate change
https://tinyurl.com/yagnnlu6

Recommendations

Parties to the UNFCCC could advance climate, health and development objectives by:

- Identifying and promoting actions that both cut carbon emissions and reduce air pollution, and by including specific commitments to cut emissions of Short Climate Pollutants in their National Determined Contributions.
- Ensuring that the commitments to assess and safeguard health in the UNFCCC and Paris Agreement are reflected in the operational mechanisms at national and global levels.
- Removing barriers to investment in health adaptation to climate change, with a focus on climate resilient health systems, and climate smart healthcare facilities.
- Engagement with the health community, civil society and health professionals, to help them to mobilize collectively to promote climate action and health co-benefits.
- Promoting the role of cities and sub-national governments in climate action benefiting health, within the UNFCCC framework.
- Formal monitoring and reporting of the health progress resulting from climate actions to the global climate and health governance processes, and the United Nations Sustainable Development Goals.
- Inclusion of the health implications of mitigation and adaptation measures in economic and fiscal policy.

UNAIDS Report:
75% of all people living with HIV know their HIV status

Report calls for increased efforts to reach the 9.4 million people unaware they are living with HIV

A new report from UNAIDS shows that intensified HIV testing and treatment efforts are reaching more people living with HIV. In 2017, three quarters of people living with HIV (75%) knew their HIV status, compared to just two thirds (67%) in 2015, and 21.7 million people living with HIV (59%) had access to antiretroviral therapy, up from 17.2 million in 2015. The report shows, however, that 9.4 million people living with HIV do not know they are living with the virus and urgently need to be linked to HIV testing and treatment services.

The report, *Knowledge is power*, reveals that although the number of people living with HIV who are virally suppressed has risen by around 10 percentage points in the past three years, reaching 47% in 2017, 19.4 million people living with HIV still do not have a suppressed viral load. To remain healthy and to prevent transmission, the virus needs to be suppressed to undetectable or very low levels through sustained antiretroviral therapy. And to effectively monitor viral load, people living with HIV need access to viral load testing every 12 months.

"Viral load testing is the gold standard in HIV treatment monitoring," said Michel Sidibé, Executive Director of UNAIDS. "It shows that treatment is working, keeping people alive and well and keeping the virus firmly under control."

The report outlines that access to viral load testing is mixed. In some parts of the world, getting a viral load test is easy and is fully integrated into a person's HIV treatment regime, but in other places there may be only one viral load machine for the entire country.

"Viral load monitoring needs to be as available in Lilongwe as it is in London," said Sidibé. "HIV testing and viral load testing should be equal and accessible to all people living with HIV, without exception."

In Côte d'Ivoire, the United States President's Emergency Plan for AIDS Relief is supporting a national scale-up plan for viral load testing. In just three years, as the number of people on treatment doubled, 10 additional laboratories began viral load testing. Subsequently, viral load testing coverage increased from 14% in 2015 to 66% in 2017 and is projected to reach 75% by the end of 2018.

"This year's UNAIDS theme for World AIDS Day (Live life positively – know your HIV status) reiterates the fact that HIV testing remains the only way to know your status and to adopt a healthy life plan," said Eugène Aka Aouele, Minister of Health and Public Hygiene, Côte d'Ivoire.

Newborns and viral load testing

Viral load testing is particularly important for newborns, as HIV progresses much faster in children – peak mortality for children born with HIV is within two or three months of life. Standard rapid diagnostic testing is ineffective up until 18 months of age, so the only viable test for HIV for very young children is a virological test, which they need to receive within the first four to six weeks of life. However, in 2017, only half (52%) of children exposed to HIV in high-burden countries received a test within the first two months of life.

Important advances are being made. New point-of-care testing technologies – testing that takes place in an environment as close to the person as possible – have been shown to shorten the time it takes to return children's test results from months to minutes, which is saving lives.

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HIV / AIDS figures

In 2017 an estimated:

- 36.9 million [31.1 million–43.9 million] people globally were living with HIV
- 21.7 million [19.1 million–22.6 million] people were accessing treatment
- 1.8 million [1.4 million–2.4 million] people became newly infected with HIV
- 940,000 [670,000–1.3 million] people died from AIDS-related illnesses

The persistent barriers to knowing one's status

The report shows that one of the biggest barriers to HIV testing is stigma and discrimination. Studies among women, men, young people and key populations have revealed that fear of being seen accessing HIV services, and if the person is diagnosed, fear that this information will be shared with family, friends, sexual partners or the wider community, was preventing them from accessing HIV services, including HIV testing.

For key populations – gay men and other men who have sex with men, transgender people, sex workers, people who use drugs, people in prisons and other closed settings and migrants – these barriers can affect access to an even greater extent. Stigma and discrimination, from society and health services, can deter members of key populations from accessing health care, while criminal laws can compound that discrimination, increase rates of violence and create additional barriers, including fear of arrest and harassment.

"In Côte d'Ivoire, HIV prevalence among sex workers is 11% and 13% for men who have sex with men and 9.2% for people who inject drugs," said Pélagie Kouamé, President of the Network of Key Populations in Côte d'Ivoire. "We cannot leave key populations behind. Things must change and evolve so that we can come out from the shadows and no longer live in fear."

Other barriers include violence or the threat of violence, especially among young women and girls. Parental consent laws and policies are also a barrier, since in some countries young people under the age of 18 years need parental consent to take an HIV test. In addition, services are often too far away and difficult to access or too expensive. There can also be delays or failures in returning HIV test results and delays in treatment initiation. In some countries, people do not seek HIV testing as they feel they are not at risk – in Malawi, one study found that among adolescent girls and young women (aged between 15 years and 24 years), considered to be at higher risk of HIV, more than half (52%) did not consider themselves at risk of HIV and so were unlikely to seek HIV testing services.

Next generation of testing options

The report highlights how providing a variety of testing options and services, such as community-based testing and home-based testing, can help mitigate many of the logistical, structural and social barriers to HIV testing. They offer testing options for people who live far away from health services, do not have the constraints of inconvenient opening hours, which is particularly important for men and people from key populations, and do not come with the stigma and discrimination often perceived in traditional health and HIV services.

"We cannot not wait for people to become sick," said Imam Harouna Koné, President of the Platform of Networks in the Fight Against AIDS. "We must go out to our communities and offer HIV testing and treatment services."

The report outlines the importance of taking a five Cs approach: consent, confidentiality, counselling, correct test results and connection/linkage to prevention, care and treatment. "There isn't a one size fits all approach to HIV testing," said Sidibé. "There are a number of different strategies needed to reach people at risk of HIV, including innovative approaches such as self-testing, where people may feel more comfortable that their privacy is respected."

Another important step to take is to integrate HIV testing services within other health services, including maternal and child health services, services for tuberculosis and services for sexually transmitted infections and viral hepatitis. Tuberculosis is the leading cause of death of people living with HIV, accounting for one in three AIDS-related deaths; however, it is estimated that 49% of people living with HIV and tuberculosis are unaware of their coinfection and are therefore not receiving care.

Access to HIV testing is a basic human right, and UNAIDS is calling for a global commitment to remove the barriers preventing people from testing for HIV, which include eliminating HIV-related stigma and discrimination, ensuring confidentiality in HIV testing and treatment services, deploying an optimal mix of HIV testing strategies to reach the populations most in need, integration with other health services, removing policy and legal barriers hindering access to HIV testing and treatment, expanding access to viral load monitoring in low- and middle-income countries and ensuring access to early infant diagnosis for newborns.

The report demonstrates that implementing these measures will hugely advance progress towards ensuring that all people living with and affected by HIV have access to the life-saving services they need.

on the WEB Knowledge is power – Know your status, know your viral load
https://tinyurl.com/y7kwsgj7

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Photo by Alexandra Gorn

Lack of sleep findings are a wake-up call to the risks it poses for heart disease

There have been several studies published recently regarding the effect of too little or too much sleep on the cardiovascular system. *Middle East Health* reviews some of this research.

In a study presented at the European Society of Cardiology Congress in Munich last year, researchers showed that middle-aged men who sleep five hours or less per night have twice the risk of developing a major cardiovascular event during the following two decades than men who sleep seven to eight hours.

Previous studies have generated conflicting evidence on whether short sleep is associated with a greater chance of having a future cardiovascular event. This study investigated this relationship in 50-year-old men.

Study author Moa Bengtsson, of the University of Gothenburg, Sweden, said: "For people with busy lives, sleeping may feel like a waste of time but our study suggests that short sleep could be linked with future cardiovascular disease."

In 1993, 50% of all men born in 1943 and living in Gothenburg were randomly selected to participate in the study. Of the 1,463 invited, 798 (55%) men agreed to take part. Participants underwent a physical examination and completed a questionnaire on current health conditions, average sleep duration, physical activity, and smoking. The men were divided into four groups according to their self-estimated average sleep duration at the start of the study: five or less hours, six hours, seven to eight hours (considered normal sleep duration), and more than eight hours.

21-year follow up

Participants were followed-up for 21 years for the occurrence of major cardiovascular events, which included heart attack, stroke, hospitalisation due to heart failure, coronary revascularisation, or death from cardiovascular disease. Data on cardiovascular events were collected from medical records, the Swedish Hospital Discharge Registry, and the Swedish Cause of Death Register.

Men with incomplete data on sleep duration, incomplete follow-up information, or who had a major cardiovascular event before the start of the study were excluded, leaving a total of 759 men for the analyses.

High blood pressure, diabetes, obesity,

current smoking, low physical activity, and poor sleep quality were more common in men who slept five or fewer hours per night compared to those who got seven to eight hours.

Compared to those with normal sleep duration, men who slept five or fewer hours per night had a two-fold higher risk of having a major cardiovascular event by age 71. The risk remained doubled after adjusting for cardiovascular risk factors at the start of the study including obesity, diabetes, and smoking.

Bengtsson said: "Men with the shortest sleep duration at the age of 50 were twice as likely to have had a cardiovascular event by age 71 than those who slept a normal amount, even when other risk factors were taken into account.

"In our study, the magnitude of increased cardiovascular risk associated with insufficient sleep is similar to that of smoking or having diabetes at age 50. This was an observational study so based on our findings we cannot conclude that short sleep causes cardiovascular disease, or say definitively that sleeping more will reduce risk. However, the findings do suggest that sleep is important – and that should be a wake-up call to all of us."

Short sleep leads to increased risk of asymptomatic atherosclerosis

The PESA study, also presented at the ESC Congress in Munich last year finds that sleeping less than six hours or waking up several times in the night is associated with an increased risk of asymptomatic atherosclerosis, which silently hardens and narrows the arteries.

Dr Fernando Dominguez, study author, of the Spanish National Centre for Cardiovascular Research (CNIC) in Madrid, said: "Bad sleeping habits are very common in Western societies and previous studies have suggested that both short and long sleep are associated with an increased risk of cardiovascular disease. However, there is a lack of large studies that have objectively measured both sleep and subclinical atherosclerosis."

The PESA study enrolled 3,974 healthy middle-aged adults who wore a waistband activity monitor for seven days to record sleep quality and quantity. They were divided into five groups according to the proportion of fragmented sleep, and four groups designating average hours slept a night: less than six (very short), six to seven (short), seven to eight (the reference), and more than eight (long). Atherosclerosis was assessed in leg and neck arteries using three-dimensional ultrasound.

The average age of participants was 46 years and 63% were men. After adjusting for conventional cardiovascular risk factors and potential confounding factors, including age, gender, moderate to vigorous physical activity, body mass index, smoking status, alcohol consumption, blood pressure, education level, blood glucose levels, total cholesterol, total calorie consumption per day, marital status, stress and depression questionnaire scores and obstructive sleep apnoea risk (STOP-BANG score), very short sleepers had significantly more atherosclerosis than those who got seven to eight hours (odds ratio [OR] 1.27, 95% confidence interval [CI] 1.06–1.52, p=0.008) (see figure).

Those in the highest quintile of fragmented sleep were more likely to have multiple sections of arteries with atherosclerosis compared to those in the lowest quintile (OR 1.34, 95% CI 1.09–1.64, p=0.006) (figure).

Dr Dominguez said: "People who had short or disrupted sleep were also more likely to have metabolic syndrome, which refers to the combination of diabetes, high blood pressure, and obesity, and depicts an unhealthy lifestyle."

He concluded: "Failure to get enough sleep and restlessness during the night should be considered risk factors for blocking or narrowing of the arteries. Studies are needed to find out if sleeping well and long enough can prevent or reverse this effect on the arteries. In the meantime it seems sensible to take steps to get a good night's sleep – such as having a physically active lifestyle and avoiding coffee and fatty foods before bedtime."

> We need to be aware and communicate to our patients, that sleeping a lot and having daytime naps may not always be harmless. Perhaps the ancient Greek poet Homer, author of the *Iliad* and the *Odyssey*, summed it up millennia of years ago when he said: 'Even where sleep is concerned, too much is a bad thing.

Too much sleep is also a risk factor

Another study published 5 December 2018 in the *European Heart Journal* found that the amount of time a person sleeps, including daytime naps, is linked to your risk of developing cardiovascular disease and death.

The study looked at more than 116,000 people in seven regions of the world.

The researchers found that people who slept for longer than the recommended duration of six to eight hours a day had an increased risk of dying or developing diseases of the heart or blood vessels in the brain. Compared to people who slept for the recommended time, those who slept a total of eight to nine hours a day had a 5% increased risk; people sleeping between nine and ten hours a day had an increased risk of 17% and those sleeping more than ten hours a day had a 41% increased risk. They also found a 9% increased risk for people who slept a total of six or fewer

hours, but this finding was not statistically significant.

Before adjusting for factors that might affect the results, the researchers found that for every 1000 people sleeping six or fewer hours a night, 9.4 developed cardiovascular disease (CVD) or died per year; this occurred in 7.8 of those sleeping six to eight hours, 8.4 of those sleeping eight to nine hours, 10.4 of those sleeping nine to ten hours and 14.8 of those sleeping more than ten hours.


Photo by Amy Treasure

Optimal duration of sleep

The lead author, Chuangshi Wang, a PhD student at McMaster and Peking Union Medical College, Chinese Academy of Medical Sciences, China, working at the Population Health Research Institute at McMaster, said: "Our study shows that the optimal duration of estimated sleep is six to eight hours per day for adults. Given that this is an observational study that can only show an association rather than proving a causal relationship, we cannot say that too much sleep *per se* causes cardiovascular diseases. However, too little sleep could be an underlying contributor to death and cases of cardiovascular disease, and too much sleep may indicate underlying conditions that increase risk."

Associations between sleep and death or cardiovascular and other diseases have been suggested by other studies, but results have been contradictory. In addition, they tended to look at particular populations and did not necessarily take account of the fact that in some countries daytime napping can be common and considered healthy.

This *EHJ* study looked at a total of 116,632 adults aged between 35 and 70 years in 21 countries with different income levels in seven geographic regions (North America and Europe, South America, the Middle East, South Asia, Southeast Asia, China and Africa). They were part of the Prospective Urban Rural Epidemiology (PURE) study that started in 2003.

During an average (median) follow-up time of nearly eight years, 4381 people died and 4365 suffered a major cardiovascular problem such as a heart attack or stroke. The researchers adjusted the results to take account of factors that could affect outcomes, such as age, sex, education, smoking, alcohol consumption, whether the participants lived in urban or rural areas, had a family history of cardiovascular disease, or had a history of diabetes, raised blood pressure, chronic obstructive pulmonary disease or depression.

Daytime naps

They found that regular daytime naps were more common in the Middle East, China, Southeast Asia and South America. The duration of daytime naps varied mainly from 30 to 60 minutes. People who slept six or fewer hours at night, but took a daytime nap, and so slept an average of 6.4 hours a day in total, had a slightly increased risk compared to those who slept between six and eight hours at night without a daytime nap, but this finding was not statistically significant.

"Although daytime napping was associated with higher risks of death or cardiovascular problems in those with sufficient or longer sleep at night, this was not the case in people who slept under six hours at night. In these individuals, a daytime nap seemed to compensate for the lack of sleep at night and to mitigate the risks," Wang added.

Professor Salim Yusuf, the Principal Investigator of the PURE study, Distinguished Professor of Medicine and Executive Director of the Population Health Research Institute at McMaster University and Hamilton Health Sciences, concluded: "The general public should ensure that they get about six to eight hours of sleep a day. On the other hand, if you sleep too much regularly, say more than nine hours a day, then you may want to visit a doctor to check your overall health. For doctors, including questions about the duration of sleep and daytime naps in the clinical histories of your patients may be helpful in identifying people at high risk of heart and blood vessel problems or death."

Limitations of the study include that the

Royal Brompton & Harefield Hospitals Specialist Care

Pioneering new treatment options reduce severe emphysema symptoms

In the last year, the experts at Royal Brompton Hospital have made significant advancements in treatment of emphysema with minimally invasive alternatives to thoracic surgery. Professor Pallav Shah, consultant physician, explains: "We offer patients with severe emphysema, which is a type of Chronic Obstructive Pulmonary Disease (COPD), a suite of pioneering treatments that can be tailored to each individual patient, improving quality of life, lung function, and survival."

Endobronchial valves

The endobronchial valve is one of the options for treating emphysema. This is an implantable device designed to obstruct bronchi in diseased regions of the lung and to allow for the expiration of air from the treated lobe of the lung. When used, endobronchial valves reduce hyperinflation which allows the patients' relief from their breathlessness.

Up to five valves are usually inserted into selected airways during a 30-minute procedure. They are designed to prevent air inflow during inspiration but they allow air and mucus to exit during expiration. This prevents air entering the diseased parts of the lung, which then collapses so it is no longer in the way of the healthy lung.

Lung volume reduction coils

The innovative lung volume reduction coils are implanted into the diseased parts of the patient's lung during a minimally invasive procedure, typically taking only 30-45 minutes per procedure. Treatment involves two separate procedures, for each lung, four to six weeks apart.

This treatment helps to reduce over-inflation of the lungs in severe emphysema patients, resulting in a reduction in difficult or laboured breathing. During the procedure PneumRx coils are used, which are made of a shape-memory material called Nitinol. The PneumRx coils are implanted into the airways via a catheter, and once in place are designed to gently regain their shape, gathering up loose, inelastic lung tissue and holding open surrounding airways.

Lung Volume Reduction Surgery (LVRS)

LVRS is significant operation which removes the worst affected areas of the lung so that the healthier parts of the lung can work better. Also, by removing the 'swollen' air spaces, less air is trapped so the chest and diaphragm can relax down to a more normal level and breathing is more comfortable.

During the procedure specialist equipment is used to cut and staple the lung at the same time. This seals the lung and reduces or prevents any air leaks. Mr Simon Jordan, consultant thoracic surgeon, explains: "Lung volume reduction surgery can help patients live longer, increase ability to exercise and improve quality of life, compared with people who don't have the operation."

- To refer a patient, email *privatepatients@rbht.nhs.uk* or to find out more, visit *rbhh-specialistcare.co.uk*

Yoga music a solution

Dr Naresh Sen, Consultant Cardiologist at HG SMS Hospital, Jaipur, India, told the ESC Congress about his study which showed that listening to yoga music at bedtime is good for the heart.

He said: "We use music therapy in our hospital and in this study we showed that yoga music has a beneficial impact on heart rate variability before sleeping."

Previous research has shown that music can reduce anxiety in patients with heart disease. However, studies on the effects of music on the heart in patients and healthy individuals have produced inconsistent results, partly they did not state what style of music was used.

The body's heart rate changes as a normal response to being in "fight or flight" or "rest and digest" mode. These states are regulated by the sympathetic and parasympathetic nervous systems, respectively, and together comprise the autonomic nervous system. High heart rate variability shows that the heart is able to adapt to these changes. Conversely, low heart rate variability indicates a less adaptive autonomic nervous system.

Low heart rate variability is associated with a 32-45% higher risk of a first cardiovascular event. Following a cardiovascular event, people with low heart rate variability have a raised risk of subsequent events and death. Failure of the autonomic nervous system to adapt may trigger inflammation, which is linked to cardiovascular disease. Another possibility is that people with low heart rate variability already have subclinical cardiovascular disease.

This study investigated the impact of listening to yoga music, a soothing or meditative music, before bedtime on heart rate variability. The study included 149 healthy people who participated in three sessions on separate nights: (1) yoga music before sleep at night; (2) pop music with steady beats before sleep at night; and (3) no music or silence before sleep at night.

Photo by Nate Casey

At each session, heart rate variability was measured for five minutes before the music or silence started, for ten minutes during the music/silence, and five minutes after it had stopped. In addition, anxiety levels were assessed before and after each session using the Goldberg Anxiety Scale. The level of positive feeling was subjectively measured after each session using a visual analogue scale.

The average age of participants was 26 years. The researchers found that heart rate variability increased during the yoga music, decreased during the pop music, and did not significantly change during the silence.

Anxiety levels fell significantly after the yoga music, rose significantly post the pop music, and increased after the no music session. Participants felt significantly more positive after the yoga music than they did after the pop music.

Dr Sen noted that holistic therapies such as music cannot replace evidence-based drugs and interventions, and should only be used as an add-on.

He said: "Science may have not always agreed, but Indians have long believed in the power of various therapies other than medicines as a mode of treatment for ailments. This is a small study, and more research is needed on the cardiovascular effects of music interventions offered by a trained music therapist. But listening to soothing music before bedtime is a cheap and easy to implement therapy that cannot cause harm." MEH

researchers estimated nocturnal sleep time based on the space between going to bed and waking up, and that they assumed that the duration of night time and daytime naps remained unchanged during the follow-up period. Nor did they collect information on sleep disorders such as insomnia and apnoea, which can have an impact on sleep and might also affect health.

In an accompanying editorial, Dr Dominik Linz, a cardiologist at the Royal Adelaide Hospital and Associate Professor at University of Adelaide, Australia, and colleagues write: "This study provides important epidemiological information, but causative factors explaining the described associations with increased CV [cardiovascular] risk remain speculative." They agree with Wang that too much sleep might be an indicator of an underlying, undiagnosed health condition, and they raise the question: "once a 'pathological sleeping/napping pattern' has been identified, what interventions (if any) should be applied?" ▶

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They conclude: "We need to be aware and communicate to our patients, that sleeping a lot and having daytime naps may not always be harmless. Perhaps the ancient Greek poet Homer, author of the *Iliad* and the *Odyssey*, summed it up millennia of years ago when he said: 'Even where sleep is concerned, too much is a bad thing'." MEH

Excess belly fat is an indicator of heart disease risk

Nearly two-thirds of people at high risk of heart disease and stroke have excess belly fat, according to results of the European Society of Cardiology EUROASPIRE V survey presented at the World Congress of Cardiology & Cardiovascular Health in Dubai in December. *Middle East Health* reports.

Excess fat around the middle of the body (central obesity) is a marker of abnormal fat distribution. This belly fat is bad for the heart, even in people who are not otherwise overweight or obese.

Cardiovascular diseases are the leading cause of death worldwide. Elimination of risk behaviours would prevent at least 80% of cardiovascular diseases, according to some research.

EUROASPIRE is a series of cross sectional surveys on the prevention of cardiovascular disease in ESC member countries. The results of the primary care arm of EUROASPIRE V were reported at the congress. The study was conducted in 2017 to 2018 in 78 general practices in 16 primarily European countries.

The study also found that less than half (47%) of those on antihypertensive medication reached the blood pressure target of less than 140/90 mmHg (less than 140/85 mmHg in patients with self-reported diabetes). Among those taking lipid-lowering drugs, only 43% attained the LDL cholesterol target of less than 2.5 mmol/L. In addition, many participants not taking any antihypertensive and/or lipid-lowering therapy had elevated blood pressure and elevated LDL cholesterol. Among patients being treated for type 2 diabetes, 65% achieved the blood sugar target of glycated haemoglobin (HbA1c) less than <7.0%.

Professor Kornelia Kotseva, chair of the EUROASPIRE Steering Committee from Imperial College London, UK, said: "The survey shows that large proportions of individuals at high risk of cardiovascular disease have unhealthy lifestyle habits and uncontrolled blood pressure, lipids and diabetes."

Each general practice enrolled consecutive individuals under the age of 80 years with no history of coronary artery disease or other atherosclerotic disease, but who were at high risk of developing cardiovascular disease. High risk was defined as having high blood pressure, high cholesterol, and/or diabetes; the study therefore recruited individuals who had been prescribed antihypertensive, lipid-lowering, and/or anti-diabetes treatments (diet and/or oral hypoglycaemics and/or insulin).

Participants were retrospectively identified using medical records and invited to an interview and clinical examination. Questions were asked about smoking, diet, physical activity, blood pressure, lipids and diabetes. Measurements included height, weight, waist circumference, blood pressure, low-density lipoprotein (LDL) cholesterol levels, and blood sugar levels. The primary outcomes were the proportions of participants achieving targets for cardiovascular disease prevention in the 2016 European guidelines.3

A total of 2,759 participants were interviewed and examined using standardised methods and instruments. Nearly two-thirds (64%) were centrally obese (waist circumference 88 cm or greater for women and 102 cm or higher for men). Some 37% were overweight (body mass index [BMI] 25 to 29.9 kg/m2) and 44% were obese (BMI 30kg/m2 or above). Nearly one in five participants (18%) were smokers and just 36% achieved the recommended physical activity level of at least 30 minutes, five times per week.

GPs should proactively look for cardiovascular risk

Professor Kotseva said: "GPs should proactively look for cardiovascular risk factors so that comprehensive treatment and advice can be given. She added: "GPs need to go beyond treating the risk factors they know about, and always investigate smoking, obesity, unhealthy diet, physical inactivity, blood pressure, cholesterol, and diabetes. People are often unaware that they need treatment – for example they visit their GP for their diabetes but do not know they also have high blood pressure. In our study, many participants with high blood pressure and cholesterol were not being treated."

She continued: "These data make it clear that more efforts must be made to improve cardiovascular prevention in people at high risk of cardiovascular disease. Our analysis highlights the need for health care systems to invest in prevention."

"Public health initiatives will also help to prevent heart disease and stroke," Professor Kotseva said. "This includes smoking bans, taxing foods high in sugar and saturated fat, and providing areas for exercise." MEH


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New integrated workflow improves valve sizing accuracy during aortic valve replacement procedures

By Lindsay Brownell

More than one in eight people aged 75 and older in the United States develop moderate-to-severe blockage of the aortic valve in their hearts, usually caused by calcified deposits that build up on the valve's leaflets and prevent them from fully opening and closing. Many of these older patients are not healthy enough to undergo open heart surgeries; instead, they have artificial valves implanted into their hearts using a procedure called transcatheter aortic valve replacement (TAVR), which deploys the valve via a catheter inserted into the aorta. There are challenges with this procedure, however, including the need to choose the perfect-sized heart valve without ever actually looking at the patient's heart: too small, and the valve can dislodge or leak around the edges; too large, and the valve can rip through the heart, carrying a risk of death. Like Goldilocks, cardiologists are looking for a TAVR valve size that is "just right".

Researchers at the Wyss Institute for Biologically Inspired Engineering at Harvard University have created a novel 3D printing workflow that allows cardiologists to evaluate how different valve sizes will interact with each patient's unique anatomy, before the medical procedure is actually performed. This protocol uses CT scan data to produce physical models of individual patients' aortic valves, in addition to a "sizer" device to determine the perfect replacement valve size. The work was performed in collaboration with researchers and physicians from Brigham and Women's Hospital, The University of Washington, Massachusetts General Hospital, and the Max Planck Institute of Colloids and Interfaces, and is published in the *Journal of Cardiovascular Computed Tomography*.

"If you buy a pair of shoes online without trying them on first, there's a good chance they're not going to fit properly. Sizing replacement TAVR valves poses a similar problem, in that doctors don't get the opportunity to evaluate how a specific valve size will fit with a patient's anatomy before surgery," said James Weaver, Ph.D., a Senior Research Scientist at the Wyss Institute who is a corresponding author of the paper. "Our integrative 3D printing and valve sizing system provides a customized report of every patient's unique aortic valve shape, removing a lot of the guesswork and helping each patient receive a more accurately sized valve."

When a patient needs a replacement heart valve, they frequently get a CT scan, which takes a series of X ray images of the heart to create a 3D reconstruction of its internal anatomy. While the outer wall of the aorta and any associated calcified deposits are easily seen on a CT scan, the delicate "leaflets" of tissue that open and close the valve are often too thin to show up well.

"After a 3D reconstruction of the heart anatomy is performed, it often looks like the calcified deposits are simply floating around inside the valve, providing little or no insight as to how a deployed TAVR valve would interact with them," Weaver explained.

Virtual 3D models

To solve that problem, Ahmed Hosny, who was a Research Fellow at the Wyss Institute at the time, created a software program that uses parametric modelling to generate virtual 3D models of the leaflets using seven coordinates on each patient's valve that are visible on CT scans. The digital leaflet models were then merged with the CT data and adjusted so that they fit into the valve correctly. The resulting model, which incorporates the leaflets and their associated calcified deposits, was then 3D printed into a physical multi-material model.

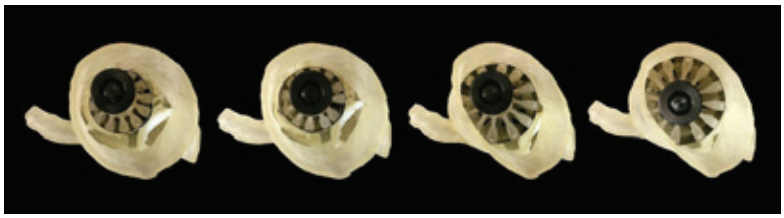
The team also 3D printed a custom "sizer" device that fits inside the 3D-printed valve model and expands and contracts to determine what size artificial valve would best fit each patient. They then wrapped the sizer with a thin layer of pressure-sensing film to map the pressure between the sizer and the 3D-printed valves and their associated calcified deposits, while gradually expanding the sizer.

"We discovered that the size and the location of the calcified deposits on the leaflets have a big impact on how well an artificial valve will fit into a calcified one," said Hosny, who is currently at the Dana-Farber Cancer Institute. "Sometimes, there was just no way a TAVR valve would fully seal a calcified valve, and those patients could actually be better off getting open-heart surgery to obtain a better-fitting result."

In addition, the multi-material design of the 3D-printed valve models, which incorporate flexible leaflets and rigid calci-

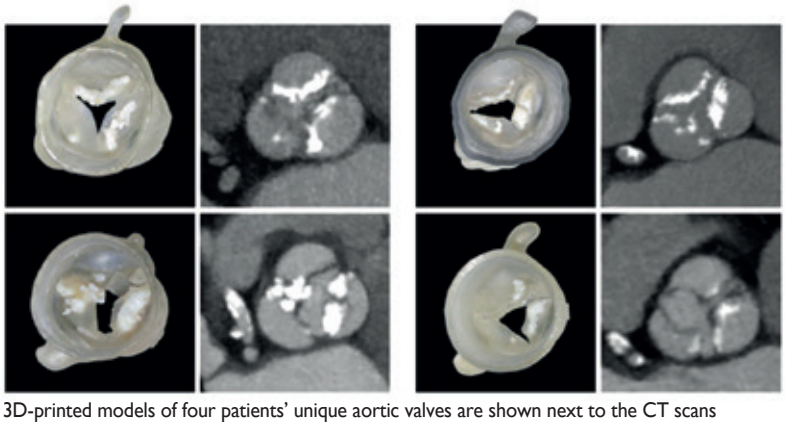
Wyss Institute at Harvard University

CT scans and a custom parametric modelling process were combined to create multi-material physical models of patients' aortic heart valves, each with its own unique size, shape, and amount of calcification.



Wyss Institute at Harvard University

A custom "sizer" device is placed inside each 3D-printed heart valve model and gradually expanded until the proper fit is achieved.



Wyss Institute at Harvard University

3D-printed models of four patients' unique aortic valves are shown next to the CT scans from which they were created (calcified deposits are shown in white).

fied deposits into a fully integrated shape, could much more accurately mimic the behaviour of real heart valves during artificial valve deployment, as well as provide haptic feedback as the sizer is expanded.

The team tested their system against data from 30 patients who had already undergone TAVR procedures, 15 of whom had developed leaks from valves that were too small. The researchers predicted, based on how well the sizer fit into the 3D printed models of their aortic valves, what size valve each patient should have received, and whether they would experience leaks after the procedure. The system was able to successfully predict leak outcome in 60-73% of the patients (depending on the type of valve the patient had received), and determined that 60% of the patients had received the appropriate size of valve.

"Being able to identify intermediate- and low-risk patients whose heart valve anatomy gives them a higher probability of complications from TAVR is critical, and we've never had a non-invasive way to accurately determine that before," said co-author Beth Ripley, M.D., Ph.D, an Assistant Professor in the Department of Radiology at the University of Washington who was a Cardiovascular Imaging Fellow at Brigham and Women's Hospital when the study was done.

"Those patients might be better served by surgery, as the risks of an imperfect TAVR result might outweigh its benefits." Additionally, being able to physically simulate the procedure might inform future iterations of valve designs and deployment approaches.

3D printing protocol freely available

The team has made their leaflet modelling software and 3D printing protocol freely available online for researchers or clinicians who wish to use them. They hope their project will serve as a springboard for evolvable biomedical design that keeps pace with the market's state of the art.

"At the core of the personalized medicine challenge is the realization that one medical treatment will not serve all patients equally well, and that therapies should be tailored to the individual," said Wyss Institute Founding Director Donald Ingber, M.D., Ph.D., who is also the Judah Folkman Professor of Vascular Biology at Harvard Medical School and the Vascular Biology Program at Boston Children's Hospital, as well as Professor of Bioengineering at Harvard's School of Engineering and Applied Sciences. "This principle applies to medical devices as well as drugs, and it is exciting to see how our community is innovating in this space and attempting to translate new personalized approaches from the lab and into the clinic."

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- **doi**: 10.1016/j.jcct.2018.09.007

WISH 2018 lights the lamp for nurses as leaders

It is over a century since Florence Nightingale passed away peacefully at the age of 90, with her reputation as the founder of modern nursing eternally secured.

The healthcare sector of the 21st Century is one that 'the Lady with the Lamp' would barely recognize. Advancements in technology have revolutionized diagnostic capability, immeasurably improved treatment strategies, and – the ultimate goal of the medical profession – extended life expectancy rates the world over.

And yet, the role of the nursing profession in instigating this medical miracle has all too often been overlooked. Nightingale came to prominence in the mid-19th Century as a beacon of hope for soldiers injured in The Crimea War, and warned at the time: "Unless we are making progress in our nursing every year, every month, every week, take my word for it – we are going back."

Her prescient comments echo down the ages and could be seen as a call to action for delegates at the World Innovation Summit for Health (WISH) 2018, which took place in Doha recently.

WISH is a global healthcare community dedicated to capturing and disseminating the best evidence-based ideas and practices. It is an initiative of Qatar Foundation for Education, Science and Community Development (QF) and is under the patronage of Her Highness Sheikha Moza bint Nasser, its Chairperson.

'Nursing and Universal Healthcare Coverage' was one of the nine themes on the agenda at WISH 2018. Global experts assembled at the summit engaged in animated discussions on how to increase the profile of the nursing profession, and ways to convert nurses into healthcare leaders.

"Nurses have a unique perspective when it comes to observing advancements in medical treatment, and in providing dedicated care to those who are suffering," said Sultana Afdhal, CEO, WISH. "It is therefore crucial that the healthcare sector capitalizes on this unrivalled knowledge and develops pathways for nursing professionals to become leaders in the field."

The issue of gender imbalance within the healthcare profession was a central element of discussions at WISH 2018 – particularly in regard to ways to influence perceptions of nursing.

"Currently, although women make up the majority of the workforce in the healthcare sector, only 19% of hospital CEOs are female, and only four% head up healthcare companies," Afdhal said, quoting the *State of Women in Healthcare* report, produced

Panellists discuss the role of nurses at the WISH 2018 summit in Doha.

by Rock Health in 2013. "So, why does the glass ceiling still exist in the 21st Century, and how can we overcome it? This will be a challenging task, but an achievable one if all stakeholders join efforts."

According to a 2017 survey conducted by Rock Health of over 300 women in the healthcare industry, nearly half (45.4%) of respondents believe it will take 25 or more years until gender parity is achieved in the workplace, while only 7.5% say it will happen in the next five years. Worryingly, 16.1% of those surveyed predict that gender parity will never be accomplished.

WISH Women's Circle

This year's summit attempted to address these concerns through the formation of the WISH Women's Circle. Comprising female CEOs and industry leaders, the forum has been assembled to promote the advancement of women in healthcare leadership roles – and nursing is a key area of focus.

"Gender imbalance is clearly a serious issue within the medical profession, and, in many ways, it is aggravated by the traditional viewpoint that doctors should be male and nurses should be female," said Afdhal. "Part of the mission of the WISH Women's Circle – and other initiatives at this year's summit – is to expose this perception as a myth."

On a global level, only around 10% of nurses are male, although there are exceptions – Iran, for example, where the figure is closer to 25%. WISH 2018 attempted to assess the reasons for such a disparity through a discussion entitled: 'What can be done about the lack of men in nursing globally?'

According to moderator Steve Ford, editor of *Nursing Times*, gender disparity in nursing is indicative of societal attitudes that have not moved with the times. "In an era when women are at the forefront of discovery, innovation, and leadership, the nursing profession has been slow to embrace gender equality," said Ford. "And, while there are signs that attitudes are changing, our panellists agree that more needs to be done to increase male representation in what is an extremely rewarding profession and – by extension – to facilitate the transition of women from nurses to industry leaders."

Lord Nigel Crisp chaired the Research Forum on Nursing and Universal Healthcare at WISH 2018. He believes that wholesale improvements are required within the industry, together with a holistic approach, in order to alter perceptions of the nursing profession.

"Investment is needed in nursing and midwifery, as well as effective legislation, regulation, education, and employment practices," he said. "There also needs to be a fundamental shift in policy at a global level to recognize what nurses and midwives can achieve if enabled to do so."

Young Innovators

Despite the challenges facing the nursing profession, WISH 2018 also highlighted inspirational stories of progress within the sector. The summit's 'Young Innovators' exhibition featured 10 potentially groundbreaking healthcare inventions, and the creative young minds behind them. They include Dalal Al Sharshani and Munira Aden, nurses in Qatar's health system who have created a practical application to improve patient experience. Their 'iCommunicate' invention looks set to remove language barriers between hospital staff and patients.

Al Sharshani said: "In hospitals, language barriers can cause misunderstandings between patients and nurses, negatively affecting the patient outcomes and quality of care delivery. That's why we created these communication cards."

WISH, alongside other healthcare stakeholders, is working tirelessly to promote the nursing profession in Qatar. One of its major priorities is to increase the number of local residents choosing nursing as a vocation. There is a recognition that part of this process involves influencing societal attitudes.

Enaam al Naimi is a nurse leader at Hamad Medical Corporation, and is an inspirational figure who has demonstrated that career advancement is possible within the nursing industry. And yet, when she was starting out, Enaam had to overcome the reservations of her family before embarking on this path.

"At first, my family did not accept my profession," she recalled. "But over time, when they saw my work and how important it is, they became proud that I had become a nurse.

"I chose this profession out of love and conviction, as it enables you to contribute to healing patients and sympathize with them. It is a career through which you can give and help people. I hope nursing will receive more attention, with more Qatari men and women choosing nursing as a profession.

"I am proud of the nurses working in the emergency room, as they are able to meet challenges they face with patience, commitment, and determination. My one wish is for nurses around the world to be recognized for their skills, valued for their compassion, and given a chance to lead."

It is a wish that Florence Nightingale, the Lady with the Lamp, would doubtless have shared. MEH

Histology in 3D: New staining method enables Nano-CT imaging of tissue samples

To date, examining patient tissue samples has meant cutting them into thin slices for histological analysis. This might now be set to change - thanks to a new staining method devised by an interdisciplinary team from the Technical University of Munich (TUM). This allows specialists to investigate three-dimensional tissue samples using the Nano-CT system also recently developed at TUM.

Tissue sectioning is a routine procedure in hospitals, for instance to investigate tumours. As the name implies, it entails cutting samples of body tissue into thin slices, then staining them and examining them under a microscope. Medical professionals have long dreamt of the possibility of examining the entire, three-dimensional tissue sample and not just the individual slices. The most obvious way forward here lies in computed tomography (CT) scanning – also a standard method used in everyday clinical workflows.

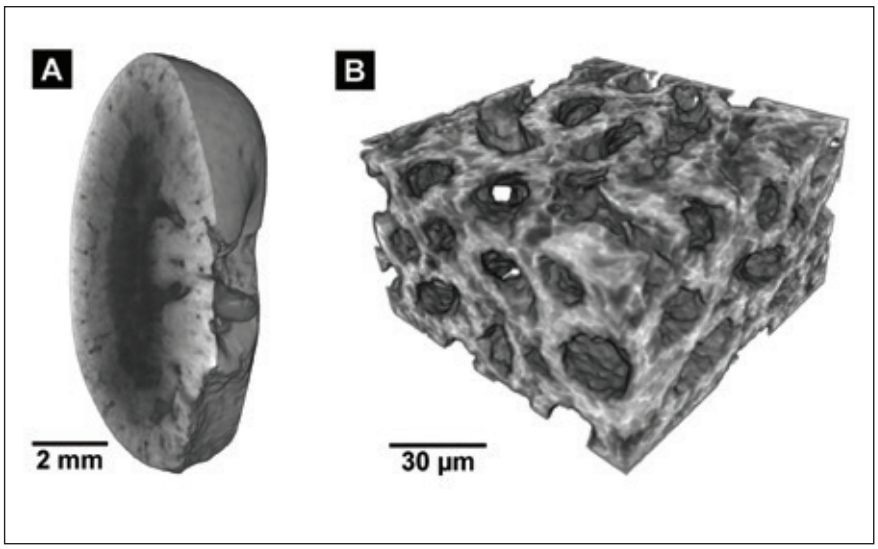

image: Müller, Pfeiffer / TUM / reproduced with permission from PNAS

Left: Micro-CT image of a mouse kidney, right: Nano-CT image of the same tissue. Both, the staining method that made these images possible and the Nano-CT device were developed at the Technical University of Munich (TUM) and first described in PNAS.

Previous limitations in resolution and contrast

Thus far, there have been two major hurdles to the realization of this goal. Firstly, the resolution of conventional CT scanners is too low. Today's Micro- and Nano-CT systems are rarely suitable for use in frontline medicine. Some do not offer sufficiently high resolution, while others rely on radiation from large particle accelerators.

Secondly, soft tissue is notoriously difficult to examine using CT equipment. Samples have to be stained to render them visible in the first place. Stains for CT scanning are sometimes highly toxic, and they are also extremely time-consuming to apply. At times they modify the tissue to such an extent that further analysis is then impossible.

Successful collaboration between physics, chemistry and medicine

Now, however, scientists at TUM's Munich School of BioEngineering (MSB) have solved both problems. In November 2017, Professor Franz Pfeiffer and his team unveiled a Nano-CT system that delivers resolutions of up to 100 nanometers and is suitable for use in typical laboratory settings. Reported in PNAS, the cross-disciplinary research team from physics, chemistry and medicine also presents a staining method for histological examination with Nano-CT.

Compatibility with conventional methods

Using a mouse kidney, the scientists have successfully demonstrated that Nano-CT is able to generate 3D images that match the information granularity of tissue sections. At the core of the staining method lies eosin, a standard dye used in tissue sampling that was previously considered unsuitable for CT.

"Our approach included developing a special pre-treatment so that we can use eosin anyway," outlines chemist Dr Madleen Busse. The staining method is so time-efficient that it is also suited to everyday clinical workflows. "Another important benefit is that there are no problems using established methods to examine the tissue sample following the scan," adds Busse.

Enhancement rather than replacement

In the next step, the researchers are looking to examine human tissue samples. However, CT histology is not set to replace conventional methods any time soon. For the moment, at least, the team views the new procedure as supplementary - for instance giving doctors additional insights into the three-dimensional distribution of cells and nuclei. Franz Pfeiffer also sees new opportunities here for basic medical research: "Alongside diagnostic applications, the non-destructive 3D examination enabled by Nano-CT could deliver new insights into the microscopic origins of widespread diseases such as cancer."

- **doi**: 10.1073/pnas.1720862115
- **doi**: 10.1073/pnas.1710742114

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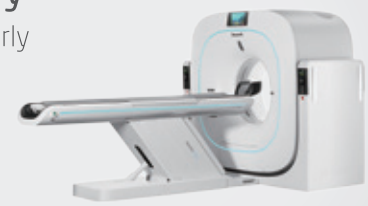

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Siemens introduces AI-Rad Companion Chest CT as first application based on its new AI-Rad Companion platform

Siemens Healthineers has introduced AI-Rad Companion Chest CT, a software assistant that brings artificial intelligence (AI) to computed tomography (CT). The intelligent software assistant can identify organs and potentially disease-relevant changes. It is designed to help radiologists interpret images faster and more accurately, and to reduce the time involved in documenting results.

Teams of Siemens Healthineers scientists trained the underlying algorithms based on extensive clinical datasets. Using CT images of the chest, the software can differentiate between the various structures of the chest, highlight them individually, and mark and measure potential abnormalities. This applies equally to organs such as the heart and lungs, the aorta and the vertebral bodies. The software automatically turns the findings into a quantitative report.

AI-Rad Companion Chest CT is the first application based on the new AI-Rad Companion platform. Being at the forefront of digitalization and AI, Siemens Healthineers will provide further intelligent assistants on its AI-Rad Companion to support healthcare providers' transformation towards value-based healthcare.

"AI-Rad Companion Chest CT is a tool that can actually simultaneously increase productivity and quality in diagnostic radiology," said André Hartung, Head of Computed Tomography at Siemens Healthineers. "The intelligent assistant also alerts physicians to potentially disease-relevant changes that would otherwise have been missed because they were not the focus of the original examination. This means that – while also considering the patient's clinical symptoms, of course – physicians can make faster, more accurate, and more comprehensive diagnoses."

"For 20 years now, Siemens Healthineers has been a pioneer in developing applications based on artificial intelligence. One of the goals we have for our intelligent digital companions is that they'll help healthcare providers overcome the challenge of rising patient numbers coupled with shortfalls in staff," said Yan Beynon, Head of Digital Services at Siemens Healthineers. "Artificial intelligence won't replace radiologists. It will relieve them of routine tasks and can thereby increase the efficiency and quality of diagnostic imaging processes."

Experts not keeping pace

In many countries, the number of radiological examinations is constantly growing, but the number of experts is not keeping pace. As a result, it is not uncommon for radiologists to conduct as many as 100 examinations in a day. This means that they interpret a new clinical image every three to four seconds – for eight hours a day and more. CT examinations of the thorax are common procedures in daily clinical practice. For radiologists, this means more examinations in a limited amount of time and usually for low reimbursement rates.

In radiology, examinations of the chest, a region containing multiple organs, are also challenging because the images display a wide variety of information. Radiologists mainly assess images regarding the primary indication – in other words, the possible disease – which was the reason for performing the CT scan. By contrast, ▶

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the algorithms in AI-Rad Companion Chest CT pay equal attention to all areas of the chest and can mark abnormalities in places that the radiologist might not consider so closely. The software assistant generates standardized, reproducible, and quantitative reports based on the AI-supported analysis.

AI-Rad Companion Chest CT currently supports a variety of tasks, such as identifying lung lesions and calculating cardiovascular risk based on an analysis of coronary artery calcification on non-ECG-triggered CT images. A study in collaboration with the Medical University of South Carolina (MUSC) has also shown that AI-Rad Companion Chest CT can segment and measure the diameter of the aorta, an important parameter for potential aneurysms. AI-Rad Companion Chest CT also examines the spine in the patient's chest region. It detects and segments the individual vertebrae, labels and analyses them for bone density and possible fractures. This can be helpful for detecting osteoporotic changes at an early stage.

AI-Rad Companion Chest CT is a cloud-based solution and uses certified, secure teamplay infrastructure that complies with the Health Information Portability and Accountability Act (HIPAA) in the U.S., and with the General Data Protection Regulation (GDPR) in the EU. The software integrates seamlessly into existing clinical workflows and conforms to Digital Imaging and Communications in Medicine (DICOM) standards. The images and all supporting information can be made automatically available in the PACS in line with the radiologist's individual requirements. The solution is particularly helpful for time-consuming, basic, and repetitive tasks.

AI-Rad Companion Chest CT is vendor-neutral, can analyze image data from all CT manufacturers and should be available in multiple markets, including the U.S. and Europe, from spring 2019. MEH

Post-mortem CT angiography illuminates causes of death

CT angiography is a useful adjunct to autopsy that is likely to increase the quality of post-mortem diagnosis, according to a study appearing online in the journal *Radiology*. Researchers said the findings could have important implications for criminal investigations and hospital quality control efforts.

High-quality post-mortem investigations are vital for a number of reasons; most notably, as evidence in criminal investigations for which the body represents the main proof of a crime, and as a quality control measure for surgical interventions and medical treatment at hospitals.

Modern imaging techniques like CT and MRI are often used in forensic pathology. However, post-mortem CT is limited by relatively low soft tissue contrast and poor visualization of the vascular system. A technique known as post-mortem CT angiography, or PMCTA, was developed to address those limitations by introducing contrast agent into the body.

"The idea of the PMCTA is to simulate a post-mortem circulation by establishing a post-mortem perfusion of the vascular system," said study lead author Silke Grabherr, M.D., Ph.D., from the University Center of Legal Medicine Lausanne-Geneva in Lausanne, Switzerland. "Therefore, the heart is 'replaced' by a perfusion device, similar to the heart-lung machine that replaces the heart during heart surgery."

To assess the performance of PMCTA, Dr. Grabherr and colleagues at nine centres in Europe performed conventional autopsies on 500 human bodies that had undergone PMCTA. All CT images were read by an experienced team including one forensic pathologist and one radiologist who were blinded to the autopsy findings.

Autopsy was performed on the day of the PMCTA, or the following day, in all cases. After examination of 500 bodies, a total of 18,654 findings were recorded.

PMCTA performed surprisingly well compared to conventional autopsy. Out of 18,654 total findings, PMCTA found 90%, compared with 61% for autopsies. PMCTA missed only 10% of forensically essential findings, while autopsy missed 23%.

"This method could – in many cases – be an alternative to invasive autopsy if such an opening of the body is not possible," Dr Grabherr said. "This offers new investigation possibilities, for example, in countries where a conventional autopsy is not accepted or in cases where family members can refuse it."

PMCTA was significantly superior to autopsy at identifying skeletal and vascular lesions, or areas of damage in the bones and blood vessels. PMCTA identified 96% of skeletal lesions and 94% of vascular lesions, compared with 65% for autopsy. These lesions can provide important information in post-mortem examinations, Dr Grabherr said.

"The combination of bone lesions and vascular lesions is especially seen in cases of traumatic death, such as falls from height, traffic accidents, ballistic trauma and sharp trauma in homicides and suicides," she said. "This means that PMCTA is an excellent choice to investigate such cases and can be used combined with or even independently of conventional autopsy for investigating in these cases."

In the future, the research group plans to study the combination of post-mortem angiography with MRI in order to increase the sensitivity of findings related to organs like the brain and liver. MEH

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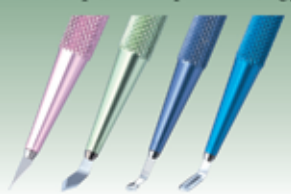

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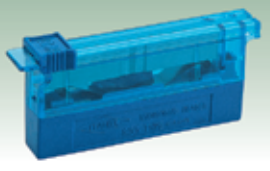

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PSMA PET/CT visualizes prostate cancer recurrence early, impacts radiation therapy

A nuclear medicine scan may locate prostate cancer recurrence after radical prostatectomy early after disease recurrence and could help guide salvage radiotherapy, according to new research from the University of California Los Angeles (UCLA). The study, which utilizes PET/CT with gallium-68 prostate-specific membrane antigen (68Ga-PSMA-11).

Prostate cancer biochemical recurrence occurs in 20% to 80% of patients within 10 years after radical prostatectomy and is difficult to treat. Salvage radiotherapy is the main option for treatment, but the imaging modalities currently used are not sensitive enough to identify the location of recurrence until it is too late, leading to a "best-guess" approach for targeting the radiotherapy.

"Based on European data, we believe that PSMA PET/CT, an imaging technique that is not yet approved by the US FDA, is sufficiently sensitive to detect and localize the recurrent prostate cancer early enough to potentially guide salvage radiotherapy," said Jeremie Calais, MD, at UCLA. "The first sign of prostate cancer recurrence is a rising PSA. For salvage radiotherapy to be successful, it should be initiated before the PSA rises above 1 ng/mL, and ideally, closer to 0.2 ng/mL or lower."

The study included 270 well-documented patients from databases established at four institutions (UCLA and three in Germany: Technical University of Munich, Ludwig-Maximilians-University of Munich, and University of Essen). All patients had a biochemical recurrence of prostate cancer after radical prostatectomy but had not received prior radiotherapy. They underwent PSMA PET/CT at a serum PSA level of less than 1 ng/ml.

Nearly half (132 patients or 49%) had a positive PSMA PET/CT, and 52 (19%) had at least one PSMA-positive lesion that was not covered by the consensus clinical target volume (CTV). The two most common PSMA PET-positive lesion locations outside the consensus radiation fields were bone (23/52, 44%) and perirectal lymph nodes (16/52, 31%).

Calais pointed out: "Salvage radiotherapy is only curative if recurrent disease is completely encompassed by the radiotherapy fields. Therefore, in almost 20 percent of these patients, the addition of PSMA PET/CT would have a potentially major impact on the outcome of salvage radiotherapy."

He added: "Visualizing sites of prostate cancer recurrence accurately, and early enough to guide therapy, enables truly precision radiation therapy. This is, in fact, the definition of individualized medicine. We believe that PSMA PET/CT imaging will ultimately be incorporated into the standard of care for prostate cancer patients with biochemical recurrence."

Toward that end, the suggested next step is a randomized imaging trial of salvage radiotherapy with or without PSMA PET/CT to investigate further its potential beneficial impact on treatment outcome. MEH

Researchers identify method to overcome false positives in CT imaging for lung cancer

A team of researchers including investigators from Mayo Clinic has identified a technology to address the problem of false positives in CT-based lung cancer screening. The team's findings are published in *PLOS One*.

"As physicians, one of the most challenging problems in screening patients for lung cancer is that the vast majority of the detected pulmonary nodules are not cancer," said Tobias Peikert, M.D., a pulmonologist at Mayo Clinic. "Even in individuals who are at high risk for lung cancer, up to 96% of nodules are not cancer."

Dr Peikert said false-positive test results cause significant patient anxiety and often lead to unnecessary additional testing, including surgery. "False-positive lung cancer screening results also increase health care costs and may lead to unintentional physician-caused injury and mortality," Dr Peikert said.

To address the problem of false positives in lung cancer screening Dr Peikert and Fabien Maldonado, M.D., from Vanderbilt University, along with their collaborators used a radiomics approach to analyze the CT images of all lung cancers diagnosed as part of the National Lung Cancer Screening Trial. Radiomics is a field of medicine that involves extracting large amounts of quantitative data from medical images and using computer programs to identify disease characteristics that cannot be seen by the naked eye.

Researchers tested a set of 57 variables for volume, nodule density, shape, nodule surface characteristics and texture of the surrounding lung tissue. They identified eight variables which enabled them to distinguish a benign nodule from a cancerous nodule. None of the eight variables were directly linked to nodule size and the researchers did not include any demographic variables such as age, smoking status and prior cancer history as part of their testing.

Dr Peikert said that while the technology looks very promising and has the potential to change the way physicians evaluate incidentally detected lung nodules, it still requires additional validation. MEH

Mayo Clinic again ranked No. 1 hospital in the U.S.

Mayo Clinic in Rochester, Minnesota, was again named the best hospital in the United States in *U.S. News & World Report's* 2018-19 Best Hospitals. Mayo Clinic also ranked No. 1 in more specialties than any other hospital in the country.

Mayo Clinic has always ranked at or near the top of the annual "Best Hospitals Honor Roll". Mayo Clinic in Arizona, Florida and Minnesota was also ranked No. 1 within those states.

Mayo Clinic is part of a select group of hospitals recognized on the "Best Hospitals Honor Roll" for "breadth of excellence", according to *U.S. News & World Report*. The honor roll consists of 20 hospitals with the highest combined overall scores in 16 medical and surgical specialties.

Mayo Clinic ranks first, second or third in 11 specialties, including No. 1 rankings in six specialties:

- Diabetes and Endocrinology
- Gastroenterology and Gastrointestinal Surgery
- Geriatrics
- Gynecology
- Nephrology
- Neurology and Neurosurgery

Mayo Clinic ranked No. 2 in four specialties – Cardiology and Heart Surgery, Orthopedics, Pulmonology and Urology (two-way tie). It ranked No. 3 in Cancer.

Specialties are measured for various factors, including mortality index, patient safety, nurse staffing and Magnet status (the gold standard in nursing), patient services, technology and reputation. Mayo Clinic staff work to deliver the highest standards of care and transform scientific discoveries into clinical advances that help people everywhere.

"We are humbled and honored by our ranking with *U.S. News & World Report*," said Gianrico Farrugia, M.D., president and CEO, Mayo Clinic. "We have continuously refined our system of care for more than 150 years. We are always working to deliver accurate answers as quickly as possible and ensure the best outcomes for our patients."

Mayo Clinic's commitment to quality dates back more than 150 years to when the Mayo brothers invented the team-based approach to medicine – an approach that continuously evolves and improves. Mayo Clinic's physicians are salaried to eliminate any financial pressure from patient care decisions. Mayo Clinic's experts work across specialties to provide comprehensive and coordinated care for patients.

"Our top ranking is only possible because of our talented staff," Dr. Farrugia said. "Mayo Clinic's emphasis on collaboration and teamwork allows us to bring the full spectrum of our knowledge and expertise together to focus on the individual needs of each patient."

Mayo Clinic is a global destination for patients with serious and complex conditions. More than 1.3 million people from about 140 countries turn to Mayo Clinic for diagnosis and treatment each year.

"Our primary value is that the needs of the patient come first. We take that value and we embed it in everything we do," Dr. Farrugia said.

Many outside agencies rate quality in health care. Mayo Clinic is the only health care organization that consistently ranks among the top providers nationwide regardless of the quality measure used.

■ For more information or to make an appointment, visit *mayoclinic.org* or *mayoclinic.org/arabic*. MEH

Brainlab uses AI and 3D visualization to enhance surgical treatment

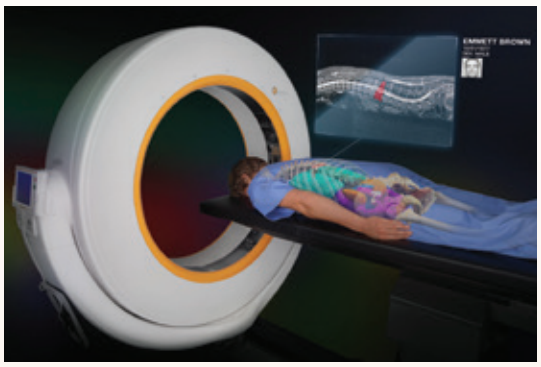
Brainlab has been at the forefront of digital surgery for nearly 30 years with technology to enhance anatomical image data and to utilize it during surgical navigation. It is now looking to the future and embracing 3D visualisation technology and artificial intelligence to improve surgery in a profound way.

No other field generates as much data as medicine. Because of this medicine has the potential to benefit significantly with the use of artificial intelligence (AI) in the interpretation and use of this data.

In its scope and versatility, this data represents a large growth potential for health care. The information can be used to develop individualized treatments, optimized medication plans and more efficient operations. Treatment costs can thus be reduced, drugs can become more effective, and surgical procedures safer and gentler. The collection and correlation of this data forms the basis for achieving these goals. Digitalization, cloud computing and, consequently, artificial intelligence, are key technologies to improve the quality of healthcare while reducing costs.

Brainlab's software recognizes the location, structure of organs and tissue types on medical image data. It is capable of automatically and completely segmenting patient anatomy using artificial intelligence and machine learning.

In addition to image data, Brainlab technology also makes it possible to capture the position and movement of instruments during an operation. By recording such data it will be possible, for example, to check a surgeon's patterns of action and to investigate the results of interventions with regard to optimization potential, risks and sources of error. With this information, more efficient and individualized treatments for patients can be developed.



Mixed Reality in the operating theatre of the future

Mixed Reality

Brainlab is collaborating with Magic Leap to integrate digitized medical data into a mixed reality (MR) headset. This technology allows one to 'experience' abstract data – and opens up information technology with completely new user guidance concepts for a broader target group.

For example, anatomical structures, such as a tumour that surgeons plan to remove, can be displayed virtually in 3D using the MR headset. Surgeons can then virtually walk around the object, view structures and assess risks for surrounding tissue from all sides, in order to plan and perform operations more precisely.

These developments are becoming a reality by integrating Brainlab's anatomical mapping and intelligent viewing algorithms which are accessible through their digital OR.

Stereotactic radiosurgery

Brainlab is a key player in the field of precision radiotherapy and stereotactic radiosurgery (SRS). Algorithms for SRS automatically create plans for complex cranial indications without compromising treatment quality. For example, with Brainlab's software for multiple brain metastases treatment planning, it has become possible to treat multiple metastases in the same amount of time with the same effort than what it would take to treat one with traditional treatment methods.

Clinicians can also gain insight into post-treatment tumour characteristics with help from Brainlab software. Algorithms are used to analyze the contrast clearance in a series of MR images, differentiating between regions of high and low vascular activity within the brain, to support clinical decision-making and ongoing assessment of patients.

Novalis Certified

Consistency of treatments is a cornerstone of the Brainlab vision. To support this, Brainlab initiated the Novalis Certified program designed to ensure radiosurgery programs remain safe and efficient as treatments become increasingly more sophisticated. Hospitals receive certification after successfully undergoing an external audit conducted by the independent Novalis Circle expert group.

SRS Registry

Brainlab supports the statistical mining of data with the SRS Registry. In partnership with the American Society for Radiation Oncology (ASTRO) and the American Association of Neurological Surgeons (AANS), the Registry aims to not only create benchmarks in radiosurgery, but also the use of statistical data to drive future decisions and the evolution of care. MEH

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Cancer burden rises to 18.1 million new cases and 9.6 million deaths

The global cancer burden is estimated to have risen to 18.1 million new cases and 9.6 million deaths in 2018, according to The International Agency for Research on Cancer (IARC). One in 5 men and one in 6 women worldwide develop cancer during their lifetime, and one in 8 men and one in 11 women die from the disease. Worldwide, the total number of people who are alive within 5 years of a cancer diagnosis, called the 5-year prevalence, is estimated to be 43.8 million.

The International Agency for Research on Cancer (IARC) in September released the latest estimates on the global burden of cancer. The GLOBOCAN 2018 database, accessible online as part of the IARC Global Cancer Observatory, provides estimates of incidence and mortality in 185 countries for 36 types of cancer and for all cancer sites combined. An analysis of these results, published in *CA: A Cancer Journal for Clinicians*, highlights the large geographical diversity in cancer occurrence and the variations in the magnitude and profile of the disease between and within world regions.

The increasing cancer burden is due to several factors, including population growth and ageing as well as the changing prevalence of certain causes of cancer linked to social and economic development. This is particularly true in rapidly growing economies, where a shift is observed from cancers related to poverty and infections to cancers associated with lifestyles more typical of industrialized countries.

Effective prevention efforts may explain the observed decrease in incidence rates for some cancers, such as lung cancer (e.g. in men in Northern Europe and North America) and cervical cancer (e.g. in most regions apart from Sub-Saharan Africa). However, the new data show that most countries are still faced with an increase in the absolute number of cases being diagnosed and requiring treatment and care.

Global patterns show that for men and women combined, nearly half of the new cases and more than half of the cancer deaths worldwide in 2018 are estimated to occur in Asia, in part because the region has nearly 60% of the global population.

Europe accounts for 23.4% of the global cancer cases and 20.3% of the cancer deaths, although it has only 9.0% of the global population. The Americas have 13.3% of the global population and account for 21.0% of incidence and 14.4% of mortality worldwide. In contrast to other world regions, the proportions of cancer deaths in Asia and in Africa (57.3% and 7.3%, respectively) are higher than the proportions of incident cases (48.4% and 5.8%, respectively), because these regions have a higher frequency of certain cancer types associated with poorer prognosis and higher mortality rates, in addition to limited access to timely diagnosis and treatment in many countries.

Major cancer types in 2018

Cancers of the lung, female breast, and colorectum are the top three cancer types in terms of incidence, and are ranked within the top five in terms of mortality (first, fifth, and second, respectively). Together, these three cancer types are responsible for one third of the cancer incidence and mortality burden worldwide.

Cancers of the lung and female breast are the leading types worldwide in terms of the number of new cases; for each of these types, approximately 2.1 million diagnoses are estimated in 2018, contributing about 11.6% of the total cancer incidence burden. Colorectal cancer (1.8 million cases, 10.2% of the total) is the third most commonly diagnosed cancer, prostate cancer is the fourth (1.3 million cases, 7.1%), and stomach cancer is the fifth (1.0 million cases, 5.7%).

Lung cancer is also responsible for the largest number of deaths (1.8 million deaths, 18.4% of the total), because of the poor prognosis for this cancer worldwide, followed by colorectal cancer (881,000 deaths, 9.2%), stomach cancer (783 000 deaths, 8.2%), and liver cancer (782,000 deaths, 8.2%). Female breast cancer ranks as the fifth leading cause of death (627,000 deaths, 6.6%) because the prognosis is relatively favourable, at least in more developed countries.

Global patterns by level of human development

For many cancers, overall incidence rates in countries with high or very high HDI[1] are generally 2–3 times those in countries with low or medium HDI. However, the differences in mortality rates between these two categories of countries are smaller, on the one hand because lower-HDI countries have a higher frequency of certain cancer types associated with poorer survival, and on the other hand because access to timely diagnosis and effective treatment is less common. In men, lung cancer ranks first and prostate cancer second in incidence in both developed and developing countries. In women, incidence rates for breast cancer far exceed those for other cancers in both developed and developing countries, followed by colorectal cancer in developed countries and cervical cancer in developing countries.

Global cancer patterns by sex

Lung cancer is the most commonly diag-

Worrying rise in lung cancer in women

Lung cancer is a leading cause of death in both men and women and is the leading cause of cancer death in women in 28 countries. The highest incidence rates in women are seen in North America, Northern and Western Europe (notably in Denmark and The Netherlands), China, and Australia and New Zealand, with Hungary topping the list.

"Best practice measures embedded in the WHO Framework Convention on Tobacco Control have effectively reduced active smoking and prevented involuntary exposure to tobacco smoke in many countries," says Dr Freddie Bray, Head of the Section of Cancer Surveillance at IARC. "However, given that the tobacco epidemic is at different stages in different regions and in men and women, the results highlight the need to continue to put in place targeted and effective tobacco control policies in every country of the world."

nosed cancer in men (14.5% of the total cases in men and 8.4% in women) and the leading cause of cancer death in men (22.0%, i.e. about one in 5 of all cancer deaths). In men, this is followed by prostate cancer (13.5%) and colorectal cancer (10.9%) for incidence and liver cancer (10.2%) and stomach cancer (9.5%) for mortality. Breast cancer is the most commonly diagnosed cancer in women (24.2%, i.e. about one in 4 of all new cancer cases diagnosed in women worldwide are breast cancer), and the cancer is the most common in 154 of the 185 countries included in GLOBOCAN 2018. Breast cancer is also the leading cause of cancer death in women (15.0%), followed by lung cancer (13.8%) and colorectal cancer (9.5%), which are also the third and second most common types of cancer, respectively; cervical cancer ranks fourth for both incidence (6.6%) and mortality (7.5%).

"These new figures highlight that much remains to be done to address the alarming rise in the cancer burden globally and that prevention has a key role to play," says IARC Director Dr Christopher Wild. "Efficient prevention and early detection policies must be implemented urgently to complement treatments in order to control this devastating disease across the world."

These new figures highlight that much remains to be done to address the alarming rise in the cancer burden globally and that prevention has a key role to play.

In conclusion

In conclusion the report notes: The extraordinary diversity of cancer is captured by the variations in the magnitude and profile of the disease between and within world regions. On one hand, there are specific types of cancer that dominate globally: lung, female breast, and colorectal cancers explain one-third of the cancer incidence and mortality burden worldwide and are the respective top 3 cancers in terms of incidence and within the top 5 in terms of mortality (first, fifth, and second, respectively).

Conversely, 13 different cancers are the most frequent form of cancer diagnosis or death in 1 or more of the countries studied, and 23 individual cancer sites that explain at least 1% each of the global incidence burden explain 90% when combined. The regional variations in common cancer types signal the extent to which societal, economic, and lifestyle changes interplay to differentially impact on the profile of this most complex group of diseases.

Recent studies in high-income countries have indicated that from one-third to two-fifths of new cancer cases could be avoided by eliminating or reducing exposure to known lifestyle and environmental risk factors.77,79,80 Although there are several interventions that have proven to be an effective means of cancer prevention, international efforts to promote and implement primary prevention still lack momentum, and policymakers remain unaware of the degree of progress and the benefits that prevention brings. MEH

on the WEB IARC Global Cancer Observatory
http://gco.iarc.fr

References

[1] The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, education, and a decent standard of living. The two-tier HDI classification is used as a proxy of national social and economic development using fixed cut-off points of HDI to compare countries with high or very high levels of human development with countries with low or medium levels of human development.

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TRANSFORMING HEALTHCARE TAKES MORE THAN TALK. IT TAKES ACTION.

Achieving better patient outcomes while reducing costs is the goal. Let's reach for it together.

Healthcare organizations are privileged to have a shared purpose focused on helping people live longer, healthier lives. At Medtronic, we make it our Mission to alleviate pain, restore health, and extend life. And we see countless opportunities to deliver on our Mission as long as we are driven to improve patient outcomes. While much of the industry's growth has been based on innovative products and services, the biggest area of improvement within reach today is centered on the continued development and implementation of value-based healthcare — which we define as sharing direct accountability for system costs and patient outcomes in our business models. To foster constructive dialogue about how to create a higher performing healthcare system, Medtronic sponsors events that bring together leading policymakers, researchers, providers and health system executives. Working together, they identify solutions and drive consensus for this important transformation.

As an industry, we have been focusing on helping people recover from episodes of illness or injury. However, system-wide changes need to occur to increase the health of patients and systems around the world. Stakeholders have to think bigger than episodic care and focus on value-based initiatives that emphasize managing broader patient populations more effectively. While many governments and payers around the world have begun shifting to value-based healthcare models, central questions remain. How do you define value? How do you expand patient access without compromising quality and escalating costs? How do you balance the immediate costs of treatments with longer-term success rates? These are complex questions without clear answers.

Working closely with key industry players, we have identified these key takeaways:

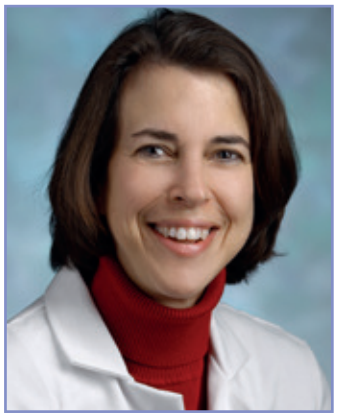
- Successfully creating a program that works depends greatly on the engagement and collaboration with physicians, hospital systems, payers and others. All must be at the table.
- Together, we've seen that if we can continually monitor and measure outcomes, minimize the variance in care pathways, share data and expand access, and we can support the well-being of countless health systems worldwide.

Healthcare systems in the Middle East region are facing challenges due to aging populations and the rise in non-communicable diseases (NCDs). With healthcare costs rising and governments struggling to ensure equitable access to quality health services, how can we work together to come up with new approaches to solve these critical issues?

To effectively treat these conditions and overcome these public health threats, partnerships between public and private stakeholders who have a vested interest in value-based healthcare will be an important part of the solution. In order to pivot successfully, all stakeholders need to understand the expertise others can offer to make quality healthcare sustainable and affordable. Although the focus of healthcare partnerships is on improving access and patient outcomes, these partnerships have additional benefits. Industry partners gain a greater understanding of healthcare systems, improve market access, and strengthen their corporate reputation through working together.

Medtronic

Managing pain: Sickle cell patients need individualized treatment plans



By **Sophie Lanzkron**, M.D., M.H.S.

In every country where I work, I see the same story: A patient walks into an emergency room with excruciating pain, and the provider hesitates to give the proper medication.

Why does this happen repeatedly? No objective test proves a sickle cell patient is in crisis, and the medication used to manage acute pain is often an opioid, which physicians are increasingly reluctant to prescribe.

Sickle cell disease is a genetic disease inherited from the parents that affects the hemoglobin, a protein that carries oxygen throughout the body. The most common complications of sickle cell disease are severe painful events that typically last five days, but can take nine days or longer for patients to feel like themselves again. Patients have described these events as worse than labor pain, worse than passing a renal stone.

Even though we know about the severity of the pain, data show that providers often suspect patients of addiction when they show up in an emergency room seeking treatment for a painful crisis.

Recognizing the need for specialized treatment, The Johns Hopkins Hospital opened the comprehensive Sickle Cell Center for Adults. We offer regularly scheduled outpatient visits, eligibility screening for the drug hydroxyurea, genetic counseling, pain management, education, wound care and social services.

Our approach is successful because we work with each patient to create a specific treatment plan to manage everyday pain, as well as crises.

When I travel to countries with high incidence of sickle cell – such as Bahrain, the Kingdom of Saudi Arabia and Panama – my message remains the same: Sickle cell patients need an individualized treatment plan implemented by a multidisciplinary team of experts. No one protocol will fit all patients.

Saudi Arabia

For the last two-and-a-half years, I've been working with colleagues from Johns Hopkins Aramco Healthcare in Saudi Arabia to start and manage a sickle cell infusion clinic where clinicians provide treatment outside of the emergency department.

Because of the high-prevalence of sickle cell disease there, the long-term vision is to create a center of excellence, a centralized location where people who are struggling with this disease can get high-quality, individualized care.

I believe it is important to educate and empower sickle cell patients everywhere about treating and living with their disease:

Get a specific treatment plan

Patients and providers need to discuss pain management options. There are downsides to every treatment, including curative therapies. The treatment plan must take into account what the patient specifically wants and needs. The plan should also include how to manage the pain when the patient goes to an emergency department.

Update the treatment plan

Physicians need to update patient-specific treatment plans on a routine basis. Let's say a patient has a bad year with multiple crises. The treatment might change for that year. Then comes a good year. It is equally important to readjust the treatment plan then. I don't want patients to stay on the same "bad year" plan because if they go for a prolonged period of time without pain, treating them with the same old plan may cause harm.

Sickle cell patients can have fulfilling lives

Sickle cell is a lifelong struggle, but with the appropriate therapy, patients can thrive. With good, high-quality care, people with sickle cell can grow, learn and work, and lead full and enriching lives.

The author

Sophie Lanzkron, M.D., M.H.S., is the director of the Sickle Cell Center for Adults at the Johns Hopkins Hospital in Baltimore, Maryland, USA, and an associate professor of medicine at the Johns Hopkins University School of Medicine.

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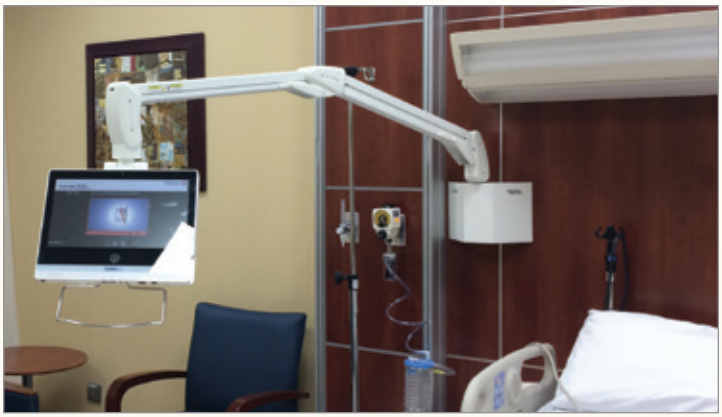
Enhancing the patient's hospital experience

Healthcare is not only about treatment. Nowadays it is becoming increasingly important to take into account the patient experience – how the patient feels during their stay in the hospital.

It has now become essential in any hospital development to build a healthcare environment which connects doctors, nurses, patients and the patient's family.

Advantech understands this and uses healthcare IT to promote the best patient experience possible while taking into consideration that each hospital has its own unique procedures. Advantech does this by working closely with their solution partners including ClinicAll and local system integrators as well as the hospital to develop a solution which best meets the hospital's requirements.

Advantech was recently called on to provide such a solution for one of the largest private hospital groups in Saudi Arabia, with branches in a number of the Gulf countries and plans to expand further across the GCC.



Advantech's solution

Advantech's HIT series bedside terminal incorporates innovative IT software provided by Advantech's clinical solution partners.

The bedside terminal can be integrated with a hospital's Electronic Medical Record as well as the Hospital Information System so that patient info is readily available to doctors and nurses at the patient bedside.

As well as supporting English and Arabic functions, the bedside terminal has a direct media connection enabling the patient to access TV, multimedia and movies. The patient also can access social media, such as Facebook and Instagram, as well as Skype and other communication applications.

The solution also enables patients to enjoy a variety of services, such as e-Service for meal selection as well as healthcare information such as treatment information or healthcare notices.

Furthermore, if there is any urgent request for the patient, a family member also can access the bedside terminal to communicate with the nursing station to get immediate support.

The bedside terminal solution developed collaboratively by Advantech enhances the quality of medical care by providing stable and reliable communications.

Additional features include:

- A variety of different terminal dimensions 10", 15.6", 18.5", 21.5"
- 16:9 widescreen display with multi-touch PCAP control
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- Compatible with Android, Linux, Microsoft operating systems
- Supports counter top, cart, swing arm, and wall-mount bracket
- Medical grade standard EN 60950 & EN 60601-1 approved
- Supports Power over Ethernet (POE)

Future trends

Efficient communication is playing an increasingly important role in patient care and the patient's hospital experience. This will become essential in future. Based on years of experience in the field of patient care, Advantech is well placed to provide this advanced technology.

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

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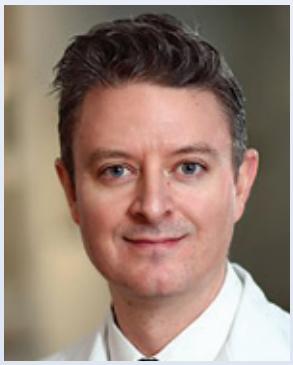
Endoscopic technique allows removal of thyroid and parathyroid with no visible scar

A new procedure that allows surgeons to access and remove the thyroid and parathyroid glands through small incisions on the inside of the mouth provides successful results with no visible scarring on the neck. **Dr. Raymon Grogan**, associate professor in the Michael E. DeBakey Department of Surgery at Baylor College of Medicine, describes how the procedure works and outlines its benefits.

The thyroid gland releases hormones to control metabolism. Parathyroid glands are found next to or behind the thyroid glands and control calcium levels in the blood and bones. If cancer or benign nodules are found, or if these glands become overactive, the affected gland needs to be removed.



Dr. Raymon Grogan, associate professor in the Michael E. DeBakey Department of Surgery at Baylor College of Medicine

Traditionally, surgeons remove the thyroid and parathyroid glands using a small horizontal incision in the center of the neck. The scar size depends on the size of the gland, with the average size being 4 to 6 centimeters long.

The procedure that Dr. Grogan performs, transoral endocrine surgery, applies the same laparoscopic or endoscopic techniques that are used to remove the gall bladder, appendix or colon. Cancers less than 2 centimeters and benign nodules under 6 centimeters can be removed using this procedure. He conducts these surgeries at Baylor St. Luke's Medical Center, where he is section chief of endocrine surgery.

In this procedure, three small incisions are made on the inside of the lower lip. Through these incisions, the surgeon is able to place endoscopic instruments between the jaw and the skin to open up the working space needed to remove the gland, which is a short distance from the incision site. The procedure is performed under general anesthesia and patients are required to stay in the hospital overnight.

Numerous other procedures have been developed to reduce the size of the incision on the neck or to get rid of it entirely.

"This approach is the culmination of work that has been done over the last 20 to 30 years internationally as well as in the United States," Dr. Grogan said.

However, the other 'scarless' procedures that have been tried involve going through the armpit, the hairline in the back of the neck or even the nipples, meaning that the patient would still have a scar, just not on the neck. The transoral endocrine procedure is the only procedure where there are no visible incisions. In addition, with the transoral procedure the lower lip incisions are very close to the target anatomy, so there is minimal increase in dissection relative to the traditional approach. This is in contrast to the other 'scarless' techniques where the incisions are made much further from the target anatomy. This is important since larger dissections can lead to increased pain, complications and recovery time.

The incisions on the inside of the lip are minimally painful, and patients usually take pain medication for a day or two after the surgery before switching to anti-inflammatory medication. Dr. Grogan recommends staying on a liquid diet for the first day after the surgery and then switching to soft foods for the following couple of days.

Patients are encouraged not to drive while they are on pain medication or if they have a stiff neck. They can experience bruising, swelling, tingling and temporary numbness of the lower lip, chin and upper neck, which should only last one to two weeks. Dr. Grogan usually recommends one week off from work after the procedure. The recovery time is similar to the traditional open approach.

As for the risks, published data from a series of cases done internationally has found that the complication rates for this procedure are comparable to the traditional open approach. These known complication risks include injury to the recurrent laryngeal nerve and injury to the parathyroids. There has been one surgical site infection in over 1,500 cases to date. The additional possible risk for this procedure is numbness of the chin or lip, which has been found in 1 in 1,500 of the cases studied in the international population so far. Dr. Grogan said that it is possible that anatomic differences between an American population and the international population could alter that risk profile, therefore more data need to be collected to see how these data in an international population compares to the U.S. population.

■ For more information contact International Services at Baylor St Luke's Medical Center
Via email at: *international@stlukeshealth.org*,
call: +1 832 355 3350
or visit: *StLukesInternational.org*
Texas Medical Center, Houston, Texas - USA

Bringing more world-class healthcare innovations to the 9th edition of MEDICAL FAIR THAILAND as it moves to a bigger venue

Southeast Asia's leading medical and healthcare exhibition, MEDICAL FAIR THAILAND, is set to stage its largest edition to date, as 1,000 exhibitors from 60 countries come together to do business at a new venue next year. For the first time in the exhibition's 15-year history, MEDICAL FAIR THAILAND will take place in the fair grounds of BITEC – a much larger venue and expanded showfloor where more than 10,000 medical and healthcare innovations will be on display.

The 9th edition of MEDICAL FAIR THAILAND, which is organised by one of the region's leading exhibition organisers, Messe Düsseldorf Asia, comes on the back of the highly successful edition of MEDICAL FAIR ASIA which took place in Singapore at Marina Bay Sands, in August last year. The exhibitions are part of the MEDICAlliance global network of trade fairs – sharing the global expertise of MEDICA, REHACARE and COMPAMED – by the Messe Düsseldorf Group in Germany.

MEDICAL FAIR THAILAND 2019 is set against a dynamic marketplace that is the second largest healthcare market in Southeast Asia, and one which is expected to be valued at US$28.5 billion by 2020[1].

The previous edition of MEDICAL FAIR THAILAND in 2017 was a resounding success, as 830 exhibitors from 66 countries welcomed over 9,000 quality trade visitors – with 33 percent coming from outside Thailand. Continuing on this successful path and international reach of MEDICAL FAIR THAILAND, this year's edition of the exhibition will showcase some of the latest and most innovative trends in the market, by way of new highlights such as the Community Care Pavilion and Start-Up Park, further reflecting the changing medical and healthcare landscape.

Highlights at MEDICAL FAIR THAILAND 2019:

- **Community Care Pavilion**

The first-ever Community Care Pavilion at the exhibition, will showcase new technologies and innovations in the areas of remote healthcare monitoring, geriatrics, rehabilitation products, and assistive devices. With the ageing population in Southeast Asia expected to make up 15 per cent of its total population by 2035[2], the innovations in this pavilion will not only address the shifting needs of the market, but also provide patients and end users with targeted and useful products and solutions to enhance and enable a sustainable quality of life.

- **Start-Up Park**

Another highlight on the show floor is the all-new Start-Up Park; a dedicated platform for new and innovative companies to present the latest technologies to potential buyers and investors. With a start-up ecosystem in Southeast Asia estimated to be valued at US$13 billion[3], this represents the region's openness to new ideas and innovative new companies. At the debuting Start-Up Park, medical and healthcare start-up companies with innovations in IoT, from big data, wearable technologies to the latest software, will be able to pitch their technologies and solutions through onsite presentations during the exhibition.

Here are some additional highlights:

- **4th Advanced Rehab Technology Conference (ARTeC)**

With overwhelming response from the industry including physicians and allied healthcare professionals since it was first introduced in 2013, ARTeC will once again co-locate with MEDICAL FAIR THAILAND. Jointly organised by the Royal College of Physiatrists of Thailand, Thai Rehabilitation Medicine Association, and Messe Düsseldorf Asia, the 2-day multi-disciplinary conference centred around the theme of "The Combination of Ultrasonography and Electrodiagnosis: An Innovative Approach to Neuromuscular Disorders", will discuss rehabilitation technology and emerging trends in physical and rehabilitation medicine.

As the Southeast Asian market continues to offer a wide range of business and growth opportunities against its dynamic medical and healthcare landscape, MEDICAL FAIR THAILAND 2019 is the ideal platform for companies to conduct business, network and share best practices. With more companies keen on expanding their foothold into the region, interested exhibitors are encouraged to submit their space application forms early.

- For more information on the exhibition, please visit: *www.medicalfair-thailand.com*

References:

1 Opportunities in Thailand's Healthcare Sector: Business Sweden
2 Share of population older than 65 in Southeast Asia in 2035: Statista
3 A Guide To Southeast Asia's Thriving Startup Ecosystem - Forbes

Infant receives life-changing corneal transplant

Steingrimur Sveinsson – Stoni, for short – was born on December 6, 2017, in Reykjavik, Iceland. Because he hadn't been getting enough nutrition in the womb, the decision was made to perform a C-section at about 27 weeks into his mom's pregnancy.

Shortly after Stoni's birth, "we saw that his eyes were different", says his mom, Tinna Thorvaldsdottir. They appeared clouded over. It was the first clue that would lead to a diagnosis of an exceptionally rare genetic disorder called Peters Plus when Stoni was two months old. According to the U.S. National Library of Medicine, fewer than 80 cases of Peters Plus have been reported worldwide .

"He was the first case in Iceland," says Thorvaldsdottir. "Many, many people examined him." Other indicators of Peters Plus included a cleft palate, and cleft lip. Stoni had surgery to repair his cleft palate in Reykjavik, with surgery for his cleft lip scheduled later, also in Iceland.

The cloudy or opaque cornea, the transparent layer that forms the surface of the eye, causes severely blurred vision that often worsens with time, and about this, Thorvaldsdottir and Stoni's dad, Sveinn Runarsson, were told that nothing could be done. No one they talked with felt comfortable performing such complex operations on such a small baby.

At first, "the news that he would be blind was worse than the news of his diagnosis", says Thorvaldsdottir, but gradually the family began to accept it. However, Stoni's future began to change when his pediatric ophthalmologist reached out to UPMC Children's Hospital of Pittsburgh's Ken Nischal, MD, FRCOphth, chief of the Division of Pediatric Ophthalmology, Strabismus, and Adult Motility.

Dr. Nischal agreed to examine Stoni in London, to which Dr. Nischal returns every three months to see patients, and in June 2018, the family made the trip. When Dr. Nischal met Stoni and his family, he knew

Steingrimur "Stoni" Sveinsson received a life-changing corneal transplant at UPMC Children's Hospital of Pittsburgh.

that he could help, and with the aid of the Icelandic Government, the family flew to the United States in August for a series of surgeries at UPMC Children's Hospital's main campus in Pittsburgh, Pennsylvania.

"We were really lucky to meet Dr. Nischal," says Thorvaldsdottir. "When we met him, we just knew that he was perfect."

The first surgery was on Stoni's left eye. Dr. Nischal made what amounts to a new pupil, cutting out a piece of the cornea to allow light to come in. The clouding in the right eye was more severe, so he performed a corneal transplant, replacing the opaque cornea with a clear one from a donor. Performing a corneal transplant on a baby is quite complex for various reasons in addition to the tiny size, says Dr. Nischal. "You have to have the anesthesia just right; the tissue is different; there's significant post-operative care involved," he says. "Children don't just sit up and open their eyes. You have to be vigilant. One loose suture could cause his body to reject the whole graft."

While never a magic bullet that restores perfect vision, Stoni's surgeries have all the markings of success. "He is completely another child!" says Thorvaldsdottir. "He's

Ken Nischal, MD, FRCOphth, chief of the Division of Pediatric Ophthalmology, Strabismus, and Adult Motility at UPMC Children's Hospital of Pittsburgh

more alert, more confident, he plays with toys. He follows things with his eyes."

"He'll be able to see big letters," says Runarsson, adding that "the left eye is the one he'll go to school with."

Perhaps even more importantly, "the purpose of doing all of this is to promote better global development", says Dr. Nischal, and Stoni looks to be well on his way, with a follow-up visit with Dr. Nischal in London on his schedule, and vigor of his own. "He's very strong," Runarsson says of his son. "Never sick or anything. Viking strong!" MEH

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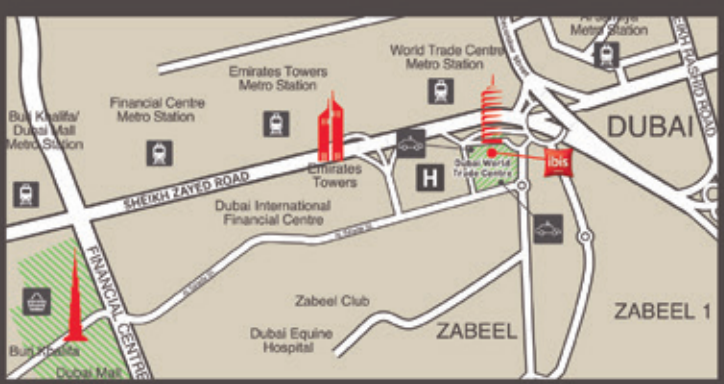

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Gulf Medical University - Medicity

Gulf Medical University's Newly Launched 'College of Healthcare Management and Economics', prepares Future Healthcare Leaders

By **Prof. Hossam Hamdy**,
Chancellor, Gulf Medical University

A unique, specialized college of healthcare management and economics is starting to admit students from the Spring semester 2019. Its main goal is to prepare the graduates to pursue careers in healthcare management, health economics, policy-making and administration in the region and international.

The healthcare sector today is much more advanced and sophisticated than yesteryears, thanks to its continuous innovation and technical advancements, as well as the rising focus on specialized care and patient satisfaction. Present and future healthcare managers and policymakers need specialized education and skills which will help them fulfill their roles in the rapidly changing, highly competitive health industry. It is with this fact in mind that GMU has launched its new College.

The first full-fledged college of its kind in the Middle East region, the college offers bachelors and masters programs designed to respond to the constantly growing health industry. The college has been established in view of the huge expansion of the healthcare industry, in the region and worldwide. According to a 2018 GCC Healthcare Industry Report by Alpen Capital, the current healthcare expenditure in the GCC is projected to reach US$ 104.6 billion in 2022 from an estimated US$ 76.1 billion in 2017. Furthermore, the GCC may require a collective bed capacity of 118,295 by 2022, indicating a demand for 12,358 new beds. To mitigate this demand, 700 new healthcare projects worth US$ 60.9 billion are under various stages of development throughout the GCC. All these signify an increased demand for expert professionals in healthcare management, economics, technology assessment, informatics, medical insurance and medical tourism.

Programs of study

The new college offers two programs.

The Bachelor of Science in Healthcare Management and Economics (BSc. HME) a four-year program designed to graduate professionals with a deep understanding of the healthcare industry, its language and unique culture.

The Executive Master in Healthcare Management and Economics (EMHME) is a 12-month program designed to benefit middle to senior level professionals in the healthcare industry. The program would be highly beneficial for working professionals to improve their career prospects and widen their professional networks.

Why study at GMU?

GMU is a specialized medical University offering the full spectrum of health professions education, including Medicine, Dentistry, Pharmacy etc. and the only University owning a network of teaching hospitals, clinics, pharmacies and diagnostic labs. The students learn in a truly inter-professional atmosphere, experiencing multifaceted interactions within various healthcare systems.

Accreditations & International Collaborations

The college as well as its programs is accredited by the Ministry of Education, UAE. The programs are offered in collaboration with leading international universities, the University of Milan, University of Arizona, American University of Cairo, University of Central Florida, etc. The college is a member of the European Healthcare Management Association, giving it seamless access to the network of faculty and collaborating universities. The faculty for the executive master's program are top academicians and practitioners from renowned international institutions in the US, UK, France and Italy.

Scope & Career Prospects

The College of Healthcare Management & Economics enjoys strong ties with industry partners in the UAE and the GCC, as well as in India, US and Africa. One of the biggest advantages of the programs offered by the college is that the graduates have broad knowledge and skills in management, policy, economics, and in-depth experience in healthcare industry, innovation and informatics. These types of graduates will be highly needed for the healthcare sector and all related future businesses and services. MEH

MULTIVAC's Snapsil packaging

MULTIVAC provides flexible solutions for packing medical products

At Arab Health 2019 Exhibition in Dubai, UAE, MULTIVAC will be presenting an innovative packaging concept for medical and pharmaceutical products, which offers users a novel opening aid for easy product removal. In addition to this, MULTIVAC is also featuring at the exhibition a number of other packaging solutions, which enable medical products to be packed flexibly, efficiently and with a very high level of process reliability.

With Snapsil® MULTIVAC is showing a novel packaging concept for medical and pharmaceutical products, which is ideally suited to packing products such as syringes, tablets, plasters, injectors, catheters etc. With their integrated "snap-opening" function, Snapsil packs offer an innovative opening aid, which enables the packs to be used more easily, even by elderly or disabled persons. Snapsil packs can be produced on MULTIVAC thermoforming packaging machines and traysealers. The solution was developed in conjunction with the Snapsil Corporation.

Along with exhibits of global medical and pharmaceutical products packed by MULTIVAC, MULTIVAC machines will be on display as well. The MULTIVAC Baseline Chamber Machine P300 – a table top machine which can be used for a wide range of consumer products where the products can be packed under vacuum or with modified atmosphere (MAP) with controlled oxygen content, even in small batch sizes. Another machine is the MULTIVAC Thermoforming machine R 085 – an entry-level machine that reliably processes both rigid and flexible films. It features rapid availability and a price/performance ratio that is unique in the market.

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By incorporating a Macintosh blade, i-view can also be used for direct laryngoscopy and the technique for insertion is more familiar and instinctive than for devices with a hyper-angulated blade. Its ergonomic design ensures i-view is easy to use, and the integral LCD screen provides an optimal view in a variety of light conditions.

By combining all the advantages of a fully integrated video laryngoscope in a single-use, disposable product, i-view provides a cost-effective solution. In addition, i-view is ready to use seconds after removing from the packaging.

- For more information, to view the video, download the information sheet or make an enquiry, visit: *www.intersurgical.co.uk/info/iview*

Intersurgical will be exhibiting their full range of respiratory care products in **Hall 7, Stand B50 (UK Pavilion)** at Arab Health.

SensFloor turns ward floors into a large touchpad to track patient movement and enhance patient safety

How can the best professional support for nursing staff be delivered to ensure the best possible care? A German nursing home near Munich has taken this issue to heart by creating a high-tech work environment for its nursing staff.

It is 3am, the sky over Munich is starlit and it is quiet in the nursing home *Wohnen am Schlossanger* – all the residents are asleep. Only the night nurse is awake and works quietly on the PC. Suddenly the silence is broken by an alarm. The nurse looks up and the ward terminal shows her that the resident in room 40 is awake and has risen from his bed. He is a little wobbly on his legs and she knows that he has fallen before when he has got up at night. The nurse immediately goes to help him to the restroom and accompanies him safely back to his bed. A glance at her smartphone shows that the residents in the other rooms are lying quietly in bed. She calmly returns to the ward room.

The secret behind this story is hidden under the flooring. SensFloor® – developed and produced by Future-Shape – has been installed and turns the floor into a large touchpad. As soon as a person steps on the floor, the sensors report where and in which direction the person is moving. In emergency situations, an alarm is sent to the caregivers. The sensor's fall detection algorithm ensures that the caregiver is notified and can quickly provide vital help.

The SensFloor® underlay fits any infrastructure and any flooring

But SensFloor® can do much more than just detect falls. Each room reports activity in that room to the ward terminal, which gives an overview of the entire ward. One glance is all it takes for the nursing staff to see what is happening on their ward.

SensFloors serves as an important contribution to patient safety and quality of life for residents. For the nurses, their workflow becomes more efficient and easier to plan – and they have peace of mind knowing that they will be alerted immediately in the event of a fall.

Long-term activity monitoring or recording enables staff to draw conclusions about health status changes. What is the sleeping behaviour like? How has the resident's activity changed over time? Does the movement show indicators of disorientation? This is information that usually cannot be gathered without an invasion of privacy.

Ward terminal with room overview: An alarm was triggered in the room marked in red - someone fell here. Residents are active in the blue rooms, there is no activity in the green rooms.

SensFloor® ensures safety and well-being. It is discreet and only records patient / resident's movements – nothing else.

- For more information, visit: International: *www.future-shape.de/en*
MENA: *www.7dwarfs.net/products/sensfloor/*
- Contact: *sensfloor@7dwarfs.net*

EKF Diagnostics Quo-Lab HbA1c analyser revolutionises glycated haemoglobin measurement

Quo-Lab HbA1c is a desk-top point-of-care analyzer for measuring glycated haemoglobin (HbA1c).

The semi-automated analyzer has been designed specifically to meet the needs of diabetes clinics and laboratories in settings that demand low cost of operation and ease of use.

From a simple procedure, Quo-Lab provides lab-accurate test results within four minutes (CV < 3% at 7% A1c) from a venous or finger prick blood sample of just 4 µl. Quo-Lab uses the same boronate affinity methodology used by Quo-Test and is similarly unaffected by Hb variants.

Step-by-step instructions are displayed on a clear, multi-lingual display. Staff training time can therefore be minimised and the opportunity for error is reduced.

Quo-Lab HbA1c can store over 7,000 results which can be downloaded as text files to a PC via the integrated USB interface. Alternatively, results can be printed using a printer which connects via a serial port.

Quo-Lab has received its CE mark and is available for sale in most global markets subject to local registration requirements.

Quo-Lab analyzers and tests are calibrated and quality controlled using European Reference Laboratory-supplied materials that are traceable to the IFCC reference method.

Easy to use

- User-friendly features minimize training time
- Step-by-step instructions on display
- User selectable language
- Just 4 µl blood required from finger prick or venous sample
- Innovative blood collector allows easy and consistent sampling
- Lightweight: 0.7 kg

Efficient data handling

- Barcode reader to scan calibration data, patient and operator ID
- Stores over 7,000 results
- User selectable dual reporting. User can select % DCCT, IFCC mmol/mol, eAG mg/dl or eAG mmol/l
- USB port
- Optional label printer available

Fast and accurate

- Results within four minutes
- Uses boronate affinity methodology which is widely recognized as interference-free
- Measuring range: 4-15 % A1c DCCT
- Imprecision: CV < 3 % at 7 % A1c DCCT
- Unaffected by Hb variants, which do not result in reduced erythrocyte life span
- Traceable to the IFCC reference method

● For more information, visit: *www.ekfdiagnostics.com/quo-lab.html*

OKI Paper Imagers

Exhibiting at Arab Health 2019 at stand S1 - F73, OKI Europe will be showing its unique paper medical imagers with embedded DICOM server. Specifically designed for medical imaging professionals, they allow doctors to produce high quality hardcopy for their patients. They are all compliant with DICOM 3 Print SCP requirements in Grey Level and color but also support true size printing and have long filming capability (up to 1.2m) for orthopedics needs. The OKI medical imager range also offers – for those whose ultrasound modality doesn't have the DICOM print option – the possibility to use DICOM store to produce vibrant looking color copies. All our DICOM embedded devices also allow the owners to take care of their business communication with the capability to add personalised logo on top of each produced hardcopy.

For those wanting more in terms of documents for the patient, OKI also offers another solution able to merge exam images with patient report in a fully finished professional looking booklet.

● Please visit the OKI booth at Arab Health, we will be pleased to explain, demonstrate and answer your questions. *www.okime.ae*

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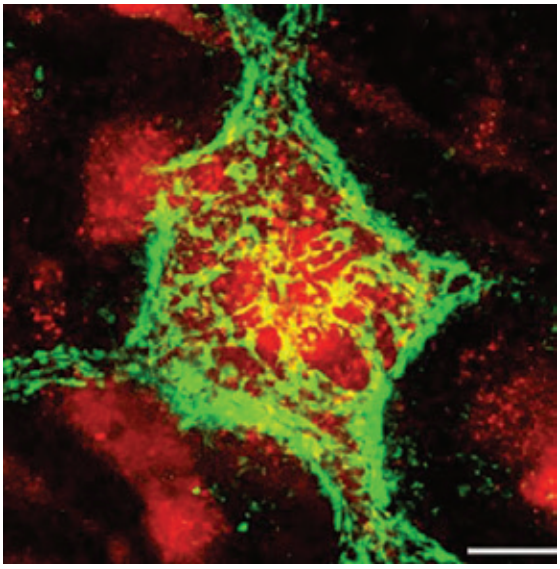
Researchers restore breathing and partial forelimb function in rats with chronic spinal cord injuries

Millions of people worldwide are living with chronic spinal cord injuries, with 250,000 to 500,000 new cases each year – most from vehicle crashes or falls. The most severe spinal cord injuries completely paralyze their victims and more than half impair a person's ability to breathe. Now there is hope for a treatment following a breakthrough study published in *Nature Communications* (27 November 2018) which has demonstrated, in animal models of chronic injury, that long-term, devastating effects of spinal cord trauma on breathing and limb function may be reversible.

The new study describes a treatment regimen that helps reawaken certain special types of nerve cells that can regenerate extensions, called axons, within the damaged spinal cord. Rats with spinal cords half severed at the second cervical vertebrae (C2) regained complete diaphragm and partial forelimb function on the severed side after treatment. The recuperative effects of the therapy were fully maintained six months after treatment end.

"For the first time we have permanently restored both breathing and some arm function in a form of high cervical, chronic spinal cord injury-induced paralysis. The complete recovery, especially of breathing, occurs rapidly after a near lifetime of paralysis in a rodent model," says senior author Jerry Silver, PhD, professor of neurosciences at Case Western Reserve University School of Medicine.

The treatment leverages the body's innate ability to very slowly sprout new axon branches from a sub-population of nerve cells that remain intact below the injury. The activity of these new branches is completely stifled by a family of potently inhibitory molecules called proteoglycans. Silver explains: "The strategy was to use a simple, one-time injection of an enzyme, chondroitinase, that breaks down the inhibitory proteoglycan molecules. The enzyme was administered, not within the lesion itself, but lower down within the spinal cord where motor nerve cells reside that send axons out to the diaphragm and forearm."



An image of the proteoglycans that have increased in the perineuronal net (green) that surrounds nerve cells (red) in the spinal cord following injury. Proteoglycans in the net limit functional regeneration and plasticity after spinal cord injury. The chondroitinase enzyme removes the net and allows for regeneration and functional recovery, especially at chronic stages.

In animals treated immediately after spinal cord injury, the enzyme only marginally helped restore nerve growth with minimal functional recovery. However, in animals treated long after injury, the therapeutic effects of the enzyme were remarkably better. In as little as one week after treatment in chronically injured rats, new nerve extensions began to restore diaphragm function that had been silent for many months. Seventy percent of rats treated with the enzyme, also began to use their forelimbs to move about and explore their environment (compared to only 30% of control animals).

"Surprisingly, the technique worked far better at chronic stages than at acute stages after injury," says Silver. The longer the animals had been paralyzed, the greater were the restorative effects of the enzyme. Silver's team found that even after an unprecedented year and a half following spinal cord injury, the treatment could recover full activity to rat diaphragms. One week after treatment, 60% of the animals had improved diaphragm function. Two weeks later, every rat showed improvement – even though their paralysis had lasted most of their lives.

Interestingly, exposing the rats to brief periods of low oxygen levels, a respiratory therapy known as acute intermittent hypoxia, helped strengthen the growing nerve extensions, providing an added benefit. However, Silver's team found that when the rats were treated with the enzyme combined with excessive amounts of respiratory therapy, rats developed chaotic activity in their once paralyzed diaphragms. The researchers hypothesized that the potential for highly abnormal activity may be why the body releases inhibitory molecules to prevent functional axon regeneration in the spinal cord. They are now working to optimize the combination therapy to maximize recovery, especially in the forearm and paw.

"Our data illustrate the relative ease with which an essential motor system can regain functionality months to years after severe spinal cord injury," says Silver. "The treatment regimen in our study is relevant to multiple types of chronic incomplete spinal traumas, and we are hopeful it may also help restore motor function following spinal cord injury in humans."

• **doi**: 10.1038/s41467-018-06937-0

Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
January 2019		
ESE Clinical Update	11 -12 January 2019, Abu Dhabi, UAE	*http://icldc.ae/event/ese-clinical-update-2019#Home*
Harvard Medical School: Introduction to Clinical Research Training – Dubai Program	19-21 January 2019 Dubai, UAE	*https://hms.harvard.edu/icrt*
26th Cancer Genomics Congress	21-22 January 2019, Dubai, UAE	*https://cancergenomics.cancersummit.org*
3rd World Congress on Eye and Vision	25-26 January 2019, Dubai, UAE	*https://vision.ophthalmologyconferences.com*
2nd World Congress on Nutrition and Obesity	25-26 January 2019, Dubai, UAE	*https://obesityprevention.nutritionalconference.com*
4th World Kidney Conference	30-31 January 2019, Abu Dhabi, UAE	*https://kidneycongress.nephroconferences.com*
February 2019		
AEEDC Dubai World Oral & Maxillofacial Surgery Conference 2019	3-4 February 2019, Dubai, UAE	*https://tinyurl.com/y8k9ox8s*
3rd International Trauma Congress (ITC)	13-15 February 2019, Dubai, UAE	*https://tinyurl.com/yd34espa*
The Arab International Paediatric Medical Congress	14-16 February 2019, Dubai, UAE	*https://tinyurl.com/yakt3mng*
2nd World Congress on Traditional and Complementary Medicine	22-23 February 2019, Abu Dhabi, UAE	*amyjones2018@gmail.com*
March 2019		
Patient Experience Excellence Congress	18-19 March 2019 Riyadh, KSA	*www.pxec.biiconferences.com*
World Congress on Depression	18-19 March 2019, Dubai, UAE	*https://depressioncongress.neurologyconference.com*
Middle East Heart Congress	18-20 March 2019, Dubai UAE	*https://heart.cardiologymeeting.com*
12th Conference on Orthopaedics and Sports Medicine	18-19 March 2019, Dubai, UAE	*https://orthopaedics.healthconferences.org/*
3rd Middle East Pharma Excellence Congress	19-20 March 2019, Dubai, UAE	*www.menapharmaexcellence.com*
Middle East Pharmaceutical Cold Chain Conference	19-20 March 2019, Dubai, UAE	*www.pharmacoldchainme.com*
2nd World Congress on Nutrition and Obesity Prevention	21-22 March 2019, Dubai, UAE	*nutrition@nutritionalconference.com*
2nd Annual Health Systems Workshop Presented by Dubai Harvard Foundation & WHO	March 31 – April 1, 2019 Dubai, UAE	*http://dhfmr.hms.harvard.edu/events*


Photo by Amy Treasure


Photo by Nate Casey

Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact

April 2019

12th World Conference on Human Genomics and Genomic Medicine	8-9 April 2019, Abu Dhabi, UA	rohit.casper@healthcarevents.com
Dubai International Conference on Infectious Diseases and Vaccination	25-27 April 2019, Dubai, UAE	www.dic-id.com

June 2019

6th International Conference on Rare Diseases and Orphan Drugs	17-18 June 2019, Dubai, UAE	rare-diseases@memeetings.net
International Conference on Vaccines and Immune Response	17-18 June 2019, Dubai, UAE	immuneresponse@me healthevents.org

July 2019

14th World Congress on Healthcare and Medical Tourism	18-19 July 2019, Abu Dhabi, UAE	https://healthcare.global-summit.com/middleeast/

List your conference:
If you have upcoming conference/exhibition details which you would like to list in the agenda, please email the details to the editor: editor@MiddleEastHealthMag.com

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Giving new hope to children with metabolic disease

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

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

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

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

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

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

Find out more about our excellent outcomes and extraordinary care.

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

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

Children's Hospital of Pittsburgh of UPMC