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422 million

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as World Health Day puts spotlight on the global pandemic



World first

Qatar's HMC is the first health system in the world to be fully accredited by JCI

Managing menopause

We look at new ways to help women experiencing this phase in their life

In the News:

- More fatalities from MERS in Saudi Arabia
- Zika virus may cause acute disseminated encephalomyelitis
- New SARS-like virus poised to infect humans
- UN adopts new framework for world drug problem
- More people obese than underweight worldwide
- 854,000 dead from unhealthy environment in EMR



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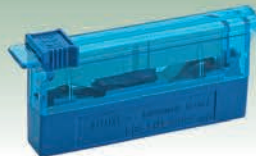
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Qatar's HMC achieves world first

Qatar has achieved a world first in healthcare following the accreditation of all of the country's Hamad Medical Corporation (HMC) hospitals by the Joint Commission International. With this prestigious achievement HMC becomes the first health system in the world to be fully accredited by the JCI. Being accredited by JCI is no easy feat. It is a rigorous process to ensure the highest standards of patient safety and healthcare quality are provided by accredited facilities and is considered the gold standard in healthcare accreditation.

Research on the Zika virus is producing new findings on an almost daily basis. Some of the latest, and quite troubling, findings show that the virus appears to cause neurological disorders in some people infected by the mosquito-borne disease. One such neurological disorder – acute disseminated encephalomyelitis, an autoimmune disorder that attacks the brain's myelin, similar to multiple sclerosis – has been found in a number of infected people covered in a small study. Zika has already been shown to be linked to microcephaly in newborns from infected mothers. To date the disease has not spread to the Middle East region, although the *Aedes* mosquito that transmits the virus to humans is present in at least eight countries in the region. The regional office of the WHO has issued guidelines in an effort to keep the virus at bay.

While on the subject of viruses, researchers at the University of North Carolina have discovered a new SARS-like virus which they say is poised to infect humans. They say the ability of WIV1-CoV (coronavirus), found in Chinese horseshoe bats, "to jump into humans is greater than we originally thought". Their concern is that the virus does not need to adapt in order to infect humans and could potentially lead to an outbreak similar to that of SARS "with significant consequences for both public health and the global economy".

Also in this issue, we report on a number of interesting developments in healthcare, including a massive undertaking by the United Nations and partners to finally stamp out polio. The initiative will replace the trivalent oral polio vaccine (tOPV) with a bivalent OPV (bOPV) for routine immunisation in 155 countries and territories. The vaccine replacement initiative, due to have begun late April, will be the largest and fastest globally coordinated rollout of a vaccine into routine immunization programmes in history.

There is a lot more regional, global and healthcare research news in this issue, read on.

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

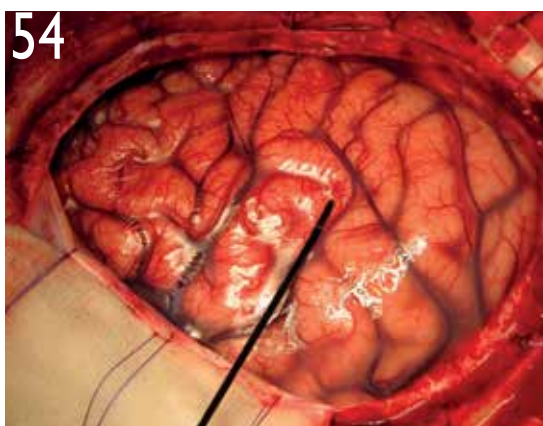
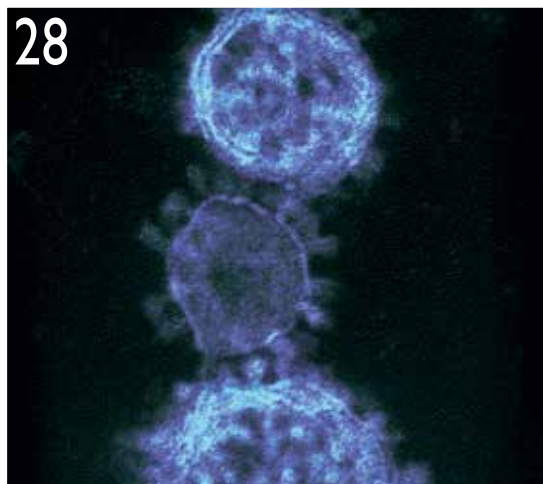
UAE National Media Council - Approval Number: 1563

Middle East Health website

www.MiddleEastHealthMag.com



Middle East Health is printed by Atlas Printing Press.
www.atlasgroupme.com



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Update from around the region



Professor Han Grrit Brunner

Professor Joris Andre Veltman

Leading genetics and cancer researchers honoured with King Faisal International Prize

The King Faisal International Prize for Medicine was jointly awarded to Professor Han Grrit Brunner (Professor of Medical Genetics at the Radboud University, part of Nijmegen Medical Center) and Professor Joris Andre Veltman (Professor of Translational Genomics at Radboud University), both of whom are from the Netherlands, for their research into the clinical application of next generation genetics.

The King Faisal International Prize was inaugurated in 1979 to commemorate the late King Faisal's commitment to humanitarian causes, and to recognize significant contributions made by the Muslim world to human progress. Prizes are awarded each year in five categories: Medicine, Science, Service to Islam, Islamic Studies, and Arabic Language and Literature.

Professor Veltman is a distinguished molecular geneticist who has been instrumental in the set-up, application and implementation of genomics approaches in medical genetics. Together with Professor Henry Bruner, (a distinguished molecular geneticist and a leader in the clinical delineation of a large number of rare genetic syndromes and the application of next generation sequencing technology in the clinic) he developed and experimentally validated the hypothesis that a major part of intellectual disability should be due to de novo gene mutations, given the severity, early onset and genetic heterogeneity of such form of disability. Professors Veltman and Bruner used a combination of genomic microarrays, exome and genomic sequencing approaches in their studies,

and their de novo paradigm has since been validated in other neurocognitive phenotypes, autism, epileptic encephalopathies and schizophrenia. Their contribution thus represents one of the recent major breakthroughs in human genetics.

High mortality from unhealthy environment in Eastern Mediterranean Region

In 2012, an estimated 854,000 people died as a result of living or working in an unhealthy environment in the Eastern Mediterranean Region – nearly one in five of total deaths in this region, according to new estimates from the World Health Organization (WHO). Environmental risk factors, such as air, water and soil pollution, chemical exposures, climate change and ultraviolet radiation, contribute to more than 100 diseases and injuries.

The second edition of the report *Preventing disease through healthy environments: A global assessment of burden of disease from environmental risks* reveals that since the report was first published a decade ago, deaths due to noncommunicable diseases, linked primarily to air pollution and chemical exposures, are amounting annually to as much as 450,000 of these deaths in the Region. Accordingly, noncommunicable diseases, such as stroke, heart disease, cancers and chronic respiratory disease, now amount to more than half of the total deaths caused by unhealthy environments.

At the same time, deaths from infectious diseases, such as diarrhoea and malaria, often related to poor water, sanitation and waste management have declined. Increases in access to safe water and sanitation and decreases in households using solid fuels for cooking have been key contributors to this decline, alongside better access to immunization, insecticide-treated mosquito nets and essential medicines. Despite the decline, the burden of infectious diseases is still of major concern in many countries of the region including those affected by civil unrest and crises.

“Over one fifth of the burden of communicable diseases, noncommunicable diseases and injuries in our Region is attributable to environmental risks that can be

modified,” said Dr Ala Alwan, WHO Regional Director for the Eastern Mediterranean. “With our Member States, we have developed a regional strategy on health and the environment to reduce those risks in our homes, cities and workplaces. National authorities in Member States need to start implementing this strategy in order to provide healthy environments to their population and reduce avoidable death and diseases.”

Environmental risks take their greatest toll on young children and older people, the report finds, with children under five and adults aged 50 to 75 years the most impacted. Lower respiratory infections and diarrhoeal diseases mostly impact children under five, while noncommunicable diseases and injuries impact older adults.

Looking across more than 100 disease and injury categories, the report finds that the vast majority of environmentally-related deaths are estimated to be due to cardiovascular diseases, such as stroke and ischaemic heart disease.

Rank	Health conditions	Estimated annual deaths caused by environmental risks
1	Ischaemic heart disease	169,272
2	Unintentional injuries	157,469
3	Stroke	126,762
4	Respiratory infections	77,633
5	Diarrhoeal diseases	75,939
6	Cancers	68,192
7	Chronic respiratory diseases	51,540
8	Neonatal conditions	38,304
9	Tuberculosis	18,611
10	Hypertensive heart disease	9,174

The report cites proven strategies for improving the environment and preventing diseases. For instance, using clean technologies and fuels for domestic cooking,

heating and lighting would reduce acute respiratory infections, chronic respiratory diseases, cardiovascular diseases and burns. Increasing access to safe water and adequate sanitation and promoting hand-washing would further reduce diarrheal diseases. Improving urban transit and urban planning, and building energy-efficient housing would reduce air pollution-related diseases and promote safe physical activity.



Preventing disease through healthy environments

www.who.int/quantifying_ehimpacts/publications/preventing-disease

Iraq MoH, WHO, partners prepare for next cholera outbreak

Following the declaration of the cholera epidemic in Iraq in September 2015 and in anticipation of a potential new outbreak, WHO, UNICEF and the Ministry of Health of Iraq, jointly with WASH and health cluster partners, held a 'lessons learned' consultation meeting in late March to review lessons and best practices from the successful 2015 outbreak response. These consultations will help guide cholera contingency plans for 2016 and beyond.

Cholera outbreaks occur in Iraq about every three to five years and have a distinct seasonality that typically start in September and continue through December when cases naturally decline with a high probability of another outbreak the following spring. However, immediate and efficient response actions can reduce cases and save lives.

"The cholera outbreak response in 2015 put in place rapid lifesaving interventions that helped minimize the epidemic. We need to take stock of what was done, and use this opportunity to design a comprehensive preparedness and response plan for the next outbreak," said WHO Acting Representative for Iraq, Altaf Musani. "WHO remains committed to support the Ministry of Health and health cluster partners with effective cholera prevention and control measures including pre-positioning stockpiles of essential medicines and

medical supplies and capacity for laboratory testing. These best practices will be important to avert mortality and morbidity when cholera strikes again."

The lessons learned consultation meeting focused on a number of key issues, including:

- Building local capacities to scale up surveillance, case investigation and management, as well as cholera prevention and control measures
- Strengthening laboratory capacities at central, governorate, and peripheral levels to ensure early detection and confirmation of the cholera
- Enhancing collaborative activities between relevant ministries and agencies, with clear roles and accountabilities
- Maintaining strong and regular communication with the health sector and applying an inter-sectorial approach for Cholera/Acute Watery Diarrhea (AWD) management.

"The Ministry of Health with the support of WHO, UNICEF, and WASH and health cluster partners is building a comprehensive cholera prevention and response program with high capacity to respond to and contain any future public health risks including a potential cholera outbreak in 2016," said Dr Adila Hammoud Minister of Health of Iraq. "We are going to benefit from the successful collaborative efforts the ministry had with WHO and partners during the last cholera outbreak that spread to almost all Iraqi governorates."

"UNICEF and partners, such as the WHO and MOH, reacted immediately when cholera was confirmed in Iraq in 2015, and within 48 hours of the announcement we began our joint response. Initial activities empowered communities to protect themselves by knowing how to avoid and treat cholera, while intensive water and sanitation programmes took away the cholera transmission routes. With these joint efforts, by December 2015, even with over 10 million people from all over the world converging in Karbala, and with over 3 million people internally displaced, the outbreak was over," said Peter Hawkins, UNICEF Iraq

Country Representative.

Cholera is endemic in Iraq, and the outbreak, officially declared in September 2015, resulted in 4,945 cases confirmed in 17 of the 18 governorates across Iraq. WHO and UNICEF supported the Ministry of Health and other partners to put in place immediate preventive and control measures that included targeting approximately 249,319 people with Oral Cholera Vaccine (OCV) in a 2-round immunization campaign for vulnerable populations in 62 refugee and internally displaced persons camps and collective centres throughout the country.

Cleveland Clinic Abu Dhabi performs new procedure for swallowing disorders

Cleveland Clinic Abu Dhabi recently performed the region's first Peroral Endoscopic Myotomy (POEM) procedure. The procedure was performed as an alternative to open or laparoscopic surgery for a patient with achalasia, a swallowing disorder.

POEM is an endoscopic procedure used to treat a variety of swallowing disorders, most commonly achalasia, a condition where the esophagus is unable to push food into the stomach due to tightened muscles. Achalasia is a rare disease, affecting from 0.6 to 1.1 in 100,000 people. Common symptoms of achalasia include, but are not limited to, difficulty swallowing, regurgitation of undigested food, chest pain and heartburn. The entire POEM procedure is done using an endoscope, which the endoscopist uses to divide the esophageal muscles that cause swallowing problems. POEM is performed entirely through the mouth alone under general anesthesia, and takes between one to two hours to complete.

The patient, who has suffered from achalasia for more than 10 years, battled symptoms of frequent regurgitations and difficulty swallowing. He has recovered well and has seen an improvement in his swallowing, allowing him to return to his normal lifestyle within just a few days of the procedure.

Only a limited number of medical centers across the world, including US-based



Cleveland Clinic, offer this less-invasive approach to treating swallowing disorders. It is a relatively new, minimally invasive treatment performed by highly skilled endoscopists, and offers patients the benefits of no incisions in the chest or abdomen, as well as reduced or no hospital stay following the procedure. Instead of having to travel abroad, patients in the region can now receive this treatment closer to home.

The procedure was performed by Cleveland Clinic Abu Dhabi's Dr Mohammad Al Haddad, director of endoscopy, and Dr Kevin El-Hayek, staff physician, general surgery, and was proctored by Dr Matthew Kroh, director of surgical endoscopy at Cleveland Clinic in Ohio, US.

Ministers of health of UAE, Belgium meet

Abdul Rahman Mohammed Al Owais, the UAE Minister of Health and Prevention, met early April with Jo Vandeurzen, the Flemish Minister for Welfare, Public Health and Family, at the Ministry's Office in Dubai to explore bilateral opportunities for cooperation in healthcare including exchange of expertise in the areas of continuing medical education, best medical practices, health information technology, and health communication strategies.

The Undersecretary Dr Mohammad Salim Al Olama, the Assistant Undersecretary for Hospitals Sector Dr Yousif Al Serkal, and the Belgian Ambassador to UAE, Dominique Minor were also present at the session.

The two parties explored possibilities of building alliances in the healthcare sector to improve the quality of services provided in the hospitals and health centers. They also discussed developing state-of-the-art research centers and medical laboratories with cutting-edge equipment and technology as well as embarking on physician exchange programs.

Sanofi appoints new head for region

Sanofi has appointed Jean-Paul Scheuer as Country Chair and General Manager, Rx, for Gulf Countries. Sanofi Gulf includes UAE, Kuwait, Qatar, Bahrain, Oman, and Yemen.

Commenting on his new position, Jean-Paul Scheuer said: "Sanofi has emerged as a strong healthcare leader in the region. Our efforts in the Gulf are directed towards meeting patients' needs in countries where we operate – through diverse product offerings and meaningful partnerships with health authorities. We are also playing a positive role in shaping the healthcare industry. I am honoured to lead the business at an exciting phase of growth while continuing the organization's long standing legacy and commitment."

Saudi primary health care facilities face shortage of doctors

Primary health care facilities are facing a severe shortage of doctors resulting in poor service delivery and forcing citizens to go to large hospitals, according to Abdulaziz bin Saeed, undersecretary for public health.

He was quoted in *Arab News* as saying that the ministry has put in place short, medium and long term plans to develop the primary care sector by recruiting competent staff. This includes deploying 50% of medical school graduates to these centres.

"One of the problems facing the ministry currently is that the majority of patients insist they must be treated at the most advanced medical centres even if their conditions do not require this," he said.

He said there are 2,200 primary health centres in Saudi Arabia and the ministry planned to assign at least one consultant to each centre, particularly in family medicine, and child and maternity care.

New health facilities for Saudi

Saudi Health Minister Khalid Al-Falih visited a new medical complex in Thuwal, near Jeddah earlier this year and remarked about future health facilities in the kingdom.

According to a report in *Arab News*, projects currently under way are the Jeddah Medical Tower for Childbirth and Children, with a 400-bed capacity; the Eye Medical Tower in Jeddah with a 200-bed capacity; Psychiatric Hospital in Jeddah with a capacity for 500 beds; Al-Jamum Hospital with a 100-bed capacity;

Makkah Hospital with a capacity for 500 beds; Women's Hospital in Qunfudah with 200-bed capacity; Amal Mental Hospital in Taif with a 500-bed capacity; and Children's Hospital in Taif with 300 beds.

The projects that are under study for construction are King Faisal Medical Tower in Makkah with 200 beds; Children's Hospital in Makkah with 300 beds; Bil-Harith Hospital with 50 beds; Qunfudah Hospital with 50 beds; King Fahd Medical Tower in Makkah with 200 beds; Namira Hospital with 50 beds; South Qunfudah Hospital with 100 beds; Umm Al-Doom Hospital in Taif with 50 beds; Al-Laith Hospital with 100 beds; North Jeddah Hospital with 200 beds; King Abdul Aziz Medical Tower in Makkah; and King Faisal Hospital in Taif.

Princess Muna appointed UN High Level Commissioner on Health Employment

HRH Princess Muna of Jordan has been appointed as a commissioner in the UN High Level Commission on Health Employment and Economic Growth, according to a report in the *Jordan Times*.

The newly established commission was formed by UN Secretary General Ban Ki-moon in response to the UN General Assembly Resolution (A/70/L.32), which recognises that investing in new employment opportunities in the healthcare sector adds broader socioeconomic value to the economy and contributes to the implementation of the 2030 Agenda for Sustainable Development, a Royal Court statement said.

Princess Muna has been named to take part in this commission, co-chaired by French President François Hollande and South African President Jacob Zuma, "based on her capacity as a world-renowned figure in the fields of global health and social development".

In Jordan, Princess Muna helped found the Princess Muna College of Nursing in 1962, and she is the founder of the Jordanian Nursing Council, which was established in 2002, as part of her early commitments to the provision of quality nursing and the advancement of nursing services, practice and education. **MEH**

worldwide monitor

Update from around the globe



Dr Margaret Chan speaks at the UN General Assembly special session on the world drug problem

UN adopts new framework for world drug problem

The United Nations 19 April adopted a new framework which puts people at the centre of global policies on drug control.

Speaking at the UN General Assembly special session on the world drug problem (UNGASS), Yury Fedotov, Executive Director of UNODC, told delegates: "Putting people first means reaffirming the cornerstone principles of the global drug control system, and the emphasis on the health and welfare of humankind that is the founding purpose of the international drug conventions.

"Putting people first means balanced approaches that are based on health and human rights, and promote the safety and security of all our societies. Putting people first means looking to the future, and recognizing that drug policies must most of all protect the potential of young people and foster their healthy styles of life and safe development," he added.

Dr Margaret Chan, the Director-General

of the UN World Health Organization, said an estimated 27 million people have drug use disorders, and more than 400,000 of them die each year.

"The health and social harm caused by the illicit use of psychoactive drugs is enormous. This harm includes direct damage to the physical and mental health of users, drastically reducing the length and quality of their lives," she warned.

"In the view of WHO, drug policies that focus almost exclusively on use of the criminal justice system need to be broadened by embracing a public health approach. A public health approach starts with the science and the evidence. It tells us several things," she added.

Dr Chan said the evidence shows that drug use can be prevented, drug use disorders can be treated, drug dependence that contributes to crime can be diminished, and people with drug dependence can be helped and returned to productive roles in society.

"WHO promotes a comprehensive package of interventions to achieve these objectives. The evidence shows they work," she stressed, urging Member States to "remember the people" when they begin to implement the new framework.

Developing countries face health financing crisis

Two major studies published in *The Lancet* in April reveal the health financing crisis facing developing countries as a result of low domestic investment and stagnating international aid, which could leave millions of people without access to even the most basic health services.

Analysing national health spending and global health funding, two studies led by

Dr Joseph Dieleman from the Institute for Health Metrics and Evaluation (IHME), Seattle, USA, should be a wake-up call to global leaders and governments to deliver greater investment in health.

"Despite tremendous need, our results show that tepid growth in health spending is likely in many of the poorest countries with the largest disease burdens over the next 25 years," says Dr Dieleman. "Historically, some of these financing gaps have been filled by international aid. But, funding growth has stalled in recent years and future projections suggest that global health funding may not be sufficient to bridge the gap."

He adds: "These changes in the growth and focus of international aid could have a serious impact on over 15 million people taking antiretroviral therapy in developing countries and on health services in some low-income countries, particularly in sub-Saharan Africa where HIV/AIDS, tuberculosis, and malaria remain among the top threats to health."

Global health funding increased substantially after 2000, just as the United Nations established the Millennium Development Goals (MDGs). The majority of funding over the past 16 years, almost US\$255 billion (around 60% of all international aid) has been focused on MDG-related health areas. Between 2000 and 2009, growth in aid was greatest for HIV/AIDS, malaria and tuberculosis. But since 2010, aid for maternal health and newborn and child health has slowed less than funding for other health focus areas, such as HIV/AIDS

"The era of major growth in international aid for health has, at least temporarily, seemed to have ended. This may lead to substantial shifts in how global health is financed. Much will depend on how donors target their scarce resources and how governments fill gaps," says Dr Dieleman. "Substantial variation between countries and across time, highlights the enormous potential for governments and donors to show their ongoing commitment to ensuring essential health services are affordable to those most in need."

They report's authors conclude: "While the challenge is daunting, attaining universal health coverage and its sustainable financing by 2030 is feasible for most countries. Success will depend on governments and partners aligning their objectives into a coordinated strategic effort."

● doi: 10.1016/S0140-6736(16)30167-2

Endgame for polio

In a massive undertaking aimed at stamping out polio once and for all – dubbed 'the switch' – a United Nations-backed eradication initiative was due late April to begin the largest and fastest globally coordinated rollout of a vaccine into routine immunization programmes in history.

The Global Polio Eradication Initiative (GPEI) announced 14 April that between 17 April and 1 May, 155 countries and territories around the world will stop using the trivalent oral polio vaccine (tOPV), which protects against all three strains of wild poliovirus, and replace it with bivalent OPV (bOPV), which protects against the remaining two wild polio strains, types 1 and 3.

This effort will provide better protection for children against polio, particularly those most vulnerable to infection, the Initiative said in a press release from its partners, which include the World Health Organization (WHO), the UN Children's Fund (UNICEF), Rotary International, the United States Centers for Disease Control and Prevention (CDC).

This transition, referred to as the global vaccine 'switch,' is possible because type 2 wild polio has been eradicated. The switch has been recommended by the Strategic Advisory Group of Experts on Immunization and endorsed by the World Health Assembly as a critical component of the polio endgame strategy.

"We're closer than ever to ending polio worldwide, which is why we are able to move forward with the largest and fastest globally synchronized vaccine switch ever," said Michel Zaffran, Director of Polio Eradication at WHO. "It is a massive undertaking, but it is testimony to

how much progress is being made toward achieving a lasting polio-free world and to the commitment of all countries to make this dream a reality," he explained.

According to the initiative, currently, only two countries remain that have not stopped endemic transmission of wild polio: Pakistan and Afghanistan. In 2015, 74 cases of wild poliovirus and 32 cases of circulating vaccine-derived poliovirus were recorded.

The oral polio vaccine (OPV) has been used to stop polio in most of the world. On very rare occasions in under-immunized populations, the live weakened virus contained in OPV can mutate and cause circulating vaccine-derived polioviruses (cVDPV). More than 90% of cVDPV cases in the last 10 years have been caused by the type 2 vaccine strain.

Withdrawing tOPV and replacing it in routine immunization programs with bOPV will eliminate the risks associated with the type 2 vaccine strain and, just as importantly, boost protection against the two remaining wild strains of the virus, noted the Initiative.

The switch must be globally synchronized because if some countries continue to use tOPV it could increase the risk of the spread of type 2 poliovirus to those no longer using tOPV. The switch is the first major step toward the eventual removal of all OPV after wild polio transmission has been stopped.

"This is an extremely important milestone in achieving a polio free world," said Reza Hossaini, Chief of Polio at UNICEF. "Hundreds of thousands of vaccinators and health workers have been trained for the switch to happen quickly and effectively, so that children everywhere can be protected from this devastating disease."

Health needs from humanitarian emergencies at an all-time high

WHO and partners need US\$2.2 billion to provide lifesaving health services to more than 79 million people in more than 30 countries facing protracted emergencies this year, according to WHO's Humanitarian Response Plans 2016.

WHO and health partners are working together to provide urgent health services including essential medicines, vaccines and treatment for diseases such as cholera and measles, often in insecure and extremely difficult settings. Collectively we need \$ 2.2 billion to provide lifesaving health services, of which WHO is appealing for \$480 million.

"The risks to health caused by humanitarian emergencies are at an all-time high," says Dr Bruce Aylward, Executive Director a.i., Outbreaks and Health Emergencies, WHO. "And the situation is getting worse. The increasing impact of protracted conflict, forced displacement, climate change, unplanned urbanization and demographic changes all mean that humanitarian emergencies are becoming more frequent and severe."

In Syria, one of the biggest humanitarian emergencies, WHO and partners are seeking funds to provide 11.5 million people with health services including trauma and mental health care, and to provide vaccines, medicines and surgical supplies to almost 5 million Syrian refugees living in neighbouring countries.

WHO also needs urgent funds to support 6.8 million people threatened by the worst drought in decades in Ethiopia, with one of the priorities to provide emergency health services to save the lives of more than 400,000 severely malnourished children.

In addition to more than 30 protracted emergencies, WHO is also responding to sudden onset emergencies, such as Cyclone Winston that impacted Fiji in February 2016, and to infectious disease outbreaks including Zika virus, the remaining risks of Ebola in West Africa and Angola's worst outbreak of yellow fever in 30 years.

In one of the most profound transformations in its history, WHO is rolling out a new Health Emergencies Programme that will increase operational capacity in countries and enable a faster, effective and predictable response to all kinds of health emergencies including outbreaks and humanitarian crises.



WHO Humanitarian Response Plan 2016

www.who.int/hac/donorinfo/2016/who_humanitarian_response_plan_2016.pdf

WHO, OIE launch new global framework to eliminate rabies

A new framework to eliminate human rabies and save tens of thousands of lives each year has been launched in December by WHO, the World Organization for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO) and the Global Alliance for the Control of Rabies (GARC).

The framework calls for three key actions – making human vaccines and antibodies affordable, ensuring people who get bitten receive prompt treatment, and mass dog vaccinations to tackle the disease at its source.

“Rabies is 100% preventable through vaccination and timely immunization after exposure, but access to post-bite treatment is expensive and is not affordable in many Asian and African countries. If we follow this more comprehensive approach, we can consign rabies to the history books,” said Dr Margaret Chan, WHO Director-General.

Tens of thousands of people die from rabies each year and, worldwide, 4 out of every 10 people bitten by suspected rabid dogs are children aged under 15 years. One person dies every 10 minutes, with the greatest burden in Asia and Africa.

The cost of vaccines to protect humans from rabies is, however, beyond the reach of many of those who may need it. And treatment for people who are bitten can cost US\$40-50, representing an average of 40 days of wages in some of the affected countries. Recognizing that human vaccination is currently not always affordable, the new framework emphasizes prevention through vaccinating dogs – whose bites cause 99% of all human rabies cases. A dog vaccine costs less than US\$1.

“Vaccinating 70% of dogs regularly in zones where rabies is present can reduce human cases to zero. Eliminating canine

rabies through dog vaccination is the most cost-effective and only long-term solution,” states OIE Director-General Dr Bernard Vallat. “Human deaths can be prevented when mass dog vaccination is combined with responsible pet ownership and stray dog population management, both complying with OIE intergovernmental standards, as well as with bite treatment, as recommended by WHO.”

Whilst vaccinating dogs will be key in the new approach, the elimination of rabies – and saving the lives of those who are bitten – will not be possible without more widely-available human vaccines.

Currently, about 80% of people exposed to rabies live in poor, rural areas of Africa and Asia with no access to prompt treatment should they be bitten. Bringing treatment closer to victims and providing wider access to affordable vaccines and potent rabies immunoglobulins, which neutralize the rabies virus before it can get a hold in the body, are vital to achieving zero rabies deaths.

Bringing down the cost of human rabies vaccines and treatments will require strong international collaboration to make quality-assured vaccines and rabies immunoglobulin available to health centres in regions where rabies is endemic.

As of 2015, WHO and the OIE Vaccine Bank have delivered more than 15 million doses of canine rabies vaccines in many countries.

New study shows more people are obese than underweight worldwide

In the past 40 years, there has been a startling increase in the number of obese people worldwide – rising from 105 million in 1975 to 641 million in 2014, according to the most comprehensive analysis of trends in body mass index (BMI) to date, published in *The Lancet*.

The age-corrected proportion of obese men has more than tripled (3.2% to 10.8%), and the proportion of obese women has more than doubled (6.4% to 14.9%) since 1975. At the same time, the proportion of underweight people fell more modestly – by around a third in both

men (13.8% to 8.8%) and women (14.6% to 9.7%).

Over the past four decades, the average age-corrected BMI increased from 21.7kg/m² to 24.2 kg/m² in men and from 22.1kg/m² to 24.4 kg/m² in women, equivalent to the world’s population becoming on average 1.5kg heavier each decade. If the rate of obesity continues at this pace, by 2025 roughly a fifth of men (18%) and women (21%) worldwide will be obese, and more than 6% of men and 9% of women will be severely obese (35 kg/m² or greater).

However, excessively low body weight remains a serious public health issue in the world’s poorest regions, and the authors warn that global trends in rising obesity should not overshadow the continuing underweight problem in these poor nations. For example, in south Asia almost a quarter of the population are still underweight, and in central and east Africa levels of underweight still remain higher than 12% in women and 15% in men.

“Over the past 40 years, we have changed from a world in which underweight prevalence was more than double that of obesity, to one in which more people are obese than underweight,” explains senior author Professor Majid Ezzati from the School of Public Health at Imperial College London, London, UK. “If present trends continue, not only will the world not meet the obesity target of halting the rise in the prevalence of obesity at its 2010 level by 2025, but more women will be severely obese than underweight by 2025.”

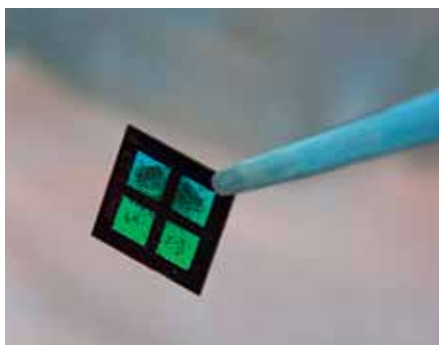
He adds: “To avoid an epidemic of severe obesity, new policies that can slow down and stop the worldwide increase in body weight must be implemented quickly and rigorously evaluated, including smart food policies and improved health-care training.”

The findings come from a comprehensive new analysis of the global, regional, and national trends in adult (aged 18 and older) BMI between 1975 and 2014. For the first time, this includes the proportion of individuals classified as underweight (less than 18.5 kg/m²), and severely obese (35 kg/m² or higher) and morbidly obese (40 kg/m² or higher).

● doi: 10.1016/S0140-6736(16)30054-X

the laboratory

Medical research news from around the world



The key to the device is a microchip. The chips are affordable, precise and make ideal filters. They are also the scaffolding in which living cells will grow.

Researchers test first-ever artificial kidney

Vanderbilt University Medical Center nephrologist and associate professor of medicine Dr William H. Fissell IV, is making major progress on a first-of-its kind device to free kidney patients from dialysis. He is building an implantable artificial kidney with microchip filters and living kidney cells that will be powered by a patient's own heart.

"We are creating a bio-hybrid device that can mimic a kidney to remove enough waste products, salt and water to keep a patient off dialysis," said Fissell.

Fissell says the goal is to make it small enough, roughly the size of a soda can, to be implanted inside a patient's body.

The key to the device is a microchip.

"It's called silicon nanotechnology. It uses the same processes that were developed by the microelectronics industry for computers," said Fissell.

The chips are affordable, precise and make ideal filters. Fissell and his team are designing each pore in the filter one by one based on what they want that pore to do. Each device will hold roughly fifteen microchips layered on top of each other.

But the microchips have another essential role beyond filtering.

"They're also the scaffold in which living kidney cells will rest," said Fissell.

Fissell and his team use live kidney cells that will grow on and around the microchip filters. The goal is for these cells to mimic the natural actions of the kidney.

"We can leverage Mother Nature's 60 million years of research and development and use kidney cells that fortunately for us grow well in the lab dish, and grow them into a bioreactor of living cells that will be the only "Santa Claus" membrane in the world: the only membrane that will know which chemicals have been naughty and which have been nice. Then they can re-absorb the nutrients your body needs and discard the wastes your body desperately wants to get rid of," said Fissell.

Because this bio-hybrid device sits out of reach from the body's immune response, it is protected from rejection.

"The issue is not one of immune compliance, of matching, like it is with an organ transplant," said Fissell.

The device operates naturally with a patient's blood flow.

"Our challenge is to take blood in a blood vessel and push it through the device. We must transform that unsteady pulsating blood flow in the arteries and move it through an artificial device without clotting or damage."

And that's where Vanderbilt biomedical engineer Amanda Buck comes in. Buck is using fluid dynamics to see if there are certain regions in the device that might cause clotting.

She uses computer models to refine the shape of the channels for the smoothest blood flow. Then they rapidly prototype the new design using 3-D printing and test it to make the blood flow as smoothly as possible.

Fissell says he has a long list of dialysis patients eager to join a future human trial. Pilot studies of the silicon filters could start in patients by the end of 2017.

"My patients are absolutely my heroes," said Fissell. "They come back again and again and they accept a crushing burden of illness because they want to live. And they're willing to put all of that at risk for the sake of another patient."

The US National Institutes of Health awarded a four-year, US\$6 million grant to Fissell and his research partner Shuvo Roy, from the University of California at San Francisco. The two investigators are

longtime collaborators on this research. In 2003, the kidney project attracted its first NIH funding, and in 2012 the Food and Drug Administration selected the project for a fast-track approval program.

Cancer drug target visualized at atomic resolution

A new study shows that it is possible to use an imaging technique called cryo-electron microscopy (cryo-EM) to view, in atomic detail, the binding of a potential small molecule drug to a key protein in cancer cells. The cryo-EM images also helped the researchers establish, at atomic resolution, the sequence of structural changes that normally occur in the protein, p97, an enzyme critical for protein regulation that is thought to be a novel anti-cancer target.

The study appeared online 28 January 2016, in *Science*. Sriram Subramaniam, Ph.D., of the National Cancer Institute's (NCI) Center for Cancer Research, led the research. NCI is part of the US National Institutes of Health.

"Cryo-EM is positioned to become an even more useful tool in structural biology and cancer drug development," said Douglas Lowy, M.D., acting director, NCI. "This latest finding provides a tantalizing possibility for advancing effective drug development."

To determine structures by cryo-EM, protein suspensions are flash-frozen at very low temperatures; nevertheless, the water around the protein molecules stays liquid-like. The suspensions are then bombarded with electrons to capture their images. To produce three-dimensional protein structures using cryo-EM, researchers generate thousands of two-dimensional images of the molecules in different orientations, which are then averaged together. This type of imaging procedure has gained in popularity in structural biology research because it allows for the observation of specimens that have not been stained or fixed in any way, enabling visualization of the specimens under near-native, or natural, conditions.

Earlier structural studies of full-length p97 by a well-established technique known



as X-ray crystallography have been limited so far to medium resolution (3.5 Å to 4.7 Å). With cryo-EM, however, researchers were able to image full-length p97 at an overall resolution of 2.3 Å, which is much finer, allowing them to visualize key regions of the protein in atomic detail.

Most significantly, the mode of binding and contact sites of a small molecule inhibitor of p97 activity could be observed directly. Drug development efforts often involve mapping the contacts between small molecules and their binding sites on specific proteins. With this latest finding, the resolutions achieved were significant enough to discern both the shape of the protein chain and some of the hydrogen bonds between the protein and the small molecule inhibitor.

“Our latest research provides new insights into the protein structures and interactions that are critical for the activity of a cancer cell, and this knowledge will hopefully enable the design of clinically useful drugs,” said Subramaniam.

Painless patch of insulin-producing beta cells may help control diabetes

For decades, researchers have tried to duplicate the function of beta cells, the tiny insulin-producing entities that don't work properly in patients with diabetes. Insulin injections provide painful and often imperfect substitutes. Transplants of normal beta cells carry the risk of rejection or side effects from immunosuppressive therapies.

Now, researchers at the University of North Carolina at Chapel Hill and North Carolina State University have devised another option: a synthetic patch filled with natural beta cells that can secrete doses of insulin to control blood sugar levels on demand with no risk of inducing hypoglycaemia.

The proof-of-concept builds on an innovative technology, the “smart insulin patch,” reported last year in the *Proceedings of the National Academy of Sciences*. Both patches are thin polymeric squares about the size of a small coin and covered in tiny needles, like a miniature bed of nails. But



Zhen Gu, PhD, assistant professor in the joint UNC/NC State department of biomedical engineering

whereas the former approach filled these needles with manmade bubbles of insulin, this new “smart cell patch” integrates the needles with live beta cells.

Tests of this painless patch in small animal models of type-1 diabetes demonstrated that it could quickly respond to skyrocketing blood sugar levels and significantly lower them for 10 hours at a time. The results were published in *Advanced Materials*.

“This study provides a potential solution for the tough problem of rejection, which has long plagued studies on pancreatic cell transplants for diabetes,” said senior author Zhen Gu, PhD, assistant professor in the joint UNC/NC State department of biomedical engineering. “Plus it demonstrates that we can build a bridge between the physiological signals within the body and these therapeutic cells outside the body to keep glucose levels under control.”

Beta cells typically reside in the pancreas, where they act as the body's natural insulin-producing factories. In healthy people, they produce, store, and release the hormone insulin to help process sugar that builds up in the bloodstream after a meal. But in people with diabetes, these cells are either damaged or unable to produce enough insulin to keep blood sugar levels under control.

Diabetes affects more than 387 million people worldwide, and that number is ex-

pected to grow to 500 million by the year 2030. Patients with type-1 and advanced type-2 diabetes must regularly monitor their blood sugar levels and inject themselves with varying amounts of insulin, a process that is painful and imprecise. Injecting the wrong amount of medication can lead to significant complications like blindness and limb amputations, or even more disastrous consequences such as diabetic comas and death.

Since the 1970s, researchers have researched transplantation of insulin-producing cells as an alternative treatment for diabetes. The first successful transplant of human beta cells was performed in 1990, and since then hundreds of diabetic patients have undergone the procedure. Yet, only a fraction of treated patients achieved normal blood sugar levels. Most transplants are rejected, and many of the medications used to suppress the immune system wind up interfering with the activity of beta cells and insulin. More recently, researchers have been experimenting with ways to encapsulate beta cells into biocompatible polymeric cells that could be implanted in the body.

Gu, who also holds appointments in the UNC School of Medicine, the UNC Eshelman School of Pharmacy, and the UNC Diabetes Care Center, decided to create a device that would put the blood-sugar buffering properties of beta cells out of reach of the patient's immune system. Lead author



Yanqi Ye, a graduate student in Gu's lab, constructed the "smart cell patches" using natural materials commonly found in cosmetics and diagnostics. She stuffed the hundreds of microneedles, each about the size of an eyelash, with culture media and thousands of beta cells that were encapsulated into microcapsules made from biocompatible alginate. When applied to the skin, the patch's microneedles poked into the capillaries and blood vessels, forming a connection between the internal environment and the external cells of the patch.

Ye also created "glucose-signal amplifiers," which are synthetic nanovesicles filled with three chemicals to make sure the beta cells could "hear" the call from rising blood sugar levels and respond accordingly.

Gu's group showed that blood sugar levels in diabetic mice quickly declined to normal levels. To assess whether the patch could regulate blood sugar without lowering it too much, the researchers administered a second patch to the mice. As they had hoped, repeated administration of the patch did not result in excess doses of insulin, and thus did not risk hypoglycemia. Instead, the second patch extended the life of the treatment to 20 hours.

Further modifications, pre-clinical tests, and eventually clinical trials in humans will all be necessary before the patch can become a viable option for patients.

CPR administered with ventilation better than continuous compressions

In a study published online 9 November 2015 in the *New England Journal of Medicine*, researchers found that cardiopulmonary resuscitation (CPR) administered by emergency medical services (EMS) providers following sudden cardiac arrest that combines chest compressions with interruptions for ventilation resulted in longer survival times and shorter hospital stays than CPR that uses continuous chest compressions. Although compressions with pauses for ventilation lead to more hospital-free days within 30 days of the cardiac arrest, both methods achieved similar overall survival to hospital discharge, the study noted.

The compressions with interruptions consisted of 30 compressions then pauses for two ventilations. The continuous chest compressions consisted of 100 compressions per minute with simultaneous ventilations at 10 per minute. In both groups, emergency medical services (EMS) providers gave ventilations using a bag and mask.

The study, funded in part by the US National Heart, Lung, and Blood Institute (NHLBI), is the largest of its kind to date to evaluate CPR practices among firefighters and paramedics and suggests the importance of ventilation in CPR by EMS providers, the investigators say.

"Current CPR guidelines permit use of either continuous chest compressions or interrupted chest compressions with ventilations by EMS providers. Our trial shows that both types of CPR achieve good outcomes, but that compressions with pauses for ventilations appears to be a bit better," said principal author Graham Nichol, M.D., director of the University of Washington-Harborview Center for Pre-hospital Emergency Care in Seattle.

Sudden cardiac arrest, or loss of mechanical activity of the heart, can be caused by a heart attack. Studies show that only about 10% of people who suffer cardiac arrest outside the hospital survive. But effective treatment by CPR can greatly increase a victim's chance of survival.

Standard CPR performed by EMS providers involves chest compressions with interruptions for ventilation using a bag and mask. However, recent studies in animal models suggest that continuous chest compressions (CCC) may be just as good as standard CPR. To date, firefighters and paramedics have not had clear evidence-based guidance on which treatment method is optimal. As a result, treatment often varies from one community to another.

That variation in treatment could soon become a thing of the past, researchers suggest. An international multi-centre research team compared survival rates among 23,709 adults with cardiac arrest who were treated by EMS crews at 114 agencies from June 2011 to May 2015.

Approximately half had received continuous compressions with simultaneous ventilations, while the other half received standard CPR with pauses for ventilations. The study was conducted by the Resuscitation Outcomes Consortium (ROC), which includes clinical sites in the United States and Canada.

Overall, survival to discharge was not significantly different between the continuous chest compressions group and the standard CPR group. A total of 8.9% (about 1,126 patients) from the continuous compressions group survived to reach hospital discharge, while 9.7% (about 1,073 patients) of the standard CPR group reached hospital discharge. The proportion of patients able to carry out all usual activities or requiring some help but able to walk unassisted, was also similar between treatment groups.

However, the standard CPR group had significantly more days alive and out of hospital during the first 30 days following cardiac arrest.

The researchers believe that the benefits of compressions with pauses for ventilation are due to improved blood flow and oxygenation. They are continuing to analyze the data to gain additional insight into the study results.

"This is the first randomized trial to show a significant difference in outcomes after hospital admission among patients treated for out-of-hospital cardiac arrest," Dr Nichol added. "We can improve outcomes for this common health condition. We believe that this study is a significant step in that direction."

Researchers find possible cause of memory loss in Alzheimer's

The mass die-off of nerve cells in the brains of people with Alzheimer's disease may largely occur because an entirely different class of brain cells, called microglia, begin to fall down on the job, according to a new study by researchers at the Stanford University School of Medicine.

The researchers found that, in mice, blocking the action of a single molecule on the surface of microglia restored the cells' ability to get the job done – and re-



versed memory loss and myriad other Alzheimer's-like features in the animals.

The study, published online 8 December 2015 *The Journal of Clinical Investigation*, illustrates the importance of microglia and could lead to new ways of warding off the onset of Alzheimer's disease. The study also may help explain an intriguing association between aspirin and reduced rates of Alzheimer's.

Microglia, which constitute about 10-15% of all the cells in the brain, actually resemble immune cells considerably more than they do nerve cells.

"Microglia are the brain's beat cops," said Katrin Andreasson, MD, professor of neurology and neurological sciences and the study's senior author. "Our experiments show that keeping them on the right track counters memory loss and preserves healthy brain physiology."

A microglial cell serves as a front-line sentry, monitoring its surroundings for suspicious activities and materials by probing its local environment. If it spots trouble, it releases substances that recruit other microglia to the scene, said Andreasson. Microglia are tough cops, protecting the brain against invading bacteria and viruses by gobbling them up. They are adept at calming things down, too, clamping down on inflammation if it gets out of hand. They also work as garbage collectors, chewing up dead cells and molecular debris strewn among living cells – including clusters of a protein called A-beta, notorious for aggregating into gummy deposits called Alzheimer's plaques, the disease's hallmark anatomical feature.

A-beta, produced throughout the body, is as natural as it is ubiquitous. But when it clumps into soluble clusters consisting of a few molecules, it's highly toxic to nerve cells. These clusters are believed to play a substantial role in causing Alzheimer's.

"The microglia are supposed to be, from the get-go, constantly clearing A-beta, as well as keeping a lid on inflammation," Andreasson said. "If they lose their ability to function, things get out of control. A-beta builds up in the brain, inducing toxic inflammation."

The Stanford study provides strong evidence that this deterioration in microglial function is driven, in large part, by the heightened signalling activity of a single molecule that sits on the surface of microglial and nerve cells. Previous work in Andreasson's lab and other labs has shown that this molecule, a receptor protein called EP2, has a strong potential to cause inflammation when activated by binding to a substance called prostaglandin E2, or PGE2.

"We'd previously observed that if we bioengineered mice so their brain cells lacked this receptor, there was a huge reduction in inflammatory activity in the brain," she said. But they didn't know whether nerve cells or microglia were responsible for that inflammatory activity, or what its precise consequences were. So they determined to find out.

Their experiments showed that knocking out EP2 action in A-beta-provoked microglia benefited memory in mice that had either gradually (the "Alzheimer's" mice) or suddenly (the brain-injected mice) acquired excessive A-beta in their brains. Likewise, mouse microglia bioengineered to lack EP2 vastly outperformed unaltered microglia, in A-beta-challenged brains, at such critical tasks as secreting recruiting chemicals and factors beneficial to nerve cells and in producing inflammation-

countering, rather than inflammation-spurring, proteins.

Epidemiological reports suggest that the use of nonsteroidal anti-inflammatory drugs, such as aspirin, can prevent the onset of Alzheimer's – although only if their use is initiated well before any signs of the disorder begin to show up in older people, Andreasson said. "Once you have any whiff of memory loss, these drugs have no effect," she said. NSAIDs' mainly act by blocking two enzymes called COX-1 and COX-2; these enzymes create a molecule that can be converted to several different substances, including PGE2 – the hormone-like chemical that triggers EP2 action.

Although PGE2 is known to regulate inflammatory changes in the brain, it exercises diverse, useful functions in different tissues throughout the body, from influencing blood pressure to inducing labour. Complicating matters, PGE2 is just one of five different prostaglandins originating from the precursor molecule produced by COX-1 and COX-2. So aspirin and other COX-1- and COX-2-inhibiting drugs may have myriad effects, not all of them beneficial. It may turn out that a compound blocking only EP2 activity on microglial cells, or some downstream consequences within microglial cells, would be better-suited for fending off Alzheimer's without side effects, said Andreasson. Meanwhile, her group is exploring the biological mechanisms via which PE2 signalling pushes microglia over to the dark side. **MEH**

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HMC is first healthcare system in world to have all hospitals accredited by JCI

In January 2016, Hamad Medical Corporation (HMC) achieved the significant distinction of becoming the first healthcare system across the globe to have all its hospitals accredited by Joint Commission International under the Academic Medical Center accreditation program. Additionally, the National Ambulance Service, Home Healthcare Service, Stroke Service and Palliative Care, have all received this prestigious accreditation since 2011.

HMC is the main provider of secondary and tertiary healthcare in Qatar and one of the leading hospital providers in the Middle East. For more than three decades, HMC has been dedicated to delivering the safest, most effective and compassionate care to all its patients.

HMC manages eight hospitals – five specialist hospitals and three community hospitals – as well as the National Ambulance Service and has home and residential care.

HMC expands, enhances paediatric services

In an effort to provide the best care for babies and children in Qatar, HMC has expanded their facilities and introduced an array of quality services in paediatric care, earning them a Gold Seal of Approval in healthcare from the internationally-renowned and independent Joint Commission International (JCI).

“Caring for the growing number of newborn babies delivered at Women’s

Hospital in Doha, Qatar, is a top priority for HMC. By expanding our facilities and enhancing our services, we enable our newborn and neonatal teams to deliver the safest, most effective and most compassionate care to each and every one of our patients,” said Dr Hilal Al Rifai, Women’s Hospital Medical Director and Director of its Neonatal/Perinatal Services.

Among the developments, Women’s Hospital has recently expanded its highly specialized, advanced Neonatal Intensive Care Unit (NICU) for high-risk newborns, making it the largest NICU in the region.

Women’s Hospital also partnered with Ambulance Services to launch a nationwide emergency transportation service that transports critically ill babies from all public and private hospitals to the Women’s Hospital’s NICU for specialist tertiary treatment.

In addition, Hamad General Hospital has introduced a new child friendly, state-of-the-art clinic for its paediatric patients. Children visiting the clinic will be seen by the same multi-disciplinary team over time, creating a closer patient relationship between the child, their family and the care team. The Pediatric Emergency Center (PEC) Al Sadd has been expanded to provide additional space and equipment to increase patient satisfaction.

“We have achieved significant progress towards the development of paediatric

services and this is due to the commitment, hard work and dedication of HMC staff across all of our facilities. They exemplify HMC’s commitment to providing the best patient care and continuity of care in the country,” said Dr Mohammad Janahi, Chairman of Pediatrics at HMC.

“We are proud of our staff that successfully underwent the most stringent testing against the toughest international JCI criteria. Our achievement demonstrates HMC’s dedication to providing high-quality healthcare to the children of Qatar,” added Dr Janahi.

HMC recently underwent two months of rigorous on-site inspections by JCI, which identifies measures, and shares best practice in quality and patient safety worldwide.

Since the beginning of January this year, a team of JCI’s international experts and inspectors have closely examined over 1400 measureable elements in the hospitals which make up HMC – all of which have now received official accreditation under the Academic Medical Center standards.

Tertiary hospitals accredited by JCI

HMC’s tertiary hospitals have come through a comprehensive series of inspections by the the JCI with flying colours.

HMC’s four tertiary hospitals - Women’s Hospital (WH), Hamad General Hospital (HGH), Heart Hospital (HH) and the National Center for Cancer Care



In Brief

CVD forum

The World Innovation Summit for Health (WISH) announced that a Cardiovascular Disease (CVD) Forum will be held during its 2016 conference, set to take place from 29-30 November in Doha.

The forum will offer a brief overview of coronary heart disease, including its epidemiology, burden, and pressure on healthcare systems, outlining the distinction between illness prevention and management of acquired risk factors. It will also outline innovations in strategies to ensure prevention. These include lifestyle choices and broader tobacco controls, such as the impact of smoking bans in public places. Additionally, participants will learn about the potential policies and innovations that can be applied more broadly by policymakers from prevention to treatment.

Medical education

HMC's Medical Education Centre has been recognised by the Joint Commission International. HMC's Medical Education Center accreditation was the result of meeting stringent standards required by two additional JCI Chapters: Medical Professional Education and Human Subject Research.

Dr Abdullatif Al-Khal, Deputy Chief Medical Officer and Director of Medical Education at HMC explained the importance of having an accredited Academic Medical Centre: "Our accredited Graduate Medical Education program is designed to deliver high quality training to our residents and ensure that our young doctors have high competence levels that will help them take better care of their patients. Receiving AMC accreditation and meeting exacting medical education standards reflect that the training we deliver to hundreds of young doctors and residents each year is of the highest international standards."



Region's first CyberKnife Suite opened

In December 2015, Qatar's National Center for Cancer Care and Research (NCCCR) opened the region's first CyberKnife Suite. Located in the Department of Radiation Oncology, the CyberKnife Suite offers a revolutionary treatment technology for cancer.

Dr Noora Al Hammadi, Senior Consultant Radiation Oncologist and Chair of Radiation Oncology explained the benefits: "The new CyberKnife Suite technology is able

to treat tumours in most parts of the body more accurately, meaning high radiotherapy doses can be delivered to the tumour site with less side effects and damage to the surrounding healthy tissues.

"The CyberKnife Suite adds to the NCCCR's existing range of radiation treatments for cancer and improves the quality and safety of care, with faster recovery and fewer side effects for our patients," noted Dr Hammadi.



Hamad General Hospital recently opened a Pediatric Continuity Clinic.

and Research (NCCCR) – provide specialist care services for patients.

New technology, services and processes have been implemented to improve quality and patient experience at all four ter-

tiary hospitals in line with the JCI's stringent healthcare standards.

Pediatric Continuity Clinic

HGH officially opened its new Pediat-



In Brief

Emerging Leaders

The World Innovation Summit for Health (WISH) concluded the first edition of its global Academy for Emerging Leaders in Patient Safety in March in Doha. The programme, organised in partnership with Weill Cornell Medicine - Qatar (WCM-Q), aimed to provide comprehensive training for faculty and students in the healthcare industry in a bid to promote the delivery of safe and high-quality patient care.

Nearly 100 Qatar-based faculty and health science students took part in the programme, including participants from Hamad Medical Corporation (HMC), Sidra Medical and Research Center, Weill Cornell Medicine - Qatar, Qatar University, College of the North Atlantic Qatar (CNA-Q), and the University of Calgary in Qatar (UCQ).

Home healthcare

HMC's Home Healthcare Services (HHCS) conducted a Home Care Day exhibition with the theme: "Your health is our primary concern" to highlight the importance of home healthcare in the community, and to celebrate the work of the multidisciplinary teams comprising the HHCS.

The HHCS provides holistic and specialized support to patients who have been discharged from the hospital but require follow-up care and rehabilitation.

The exhibition showcased the specialized services provided by the multidisciplinary teams comprising the HHCS, including patient educators, speech therapists, respiratory therapists, subspecialty wound care nurses, occupational therapists, physical therapists, dietitians, clinical pharmacists, social workers, private nursing services, medical equipment team, nurses, laboratory, home healthcare physicians, HMC's Mobile Doctor Service, referral management, and the quality management team. MEH



ric Continuity Clinic at the end of 2015. The clinic features eight themed treatment rooms providing care for general outpatient services for children. The clinic is staffed by a multi-disciplinary care team and is operated under a patient-centred model.

By ensuring continuity of care for patients the clinic improves quality and safety standards within the clinic," said Dr Yousef Al Maslamani, Medical Director at HGH.

Women's Hospital

Quality and safety has also been at the forefront of recent improvements at Heart and Women's hospitals. WH has successfully implemented a lifesaving quality improvement project for babies born prematurely. The Golden Hour Delivery Room Management project adopts evidenced-based practice to provide the best possible care to extreme preterm babies.

Heart Hospital

The Heart Hospital opened its Advanced Heart Failure Unit last year to provide specialized multi-disciplinary care for people living with advanced heart failure. The new unit offers state-of-the-art treatment and monitoring technology and plays a significant role in attending to patients' physical, emotional and psychological needs, and in improving the quality of care they receive.

"The services at all four of HMC's tertiary hospitals were comprehensively measured against the highest interna-

tional standards as part of the JCI inspections. The results endorsed their high standards of quality and safety," stated Professor Adeel Butt, Interim Chief Quality Officer for HMC and the Director of the Hamad Healthcare Quality Institute.

The services at all four of HMC's tertiary hospitals were comprehensively measured against the highest international standards as part of the JCI inspections.

Community hospitals commended by JCI

HMC's community hospitals' delivery of high quality specialized care to the population living outside of Doha has been commended by the JCI.

Al Wakra, Al Khor and The Cuban Hospitals are bringing care closer to the communities so patients can access that care without travelling to Doha.

"We have seen significant growth of HMC's three general hospitals in Al Khor, Al Wakra and Dukhan. These hospitals have an important role to play in relieving pressure on the busy Doha hospitals and providing care closer to patients' homes," said Mohammed Al Ju-



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saiman, Deputy Chief of HMC's General Hospitals Group and Chief Executive Officer of Al Khor Hospital.

"Patients living in these areas are now able to access a full range of secondary healthcare services close to home, and no longer need to travel to Doha for much of their hospital care," he said.

In 2014, one quarter of the babies delivered in the Hamad network of hospitals were delivered in the general and community hospitals, and that number continues to grow.

"The growth and expansion of our maternity services in Dukhan, Al Wakra and Al Khor has provided expectant mothers with greater options for their care," said Al Jusaiman, adding: "The underlying principle of one system, multiple sites means that patients can expect uniformly high standards of care wherever and whenever they choose to access our services."

The three hospitals have also seen a 37% increase in outpatient department visits in 2014, which illustrates patients are able to access more specialist services within their local communities.

The hospitals continue to add more specialist clinics and services. Al Wakra Hospital recently opened a state-of-the-art paediatric day surgery service. Al Khor Hospital has doubled obstetrics and gynaecology clinics and The Cuban Hospital has opened a patient recovery hostel for patients who need follow-up care and additional recovery time before being fully discharged.

Mental health community services expand

Community mental health services for children and adolescents have received a boost with the inauguration of the Enaya Continuing Care Center in Muaither, according to Dr Majid Al Abdulla, HMC Deputy Chair Mental Health Services.

The opening of the centre is considered a milestone for mental health services in Qatar where community-based mental health care is now available in a home-like environment for the first time, a service that is expected to grow in the future.

The child and adolescent mental health section at the new centre is a multi-disciplinary outpatient service catering to children and adolescents up to

Sidra's National Development programs set to boost interest in medical careers

Sidra Medical and Research Center's (Sidra) National Development programs for 2016 will include education grants, internship and job shadowing opportunities.

Sidra is currently under construction in Doha, Qatar. It will be a groundbreaking hospital, research and education institution, focusing on the health and wellbeing of children and women regionally and globally. Sidra will be a fully digital facility, incorporating the most advanced information technology applications in clinical, research and business functions. Sidra will initially have 400 beds with infrastructure to enable expansion to 550 beds in a subsequent phase.

Sidra's Education Grant and Graduate Associate programs are set up specifically to encourage Qataris to take up careers clinical medicine and prepare them for roles at Sidra. The Education Grant program provides grants for Qatari students studying in clinical fields from approved local and international universities. The Graduate Associate program offers graduates who have successfully finished their Education Grant-supported study to join Sidra for different career opportunities.

Dr Eiman Al-Ansari, Executive

Director of Learning and Development and Director of National Development at Sidra said: "Our programs are developed to give mentorship and career guidance opportunities to nationals and motivate them to take up key roles in the healthcare sector. We are looking for ambitious, dynamic youth who share our commitment to transforming healthcare in Qatar and the region. Our goal is to target those currently studying for clinical degrees, but also to encourage students and guide them to different career paths in the healthcare sector."

Following the success of the job shadowing program with the Bedaya Center last year, Sidra has continued its partnership by launching two job shadowing programs this year. The program aims to provide an opportunity for high school students to work and shadow a Sidra employee for a day. More than 16 students were mentored by department leads at Sidra including Communications, Recruitment and the Simulation Center in the first round in January. The next round of the job shadowing program will take place in August 2016.

■ For more information, contact: scholarship@sidra.org

the age of 18, said Dr Abdulla.

"Treatment of child and adolescents in a community setting for conditions such as ADHD and other mood disorders can help to remove the stigma of mental illness, by replacing the institution with a home-like environment and putting young patients at ease with the process of recovery," said Dr Abdulla.

"We're likely to see similar facilities opening in other parts of the country soon," added Dr Abdulla.

The Enaya Continuing Care Center also provides home care and family meet-

ings and, in addition, this centre will be used to train doctors in this advanced subspecialty.

Access to the services is by referral through either a Primary Health Care Corporation centre, private clinic, or an HMC service such as the paediatric department at Hamad General Hospital or through HMC's Psychiatry Department.

The recently inaugurated continuing care center was also a key contributor in the accreditation of HMC by JCI, according to Continuing Care Group Chief, Mahmoud Al Raisi.



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“Our audit was rigorous and achieving this accreditation involved months of hard work and co-operation from various departments. This is a great illustration of excellent teamwork and commitment to quality, and provides evidence of the maturity of our healthcare services,” said Al Raisi.

New laboratory automation system launched at Hamad General Hospital

A new Laboratory Automation System was officially opened on 2 April in Hamad General Hospital (HGH) by H.E. Dr Hanan Mohamad Al Kuwari, the Qatari Minister of Public Health.

The new Laboratory Automation System handles and analyzes large volume specimens and can accommodate up to 96,000 tests a day. The computerized control system allows more functionality such as quality control monitoring, the auto verification of results and the ability to collect data for further improvements.

“The new automated system will improve efficiencies, reduce the turnaround times for tests to be returned and more importantly, ensure that high quality patient safety is maintained thanks to the automation process,” said Dr Al Kuwari.

Hi-tech pharmacy dispensing robots inaugurated

Two state of the art pharmacy “robots” (MACH 4 Omnicell) that combined can dispense 1200 prescriptions per hour were officially inaugurated 18 April at Hamad General Hospital by Dr Al Kuwari.

The biggest of its kind in the region, the MACH 4 Omnicell will significantly reduce the amount of time patients spend waiting for their medications in the pharmacy.

The new robotic pharmacy system will be able to dispense 1200 medications per hour and will enable HMC’s highly trained pharmacists to spend more one-on-one time with each patient. The new equipment will be fully integrated with the new Clinical Information System (CIS), meaning a better patient experience and less likelihood of human error in reading the scripts.

It is the second automated pharmacy system installed in an HMC hospital, with a similar one operating at Al Wakra Hospital.



Dr Hanan Mohamed Al Kuwari, the Minister of Public Health, inspects the new robotic pharmacy

The system is actually two robots combined – the Medimat and the Speedbox which work together to manage dispensary for both complex prescriptions as well as for fast moving items that are in high demand. The total stock capacity for both is 14,000 packs.

“This will mean a shorter wait time for our patients and our highly trained pharmacists will be able to spend more time

with each patient, imparting vital information and education about their medications,” said Dr Al Kuwari.

“We are always looking at ways to improve the patient experience and this is an excellent example of this commitment. New technology, services and processes have been implemented to improve quality and patient experience at all HMC hospitals and facilities. **MEH**

You make the difference

College of the North Atlantic – Qatar helping healthcare practitioners meet their continuing professional development goals

March 7, 2016 marked an important day for thousands of healthcare providers in Qatar. After years of discussion, planning, consultation and hard work, the Qatar Council for Healthcare Practitioners (QCHP) launched its much-anticipated framework for medical licensing.

From this point forward, all healthcare practitioners require proof that they are partaking in continuing professional development (CPD) activities to renew their medical licensing in the State of Qatar. Under the tireless direction of Dr Samar Aboulsoud, Acting Chief Executive Officer of QCHP, the accreditation department worked to deliver on this directive, since it was launched by Emiri decree in 2013. Engagement and support for the framework was garnered from various internal stakeholders as well as external consultants including the Royal College of Canada International (RCCI).

College of the North Atlantic - Qatar (CNA-Q) shares the sense of pride and achievement in this announcement, as the College's School of Health Sciences is a main provider of allied healthcare training for the State. Along with Qatar University, CNA-Q was one of the first post-secondary institutions to step forward in support of this initiative, and sought accreditation to provide CPD activities to the wider Qatari healthcare sector.

"Instituting continuing professional development requirements is a commitment to enrich competency that ensures an even higher level of patient safety and care," said Irene O'Brien, Dean of CNA-Q's School of Health Sciences. "For many health care professionals, it is not only about the requirement, but the desire to be more, to do more, and work toward the world-class healthcare system Qatar deserves."

As one of the first institutions to seek

accreditation status from QCHP as a preferred provider of CPD activities, College of the North Atlantic - Qatar is poised to meet the anticipated demand of CPD training. CNA-Q is one of the largest post-secondary institutions in Qatar, and is the State's premier technical college.



The College's mandate is to meet identified needs in the labour market by producing highly-skilled graduates. By offering nine healthcare diploma programs, the College has a solid curriculum base, state-of-the-art facilities and certified instructors in CPD-related areas such as: oral health care, diabetes education and conflict resolution management. Most importantly, the School of Health Sciences has many strong and notable connections with healthcare partners in the State to ensure graduates

are trained appropriately for their future careers, and that industry partners receive the best employees.

To successfully launch CNA-Q's offering of CPD activities, the College's Corporate Services department joined forces with School of Health Sciences to help identify and develop over 20 CPD activities that comply with QCHP criteria. CNA-Q is further expanding its relationship with QCHP by collaborating to develop an on-line needs assessment survey that will gather input from all healthcare providers about their educational medical licensing preferences and delivery models.

"Launching the CPD framework is a significant milestone for Qatar's health sector, and we are pleased and proud to play a role in progressing quality healthcare," Dr Ken MacLeod, CNA-Q President. "Our goal is to provide a multi-disciplinary suite of CPD activities that are meaningful, affordable and accessible. CNA-Q's technology-rich learning environment is designed for competency-based learning which targets current practitioners."

In the past month, more than 500 healthcare practitioners from various disciplines have attended accredited CPD activities at CNA-Q, garnering credit towards medical license renewal from a wide

variety of topics from healthcare communications to dental radiography. It is anticipated that this number will increase exponentially over the years as CNA-Q continues to build capacity in order to meet this rapidly emerging educational need in the healthcare sector.

■ For registration or for more information about group rates, please contact: CNA-Q Corporate Services Department Telephone: +974 4495-2111 Email: corporate.training@cna-qatar.edu.qa



(From left to right) Prasad Naik, Business Development Manager; Maged Shenouda, Senior Sales Executive; Marwan Soliman, Sales and Marketing Manager; Ahmed El Shaarawy, Senior Sales Specialist; Seifeldin Beibars, Sales and Applications Specialist

Aamal Medical – the leading distributor of medical equipment and healthcare solutions

Aamal Medical is one of the leading Medical Equipment and Surgical Consumables distributors in Qatar with major market share. The company is a subsidiary of Aamal Q.S.C. a well-established company with diversified activities consisting of more than nine companies under its banner.

Aamal Medical specializes in the sale of medical equipment, medical and surgical consumables, hospital furniture, spare parts and consumables as well as health care and IT solutions to healthcare facilities, and also provides full-service maintenance contracts to customers. Aamal Medical also offers complete integrated solutions such as hospital information systems, enterprise resource planning solutions for health care, integrated operating theatres and total integrity pharmacy robotic systems.

The company works with over 60 medical equipment suppliers from all over the world, and is the exclusive agent for major international well known suppliers. It also caters to a wide base of customers in the medical sector including government, semi-government and private sectors and with the development of the healthcare sector. It is expected that market share will increase as more projects are acquired.

Aamal Medical is committed to supply the Qatari market with high quality medical devices and consumables through dedicated and skilled sales and technical team. It is also one of the main players in the IT healthcare market and has been awarded several times for its distinguished performance by Hamad Medical Corporation

and other authorities. The company has delivered in Qatar the first Health Information System (HIS), Total Solution for the Pharmacy Automation and PACS (Picture Archiving and Communication System), in addition to Complete Integrated Operating Room Solutions (OR1). Aamal Medical is an expert in total package solution projects particularly for operation theatres/ICU and pharmacy automation.

Aamal Medical is a step ahead in health care service. In the last 10 years, healthcare services have moved strongly towards turn-key projects associated with high expectations of total solutions and services integration. It is well prepared with its outstanding performance in healthcare projects, new trends in design and keeping medical applications and requirements up to date.

Through a chain of the finest suppliers from around the world, Aamal Medical has built up a team that can attend to various healthcare projects including the following:

1. Modular rooms (walls, floors, windows, blinds, etc.): Aamal Medical is the first company in Qatar, to make use of these rooms, which can be rearranged by adding or removing components depending on the size and functionality needs of the user.
2. Medical electronics (monitors, defibrillators): Every ambulance rushing to save a life carries a defibrillator supplied and maintained by Aamal Medical; Every Qatar Airways plane carries the same.
3. Comprehensive range of endoscopic products: Supplied by Aamal Medical to assure the best diagnostic treatment in all operating rooms in Qatar.



Sherif Shehata, General Manager

4. Health Services Integration: To reduce the hassle that medical staff face, Aamal Medical supplies the most advanced, fully automated medical delivery systems with global communications for all healthcare facilities. This allows patient information to be accessed with just one click, informing the doctor of his patient's history and the medications he has received in the past.

To ensure a better understanding of the growing demands within the local healthcare sector in Qatar, the company focuses on identifying the market's requirements and maximizing the effective usage of resources. Aamal Medical aims to maintain and enhance their leadership stance while offering their clients an overall distinguished experience by building on its well-entrenched reputation, and providing the most technologically advanced solutions in the medical field, aligned with supporting Aamal's team of professionals with consistent development programs. **MEH**

End malaria for good

Each year, WHO and partners unite around a common World Malaria Day theme. This year's theme "End malaria for good" reflects the vision of a malaria-free world set out in the "Global technical strategy for malaria 2016-2030". Adopted in May 2015 by the World Health Assembly, the strategy aims to dramatically lower the global malaria

burden over the next 15 years. Its goals are ambitious but attainable:


- reducing the rate of new malaria cases by at least 90%
- reducing malaria death rates by at least 90%
- eliminating malaria in at least 35 countries

● preventing a resurgence of malaria in all countries that are malaria-free

The timeline of 2016-2030 is aligned with the "2030 Agenda for sustainable development", the new global development framework endorsed by all UN Member States.

According to WHO's "World malaria report 2015", there has been a major decline in global malaria cases and deaths since 2000. Progress was made possible through the massive expansion of effective tools to prevent and treat malaria, such as insecticide-treated mosquito nets, diagnostic testing and anti-malarial medicines.

Significant challenges remain however: globally, about 3.2 billion people – nearly half of the world's population – are at risk of malaria. In 2015, there were an estimated 214 million new cases of malaria and 438,000 deaths, mainly in sub-Saharan Africa. Millions of people are still not accessing the services they need to prevent and treat malaria.

World Malaria Day offers an annual opportunity to highlight advances in malaria control and to commit to continued investment and action to accelerate progress against this deadly disease. To achieve the targets of the "Global technical strategy" annual investment for malaria control will need to triple from current levels, reaching US\$8.7 billion annually by 2030. 

Malaria in Yemen

WHO's Regional Director for the Eastern Mediterranean Dr Ala Alwan and Yemen's Minister of Public Health and Population Dr Nasir Baoum met in the WHO Regional Office in Cairo recently to discuss the health situation in Yemen, focusing on the spread of malaria in the country and WHO's scaled-up response.

Malaria is endemic in Yemen, with more than 78,336 suspected cases and 31,791 laboratory-confirmed cases reported in 2015. However, these figures could be much higher as they only represent cases detected by sentinel sites included in the disease early warning system. More than 78% of Yemen's population lives in at-risk areas, with 25% living in high-risk areas. Limited access to clean water and sanitation has significantly increased the risk of infectious diseases, such as dengue fever and malaria further spreading.

With a number of challenges preventing an effective and timely response, the risk of an epidemic is high: fuel shortages and the consequent increasing cost of fuel have created difficulties in transporting medicines and medical supplies. Shortages of health workers are also affecting the functionality of health facilities and preventing the delivery of health services.

"I am extremely concerned about the increasing number of malaria cases in Yemen, especially among internally displaced persons who need increased protection," said Dr Alwan. "The violence has led to a number of

challenges in the delivery of vector control and surveillance services. Our main priority now is to make sure that we can prevent an epidemic before it is too late."

WHO continues to support insecticide spraying interventions in houses as a control measure for both dengue and malaria in Al-Hudaydah, Abyan, Aden, Taiz, Hadramout, Shabwah and Al-Mahra. Last month, a boat carrying 103 tonnes of anti-malarial medicines, trauma kits, interagency emergency health kits, and diarrhoeal diseases kits arrived in Aden port. These supplies were distributed by WHO and the Ministry of Health and Population to health facilities in 11 governorates, including Abyan, Aden, Shabwa, Hadramout, Marib and Al Jouf governorates, as well as Taiz City.

Increasing immunization coverage, especially in hard-to-reach areas, was key topic also discussed during the meeting in Cairo. Although the overall vaccination coverage rate in the country has not significantly decreased from pre-crisis levels, coverage rates in some affected districts are less than 50%. One of the main challenges facing health staff is a lack of fuel to maintain the cold chain for vaccines. To help ensure a functional cold chain, WHO has provided 162 refrigerators to the Expanded Programme on Immunization office in Sana'a. WHO has also provided substantial funding to cover the cost of fuel for the cold chain to ensure the potency of vaccines.

Vaccines against malaria

There are currently no licensed vaccines against malaria. One research vaccine against *P. falciparum*, known as RTS, S/AS01, is most advanced. This vaccine has been evaluated in a large clinical trial in 7 countries in Africa and received a positive opinion by the European Medicines Agency in July 2015.

In October 2015, 2 WHO advisory groups recommended pilot implementations of RTS,S in a limited number of African countries. These pilot projects could pave the way for wider deployment of the vaccine in 3 to 5 years, if safety and effectiveness are considered acceptable.

Diabetes in the spotlight

There are now more than 422 million people worldwide with diabetes. It is pandemic and is a global public health issue. The WHO issued its first 'Global report on diabetes' to coincide with World Health Day on 7 April – with a call to improve preventive measures and, for diabetics, to better manage the condition. *Middle East Health reports.*

World Health Day was marked on 7 April with a call by the WHO to better manage diabetes for people who already have the condition and to improve prevention of the disease.

“Actions are needed both by governments and by people themselves,” says Dr Ala Alwan, WHO Regional Director for the Eastern Mediterranean. “While individuals need to take responsibility for their own health through maintaining a healthy lifestyle, governments are respon-

sible for creating environments that promote healthy living and for establishing measures that reduce the exposure of the population to risk behaviours that can lead to diabetes.”

Since 1980, the number of adults with diabetes worldwide has quadrupled from 108 million to 422 million in 2014, according to a new study published in *The Lancet*. The findings provide the most comprehensive estimates of worldwide diabetes trends to date and show that diabetes

is fast becoming a major problem in low and middle income countries.

Professor Majid Ezzati, from Imperial College London, and senior author of the study, says: “Diabetes has become a defining issue for global public health. An ageing population, and rising levels of obesity, mean that the number of people with diabetes has increased dramatically over the past 35 years.

“Rates of diabetes are rising quickly in China, India, and many other low and middle income countries, and if current trends continue, the probability of meeting the 2025 UN global target is virtually non-existent.”

Diabetes is a pandemic that remains hidden throughout most of the world, with up to half of all people with diabetes worldwide remaining undiagnosed. WHO projects that diabetes will be the 7th leading cause of death by 2030.

In the Eastern Mediterranean Region, 14% of the population has diabetes. Studies indicate that in some countries, more than 20% of adults have diabetes.

According to the study published in *The Lancet*, between 1980 and 2014, diabetes has become more common among men than women. Global age-adjusted prevalence of diabetes doubled among men (4.3% to 9.0%) and increased by two-thirds among women (5.0% to 7.9%).

Although there was an increase in overall rates (crude prevalence) of diabetes in many countries in Western Europe, age-adjusted rates were relatively stable suggesting that most of the rise in diabetes in Western Europe between 1980 and 2014

It can be prevented

Diabetes can to a large extent be prevented or delayed through simple measures that can be taken by both individuals and governments.

Individuals can take these actions:

- achieve and maintain a healthy body weight
- become active and stay active throughout the life course
- eat a healthy diet of between 3 and 5 servings of fruit and vegetables each day and reduce sugar, salt and saturated fat intake
- avoid tobacco use – smoking increases the risk of heart attacks and strokes

Governments can take these actions:

- conduct national public awareness campaigns on diabetes, diet and physical activity
- create and protect physical environments that promote physical activity

- regulate the marketing of unhealthy foods and non-alcoholic beverages to children

- restrict the marketing of and increasing taxation on foods high in saturated fats and free sugars

- subsidize the production and marketing of healthy food options

- ensure free access to acceptable standard for health care for people with diabetes.

Governments should also implement certain key measures that reduce exposure to risk behaviours for heart attacks and strokes, which contribute significantly to complications and death among people with diabetes. These key measures focus on reducing the salt content of commercially produced foods, and reducing tobacco use and exposure to tobacco smoke.

was due to the ageing population. In contrast, rates of diabetes increased significantly in many low and middle income countries – such as China, India, Indonesia, Pakistan, Egypt and Mexico. No country saw a significant decrease in diabetes prevalence.

The study did not differentiate between type 1 and type 2 diabetes, but most (85-95) of cases of adult diabetes are type 2 so the observed rise is likely to be due to increases in type 2 diabetes.

Professor Ezzati notes: “Obesity is the most important risk factor for type 2 diabetes and our attempts to control rising rates of obesity have so far not proved successful. Identifying people who are at high risk of diabetes should be a particular priority since the onset can be prevented or delayed through lifestyle changes, diet or medication.”

Eastern Mediterranean region

Diabetes is one of the four main noncommunicable diseases and with cancer, heart attacks and strokes, and lung disease, is responsible for 1.7 million deaths in the Region every year, according to the WHO. These diseases all share four main lifestyle-related risk behaviours, namely unhealthy diet, physical inactivity, tobacco use and inappropriate use of alcohol.

“Efforts to address the diabetes burden should be considered within the context of the overall efforts to combat the four main noncommunicable diseases,” says Dr Alwan.

“People with diabetes can live healthy and productive lives if the condition is diagnosed early and effectively managed by health care providers and by people themselves,” says Dr Alwan. Early detection and appropriate management – including the use of medications, lifestyle measures and regular follow-up – can prevent or slow the progression of the condition, and the development of complications.

Ineffective management of diabetes can lead to heart attacks, strokes, kidney failure, blindness, impotence, amputations and infections. The potential impact of simple diet modifications and increased physical activity on preventing and improving diabetes is huge. Individuals and governments can all take action to change current unhealthy behaviours, in order to reduce diabetes.

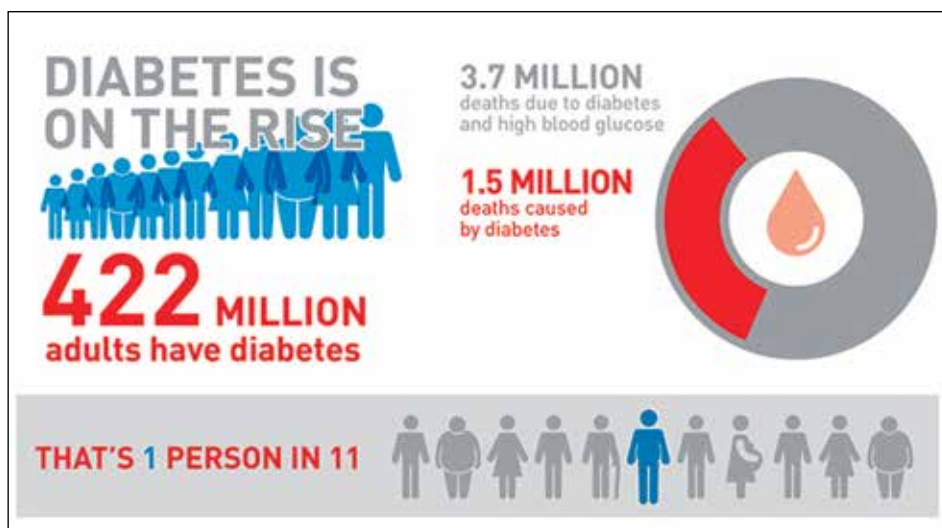
In its first “Global report on diabetes”, WHO highlights the need to step up prevention and treatment of the disease.

“If we are to make any headway in halting the rise in diabetes, we need to rethink our daily lives: to eat healthily, be physically active, and avoid excessive weight gain,” says Dr Margaret Chan, WHO Director-General. “Even in the poorest settings, governments must ensure that people are able to make these healthy choices and that health systems are able to diagnose and treat people with diabetes.”

Reference

Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4.4 million participants, *The Lancet*, 9 April 2016.

■ doi: 10.1016/S0140-6736(16)00618-8



Global report on diabetes

Among the key findings from the WHO’s “Global report on diabetes” are:

- The number of people living with diabetes and its prevalence are growing in all regions of the world. In 2014, 422 million adults (or 8.5% of the population) had diabetes, compared with 108 million (4.7%) in 1980.
- The epidemic of diabetes has major health and socioeconomic impacts, especially in developing countries.
- In 2014, more than 1 in 3 adults aged over 18 years were overweight and more than one in 10 were obese.
- The complications of diabetes can lead to heart attack, stroke, blindness, kidney failure and lower limb amputation. For example, rates of lower limb amputation are 10 to 20 times higher for people with diabetes.
- Diabetes caused 1.5 million deaths in 2012. Higher-than-optimal blood glucose caused an additional 2.2 million deaths by increasing the risks of cardiovascular and other diseases.
- Many of these deaths (43%) occur prematurely, before the age of 70 years, and are largely preventable through adoption of policies to create supportive environments for healthy lifestyles and better detection and treatment of the disease.
- Good management includes use of a small set of generic medicines; interventions to promote healthy lifestyles; patient education to facilitate self-care; and regular screening for early detection and treatment of complications.



Global report on diabetes
www.who.int/diabetes/global-report

New SARS-like virus poised to infect humans

A SARS-like virus found in Chinese horseshoe bats may be poised to infect humans without the need for adaptation, overcoming an initial barrier that could potentially set the stage for an outbreak according to a study at the University of North Carolina at Chapel Hill.

The work, led by Ralph Baric, Ph.D., professor of epidemiology at UNC's Gillings School of Global Public Health, comes on the heels of two recent high-profile outbreaks – Ebola and Zika – for which there are no vaccines. The two outbreaks combined claimed thousands of lives and cost billions in foregone economic growth.

“The capacity of this group of viruses to jump into humans is greater than we originally thought,” said Vineet Menachery, Ph.D., the study’s first author. “While other adaptations may be required to produce an epidemic, several viral strains circulating in bat populations have already overcome the barrier of replication in human cells and suggest re-emergence as a distinct possibility.”

Baric and Menachery worked with SARS-like coronavirus sequences isolated from Chinese horseshoe bats, where SARS originated. Based on the sequences, they reconstructed the viruses to evaluate their potential to infect human cells and in mice. They found that the newly identified virus, known as WIV1-CoV, could bind to the same receptors as SARS-CoV. They also showed that the virus readily and ef-

ficiently replicated in cultured human airway tissues, suggesting an ability to jump directly to humans.

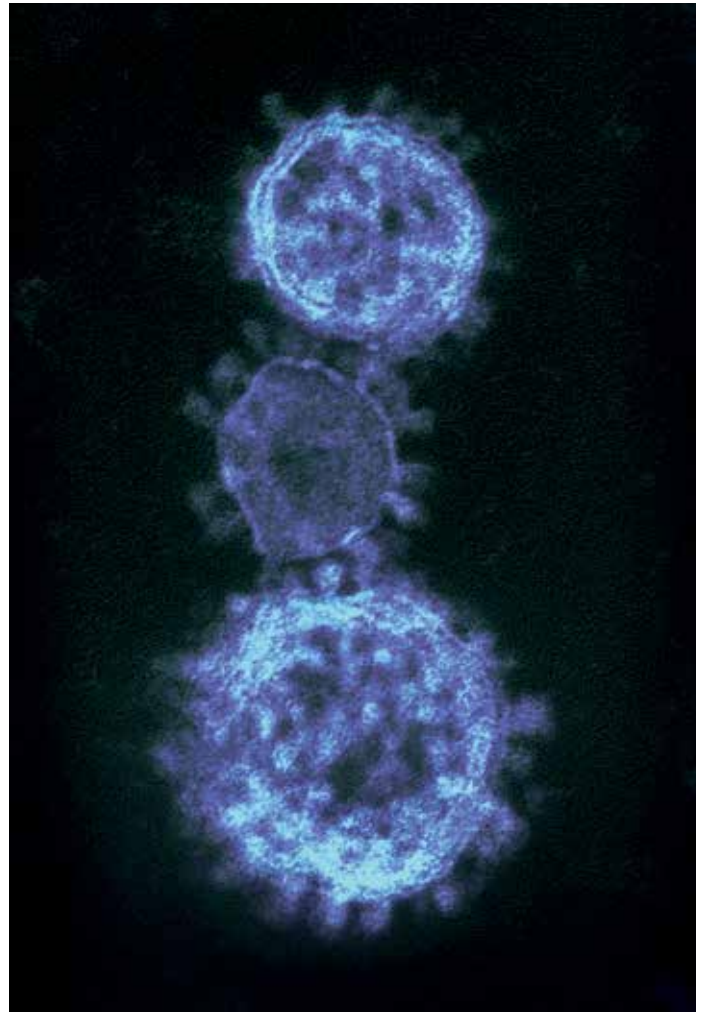
“To be clear, this virus may never jump to humans, but if it does, WIV1-CoV has the potential to seed a new outbreak with significant consequences for both public health and the global economy,” said Vineet, whose work is reported in the 13 March 2016 online version of the *Proceedings of the National Academy of Sciences*.

The research team also found that antibodies developed to treat SARS were effective in both human and animal tissue samples against WIV1-CoV, providing a potent treatment option if there were an outbreak. However, the limitation to treat with antibodies is the same as with ZMapp, the antibody approach used for Ebola: producing it at a large enough scale to treat many people. Also, in terms of prevention, existing vaccines against SARS would not provide protection for this new virus due to slight differences in the viral sequence.

SARS, short for severe acute respiratory syndrome, was first seen in an outbreak in 2002 and resulted in 8,000 cases and nearly 800 deaths. Spread through airborne contact, its onset presents symp-

toms similar to the flu with a dry cough but can accelerate rapidly to pneumonia, filling the lungs with fluid and putting extreme stress on the body’s immune system. According to the Centers for Disease Control and Prevention, SARS’ mortality rate can range from less than one percent in patients below 24 years old to more than 50% in patients aged 60 and older. Baric and his team believe that WIV1-CoV has the potential to induce similar results with proper adaptation to humans.

“This type of work generates information about novel viruses circulating in animal populations and develops resources to help define the threat these pathogens may pose to human populations,” Baric said. “It’s important to note that it’s not an approach that’s limited to SARS or SARS-like viruses. It can be applied to other emerging pathogens to helping us prepare for the next emergent virus, whether it be MERS, the Zika virus or something we haven’t even heard of yet.” MEH



More deaths in Saudi

In the latest update on MERS-CoV from WHO, before going to press, the organisation stated that between 1 and 15 April 2016, the National IHR Focal Point for the Kingdom of Saudi Arabia notified WHO of 10 additional cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection, including 3 deaths.

Contact tracing of household and healthcare contacts was ongoing for these cases.

The National IHR Focal Point for the Kingdom of Saudi Arabia also notified WHO of the death of 2 MERS-CoV cases that were reported in an earlier WHO update on 14 April.

Globally, since September 2012, WHO has been notified of 1,724 laboratory-confirmed cases of infection with MERS-CoV, including at least 623 related deaths.

Risk assessment

WHO warns that MERS-CoV causes severe human infections resulting in high mortality and has demonstrated the ability to transmit between humans. So far, the observed human-to-human transmission has occurred mainly in healthcare settings.

WHO notes that based on the current situation and available information, all Member States are encouraged to continue their surveillance for acute respiratory infections and to carefully review any unusual patterns.


Infection prevention and control measures are critical to prevent the possible spread of MERS-CoV in healthcare facilities. It is not always possible to identify patients with MERS-CoV early because

Healthcare workers should always apply standard precautions consistently with all patients, regardless of their diagnosis. Droplet precautions should be added to the standard precautions when providing care to patients with symptoms of acute respiratory infection; contact precautions and eye protection should be added when caring for probable or confirmed cases of MERS-CoV infection -- WHO

like other respiratory infections, the early symptoms of MERS-CoV are non-specific. Therefore, healthcare workers should always apply standard precautions consistently with all patients, regardless of their diagnosis. Droplet precautions should be added to the standard precautions when providing care to patients with symptoms of acute respiratory infection; contact precautions and eye protection should be added when caring for probable or confirmed cases of MERS-CoV infection; airborne precautions should be applied when performing aerosol generating procedures.

High risk

Until more is understood about MERS-CoV, people with diabetes, renal failure, chronic lung disease, and immunocompromised persons are considered to be at high risk of severe disease from MERS CoV infection. Therefore, these people should avoid close contact with animals, particularly camels, when visiting farms, markets, or barn areas where the virus is known to be potentially circulating. General hygiene measures, such as regular hand washing before and after touching animals and avoiding contact with sick animals, should be adhered to.

Food hygiene practices should be observed. People should avoid drinking raw camel milk or camel urine, or eating meat that has not been properly cooked. 

Inadequate infection control

The largest outbreak of Middle East respiratory syndrome (MERS) outside the Middle East occurred in South Korea in 2015 and resulted in 186 laboratory-confirmed infections, including 36 deaths. Some hospitals were considered epicentres of infection and voluntarily shut down most of their operations after nearly half of all transmissions occurred in hospital settings. However, the ways that MERS-coronavirus (MERS-CoV) is transmitted in healthcare settings are not well understood.

A recent Korean study published in *Clinical Infectious Diseases* explored the possible contribution of contaminated hospital air and surfaces to MERS transmission and found evidence for extensive viable MERS-CoV contamination of the air and surrounding materials in MERS outbreak units in a Korean hospital. The researchers found MERS-CoV in viral cultures of four out of seven air samples as well as 15 of 68 surface swabs.

The researchers say there needs

to be further study of the possible scenarios for contact and airborne transmission of MERS-CoV and say their study raises “concern regarding the adequacy of current infection control procedures”.

■ doi: 10.1093/cid/ciw239)

King Fahd General Hospital

Another recent study – published in *Emerging Infectious Diseases* – of a MERS outbreak in Jeddah’s King Fahd General Hospital found that the outbreak – during March-May 2014 that infected many persons who worked or received medical treatment at the hospital – was largely due to “infection control deficiencies included limited separation of suspected MERS patients, patient crowding, and inconsistent use of infection control precautions”.

The researchers note: “Continued vigilance and strict application of infection control precautions are necessary to prevent future MERS outbreaks.”

■ doi: 10.3201/eid2205.151797

Zika virus may be tied to acute disseminated encephalomyelitis

The Zika virus may be associated with an autoimmune disorder that attacks the brain's myelin similar to multiple sclerosis, according to a small study that was presented at the American Academy of Neurology's 68th Annual Meeting in Vancouver, in April.

"Though our study is small, it may provide evidence that in this case the virus has different effects on the brain than those identified in current studies," said study author Maria Lucia Brito Ferreira, MD, with Restoration Hospital in Recife, Brazil. "Much more research will need to be done to explore whether there is a causal link between Zika and these brain problems."

For the study, researchers followed people who came to the hospital in Recife from December 2014 to June 2015 with symptoms compatible with arboviruses, the family of viruses that includes Zika, dengue and chikungunya. Six people then developed neurologic symptoms that were consistent with autoimmune disorders and underwent exams and blood tests. The authors saw 151 cases with neurological manifestations during a period of December 2014 to December 2015.

All of the people came to the hospital with fever followed by a rash. Some also had severe itching, muscle and joint pain and red eyes. The neurologic symptoms started right away for some people and up to 15 days later for others.

Of the six people who had neurologic problems, two of the people developed acute disseminated encephalomyelitis (ADEM), a brief but severe attack of swelling of the brain and spinal cord. ADEM also attacks the nerves of the central nervous system and damages their myelin insulation, which, as a result, destroys the white matter. In both cases, brain scans showed signs of damage to the brain's white matter.

Unlike multiple sclerosis (MS), ADEM usually consists of a single attack that most people recover from within six months. In some cases, the disease can reoccur. Four of the people developed Guillain-Barré syndrome (GBS), a syndrome that damages the myelin of the peripheral nervous system and can lead to muscle weakness. It has a previously reported association with the Zika virus.

When they were discharged from the hospital, five of the six people still had problems with motor functioning. One person had vision problems and one had problems with memory and thinking skills.

Tests showed that the participants all

had Zika virus. Tests for dengue and chikungunya were negative.

"This doesn't mean that all people infected with Zika will experience these brain problems. Of those who have nervous system problems, most do not have brain symptoms," said Ferreira. "However, our study may shed light on possible lingering effects the virus may be associated with in the brain."

"At present, it does not seem that ADEM cases are occurring at a similarly high incidence as the GBS cases, but these findings from Brazil suggest that clinicians should be vigilant for the possible occurrence of ADEM and other

New research supports Zika virus-microcephaly link

New research, based on data from the 2013-14 Zika outbreak in French Polynesia, further supports the association between Zika virus and microcephaly. The study, published 15 March 2016 in *The Lancet*, estimates that the risk of microcephaly is about 1 for every 100 women infected with Zika virus during the first trimester of pregnancy.

The authors say that quantifying the risk may help better inform the broader public health response. Although the risk of microcephaly associated with Zika virus infection is relatively low compared to other maternal infections, the authors say that the association remains an important public health issue because the risk of Zika virus infection is particularly high during outbreaks, such as the current one in South America.

Commenting on the finding, Dr

Laura Rodrigues, London School of Hygiene & Tropical Medicine, UK, said: "The finding that the highest risk of microcephaly was associated with infection in the first trimester of pregnancy is biologically plausible, given the timing of brain development and the type and severity of the neurological abnormalities."

She noted that more research is needed. "Further data will soon be available from Pernambuco, Colombia, Rio de Janeiro, and maybe other sites...The fast production of knowledge during this epidemic is an opportunity to observe science in the making: from formulation of new hypotheses and production of new results that will provide confirmations and contradictions to the refinement of methods and the gradual building of consensus."

WHO EMR issues guide to keep region free of Zika

The World Health Organization (WHO) Regional Office for the Eastern Mediterranean invited representatives from ministries of health in the Region to two rounds of emergency meetings in February to share information on Zika virus infection and associated conditions and discuss implementation of public health measures to prepare for, and respond to, any possible spread in the Region. At the time of going to press, no case of Zika virus infection had been reported from any country in the Region, either through local transmission or importation via travel from a Zika-affected country. However, the Region remains at risk as the Aedes mosquito that transmits the virus to humans is present in at least eight countries – Djibouti, Egypt, Oman, Pakistan, Saudi Arabia, Somalia, Sudan and Yemen.

The meeting concluded with agreement on a set of recommendations for urgent implementation in order to keep the

Region free from the threat of Zika virus infection. These included to:


- enhance disease surveillance to early detect cases of Zika virus infection and notify WHO as soon as such cases occur;
- establish laboratory facilities for diagnosis and testing capacities for Zika virus infection, including establishing appropriate links with external reference laboratories for sample processing;
- strengthen entomological surveillance, especially in hotspot areas, including at ports and airports, to prevent and detect occurrence of high densities of Aedes mosquitoes and target these areas for vector control;
- establish appropriate measures at points of entry, such as disinfecting conveyances arriving from a country with active Zika virus transmission;
- conduct regular public awareness campaigns to proactively inform the public of the Zika virus situation focusing on travellers to areas with

active transmission through issuance of appropriate advisories to reduce the possibility of exposure to mosquito bites;

- urge communities to keep areas in and around the home free from mosquito breeding sites through applying appropriate risk communication messages and strategies in accordance with local culture and behavioural practice, and provide communities with the appropriate knowledge, information and tools to protect themselves from mosquito bites;
- identify and establish a network of experts, reference laboratories and training centres in the region to support Member States in the areas of entomological surveillance, vector control, field investigation and laboratory detection;

WHO will implement this plan over the next several months in the Region, in collaboration with ministries of health and other regional and international health partners.

At present, it does not seem that ADEM cases are occurring at a similarly high incidence as the GBS cases, but these findings from Brazil suggest that clinicians should be vigilant for the possible occurrence of ADEM and other immune-mediated illnesses of the central nervous system.

immune-mediated illnesses of the central nervous system,” said James Sejvar, MD, with the Centers for Disease Control and Prevention in Atlanta and a member of the American Academy of Neurology. “Of course, the remaining question is ‘why’-why does Zika virus appear to have this strong association with GBS and potentially other immune/inflammatory diseases of the nervous system? Hopefully, ongoing investigations of Zika virus and immune-mediated neurologic disease will shed additional light on this important question.” 

Sexual transmission

In March French researchers reported on a Zika virus link to meningoencephalitis and Italian researchers reported the first discovery of the virus in human saliva. These are just two examples from a wide range of new research on Zika and its potential sites of infection and routes of transmission.

The WHO says new studies on Zika and its complications are being published daily and the pace of research will continue to increase. The organisation says it will – with its partners – evaluate new studies to track any changes in the direction of the evidence base and to identify knowledge or research gaps.

The WHO says that “to allow publication of the latest evidence at regular intervals, a living systematic review is being developed. This will be an online summary of health research, which will be updated as new research becomes available.”

What is worrying about Zika is how much we don’t know. The US Centers for Disease Control and Prevention (CDC) issued a statement

outlining the gaps in our knowledge of transmission of Zika.

What we know

- Zika virus can be spread during sex by a man infected with Zika to his partners.
- In known cases of sexual transmission, the men had Zika symptoms. From these cases, we know the virus can be spread when the man has symptoms, before symptoms start, and after symptoms end.
- The virus can stay in semen longer than in blood.

What we do not know

- We do not know how long the virus can stay in the semen of men who have had Zika.
- We do not know if men infected with Zika who never develop symptoms can have the virus in their semen or spread Zika through sex.
- We do not know if a woman can spread Zika to her sex partners.
- We do not know if Zika can be spread through oral sex, including vaginal fluids and saliva.

Millions suffer as conflict continues

The week of March 28 marked one year since the escalation of the conflict in Yemen, where the violence has had a devastating impact on millions of innocent civilians, causing immeasurable suffering. Since March 2015, more than 6,200 people have been killed and 30,000 injured. More than 21 million people – 82% of the total population – are in need of humanitarian aid, including almost 2.5 million people who have been internally displaced. More than one third of people in need live in inaccessible or hard-to-reach areas.

Even before the current conflict, the health system in Yemen had been facing some challenges, and ongoing violence has led to further deterioration of the health situation. Almost 19 million people lack access to clean water and sanitation, placing them at risk of infectious diseases such as dengue fever, malaria and cholera. More than 14 million Yemenis are in need of urgent health services, including more than 2 million acutely malnourished children and pregnant or lactating women requiring



Muhammed al-Jabri/IRIN

treatment. Yet despite these critical needs, 25% of all health facilities have shut down due to damages or shortages in staff, medicines and other resources.

“Health needs in Yemen are vast, but operating in a conflict context is never an easy task. Over the past year, WHO has had to find solutions to reach people in

need. We sent life-saving medicines and supplies via boat when roads were blocked, and we transported safe water to health facilities by animals due to lack of fuel. Since March 2015, WHO has reached millions of people with 450 tonnes of life-saving medicines and supplies; delivered integrated primary health care services, including mental health services, through mobile medical teams and mobile clinics; and provided more than 150,000 vials of insulin,” said Dr Ala Alwan, WHO’s Regional Director for the Eastern Mediterranean. “Five million children under the age of five were vaccinated against polio and 2.4 million children under the age of 15 were vaccinated against measles and rubella by WHO and partners.”

WHO also provided one million litres of fuel to hospitals and 20 million litres of safe water to health facilities and camps hosting internally displaced persons.

“Despite our efforts so far, much more needs to be done to respond to the health needs of people in Yemen. I am extremely concerned about the limited funding for the health sector, which has so far only received 6% of its requirements for 2016. As we enter the second year of this conflict, I also remind all parties of their obligations under international humanitarian law to facilitate humanitarian access to all areas of Yemen, and respect the safety of health workers and health facilities already working under extremely challenging conditions,” said Dr Alwan. MCH

Hospital attack condemned

On 6 April WHO issued another strong statement condemning another attack on a healthcare facility in Yemen.

“WHO strongly condemns the attack on Ma’arib General Hospital in Ma’arib governorate, Yemen on 3 April, in which 4 people died, including one medical doctor, and 13 people were injured. The attack also caused damage to the intensive care unit and administration buildings of the hospital.

“Despite facing critical shortages in health staff and medicines, Ma’arib Hospital provides urgently-needed health services for thousands of people in Ma’arib and other governorates, including Al-Jawf, Al-Baidha’a, Aden and Lahj. At the time of the attack, 190 out of 200 beds in the hospital were occupied.

“Since the escalation of the conflict in Yemen, health workers risk their lives every day to provide essential

and life-saving assistance to people requiring health services. Once again, WHO calls on all parties to the conflict to respect the safety and neutrality of health workers and health facilities, emphasizing that these attacks are a direct violation of international humanitarian law.”

Tracking system

Data on attacks against health workers has been piecemeal and there has been no standard way of reporting them. To address this, WHO has developed a new system for collecting data that is being tested in Central African Republic, Syrian Arab Republic and West Bank and Gaza Strip. It is due to be available this year. As well as collecting data, the project plans to use the information to identify patterns and find ways to avoid attacks or mitigate their consequences.

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Is the US losing its place as a global leader in medical research?

Once the undisputed centre of global innovation in medicine, the US is steadily losing ground to Asia and Europe and will, if trends continue, relinquish its leadership in the coming decade. *Middle East Health* reports

A study published last year in the *Journal of the American Medical Association* looked at medical research activity from 1994 to 2014 in the US, Europe, Asia, Canada, and Australia, compiling data on funding by public and private sources, the creation of intellectual property, and the size of the medical and scientific workforce. It found that US spending on medical research grew at an average annual rate of 6% between 1994 and 2004. This pace fell sharply in the following decade, where the annual rate of growth decreased to 0.6%, falling behind the pace of inflation. With the exception of the temporary increases brought about by federal stimulus spending in 2009 and 2010, the last five years have seen a decrease in research funding when adjusted for inflation. Overall, medical R&D funding has declined in real terms by 13% since 2004.

“US medical research remains the primary global source of new discoveries, drugs, medical devices, and clinical procedures,” said University of Rochester neurologist Ray Dorsey, M.D., M.B.A., a co-author of the study. “However, a decade of unprecedented growth in research activity has been followed by a decade of steady decline which now leaves open the possibility that other nations could assume global leadership given their increasing investment in biomedical research.”

Research funding, particularly by the private sector, has also shifted to later stages of development and away from basic science. Guided primarily by the desire to realize short-term economic benefits, the share of spending by pharmaceutical, bio-



technology, and medical device companies on phase 3 clinical trials – large studies in people that often represent the final step before regulatory approval – grew by 36% between 2004 and 2012. Industry spending is also now the largest component of US medical R&D, increasing from 46% in 2004 to 58% in 2012.

The move away from investing in early stage research has significant long-term implications, according to the authors. They point out that new knowledge often takes from 15 to 25 years to move from the

discovery made in the lab to its clinical application in people. With the private sector moving more resources to late-stage research, this leaves the shrinking resources provided by the federal government and often very small companies as the primary sources of funding for early-stage, high-risk research.

The authors also found that the allocation of research resources does not reflect the burden of disease on society. Diseases that represent more than 80% of all US deaths receive less than half of the fund-



If current trends continue, the US will be overtaken by China as the global leader in medical R&D in the next ten years.

ing from the National Institutes of Health. The portion of total funding for cancer and HIV/AIDS research in particular are well above the levels that these diseases inflict in terms of death and disability. The amount of money spent by the pharmaceutical industry on finding treatments for rare diseases is also high, driven primarily by the lower barriers to market set forth in the Orphan Drug Act of 1983.

Medical research has become an increasingly global endeavour and investments by other countries, particularly in Asia, are eroding US leadership. In 2004, US medical R&D spending represented 57% of the global total. By 2014, the US share had fallen to 44% with Asia – led by China, Japan, South Korea, India, and Singapore – rapidly making up ground and increasing investment by 9.4% per year. If current trends continue, the US will be overtaken by China as the global leader in medical R&D in the next ten years. China has already surpassed the US in terms of the size of its science and technology workforce and global share of patents for medical technologies, and is closing the gap in published biomedical research articles.

The authors point to the low levels of research funding in the field of health services as an area in particular need of remedy. Health services – which study topics such as access to care, cost, quality of care, and efforts to promote well-being – represent only 0.3% of US research expenditures.

“The low levels of investment in health services research represent a missed opportunity to improve many aspects of health, especially the burden of chronic illness, aging populations, and the need for more effective ways to deliver care,” said Dorsey.

Medical research funding

Medical research funding in the US comes from government and the private sector.

US federal funding

The National Institutes of Health (NIH) is the agency that is responsible for management of most of the federal or government funding of biomedical research. Over the past century there were two notable periods of NIH support. From 1995 to 1996 funding increased from \$8.877 billion to \$9.366 billion, years which represented the start of what is considered the “doubling period” of rapid NIH support. The second notable period started in 1997 and ended in 2010, a period where the NIH moved to organize research spending for engagement with the scientific community. In 1997 Applications were added and in 2000 Awards had been added. These changes were coupled with increasing support; funding rose from \$13 billion in 1997 to approximately \$27 billion in 2010. In recent years, the NIH has started to publish medical research trials Success Rates per dollar spent, an initiative which illustrates that research efficiency is viewed as a significant issue both by the public and policy makers.

Privately funded medical research

Since 1980 the share of biomedical


research funding from industry sources has grown from 32% to 62%, which has resulted in the development of numerous life-saving medical advances. The relationship between industry and government-funded research in the US has seen great movement over the years. The 1980 Bayh Dole Act was passed by the US Congress to foster a more constructive relationship between the collaboration of government and industry funded biomedical research. The Bayh Doyle Act gave private corporations the option of applying for government funded grants for biomedical research which in turn allowed the private corporations to license the technology. Both government and industry research funding increased rapidly from between the years of 1994–2003.

The funding from industry for pharmaceutical research, a large part of all industry funded research, has slowed since 1994 due to multiple perceptions, lower approval rates from the FDA, increased costs with clinical trials due to more stringent regulation and longer anticipation for return on investment. A 2004 study showed that to bring a drug to market, drug development requires an average of 12–15 years and can reach costs up to \$1.7 billion.

Reversing the trend

The trends are reversible, the authors note. However, given the political environment in Washington and the pressures by shareholders on industry for short-term returns, new sources of revenue will need to be identified. They recommend several possible options, including providing tax incentives that will allow medical and pharmaceutical companies to reinvest profits held overseas in research in the US, a commitment by insurance companies and the health care sector to invest more money in health services research, and govern-

ment-backed research bonds and trusts similar to those employed in the United Kingdom, Australia, and Canada.

“Clearly the pace of scientific discovery has outstripped the capacity of current financial and organizational models to support the opportunities afforded,” said University of Rochester neurology resident Benjamin George, M.D., M.P.H., a co-author of the study. “This analysis underscores the need for the US to find new sources to support biomedical and health services research if we wish to remain the world’s leader in medical innovation.” 



A wealth of medical research

Although the growth rate of funding for medical research in the US is declining, there is still a tremendous volume of research being carried out in biomedical laboratories across the United States. Each day there are dozens of media releases about newly published medical research issued from medical research facilities, the National Institutes of Health and private sector laboratories, which is testament to the continual discovery and innovation that is taking place in medical research in the United States. Following is a small sample of some of this breakthrough research that has been published recently.

Penn researchers identify cause of insulin resistance in Type 2 diabetics

Understanding the cause of insulin resistance is critical to tackling this chronic disease. A new link between high levels of certain amino acids and type 2 diabetes was found by a team led by researchers from the Perelman School of Medicine at the University of Pennsylvania, using mouse and human muscle and blood samples to evaluate the mechanisms that lead to insulin resistance.

For people with type 2 diabetes, the problem of insulin resistance means there is plenty of insulin but the body does not respond to it effectively. While most people associate this resistance with sugar levels in the blood, diabetes is also a problem with excess fat, especially too much fat inside skeletal muscle, which leads to the insulin resistance. If the level of fat in muscles can be reduced then, theoretically, insulin resistance can be prevented, surmise investigators.

“This research sought to answer a few large questions,” said senior author Zoltan Arany, MD, PhD, an associate professor of Cardiovascular Medicine. “How does fat get into skeletal muscle? And how is the elevation of certain amino acids in people with diabetes related to insulin resistance? We have appreciated for over ten years that diabetes is accompanied by elevations in the blood of branched-chain amino acids, which humans can only obtain in their diet. ▶



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However, we didn't understand how this could cause insulin resistance and diabetes. How is elevated blood sugar related to these amino acids?"

The team found that a byproduct compound from the breakdown of these amino acids, called 3-HIB, is secreted from muscle cells and activates cells in the vascular wall to transport more fat into skeletal muscle tissue. This leads to fat accumulation in the muscle, in turn leading to insulin resistance in mice. Conversely, inhibiting the synthesis of 3-HIB in muscle cells blocked the uptake of fat in muscle.

"In this study we showed a new mechanism to explain how 3-HIB, by regulating the transport of fatty acids in and out of muscle, links the breakdown of branched-chain amino acids with fatty acid accumulation, showing how increased amino acid flux can cause diabetes," Arany said.

While most of this research was conducted using mouse cells, the team also found that 3-HIB, the byproduct molecule, was elevated in people with type 2 diabetes. Because of this, Arany and colleagues say that more studies are needed to fully examine the nature of this mechanism among people with type 2 diabetes.

"The discovery of this novel pathway – the way the body breaks down these amino acids that drives more fat into the muscles – opens new avenues for future research on insulin resistance, and introduces a conceptually entirely new way to target treatment for diabetes" Arany said.

NIH investigates potential use of photon-counting CT

The Clinical Center at the National Institutes of Health (NIH) is investigating the potential use of a new generation of a computerized tomography (CT) scanner, called a photon-counting detector CT scanner, in a clinical setting. The prototype technology is expected to replicate the image quality of conventional CT scanning, but may also provide health care specialists with an enhanced look inside the body through multi-energy imaging.

Over the next five years, David Bluemke, M.D., Ph.D., chief of the Department of Radiology and Imaging Sci-

ences, and his team will continue to develop scan protocols and image processing algorithms, which could improve screening, imaging, and treatment planning for health conditions like cancer and cardiovascular disease.

"The NIH Clinical Center has helped shape and share research advances and health care for decades. Now is an exciting time for us and for our study participants as we help test and develop this CT technology so that it may one day help patients around the world and impact the health care they receive," said Dr Bluemke.

As the world's largest hospital solely dedicated to research, the NIH Clinical Center sees thousands of patients every year, many of whom have rare and complicated illnesses. In collaboration with CT manufacturer, Siemens Healthcare, and researchers in the CT technology field, the Clinical Center is testing this technology to help the healthcare field optimize the scanner for clinical use across the US and around the world.

The Clinical Center is one of three sites in the world to use this technology and is the first hospital-based research setting of the device.

By advancing this technology, researchers aim to improve the diagnosis that doctors can offer by increasing the resolution and contrasts available for analysis. Areas of research investigation with the new technology include:

- Doctors can identify materials in the body with anatomic precision. A dye, or contrast, is often given to a patient so that researchers can see a selected area in more detail. Different materials in the body can be displayed in different colours for faster diagnosis and precision.

- The new technology may be used to help identify and characterize tumours, plaques or vessels that are smaller than half a millimetre. For many patients, finding a tumour that size may make a difference in identifying if it is benign or could be cancerous.

- The technology may help to more accurately identify soft tissues such as proteins, tendons or collagen which are hard to differentiate with current equipment.

Doctors already test breast tumours for Ki67 levels, which can inform decisions about treatment, but this is the first time scientists have been able to link Ki67 to precancerous tissue and use it as a predictive tool.

Doctors reconstruct new oesophagus

Writing in *The Lancet*, US doctors report the first case of a human patient whose severely damaged oesophagus was reconstructed using commercially available FDA approved stents and skin tissue. Seven years after the reconstruction and 4 years after the stents were removed, the patient continues to eat a normal diet and maintain his weight with no swallowing problems.

Until now, this regeneration technique has only been tested in animals. The authors, reporting on the outcome of the procedure, say that research, including animal studies and clinical trials, are now needed to investigate whether the technique can be reproduced and used in other similar cases.

Professor Kulwinder Dua from the Medical College of Wisconsin, Milwaukee, USA, and colleagues report using metal stents as a non-biological scaffold and a regenerative tissue matrix from donated human skin to rebuild a full-thickness 5cm defect in the oesophagus of a 24-year-old man. The patient was urgently admitted to hospital with a disrupted oesophagus resulting in life-threatening infection and inability to ►

George Mazariegos, MD, FACS, director of the Hillman Center for Pediatric Transplantation at Children's Hospital of Pittsburgh of UPMC and Transplant Surgeon Kyle Soltys, MD, perform a living-donor liver transplant on a young patient.



Liver transplantation: A pathway to cure for paediatric metabolic disorders

An 8-year-old boy from Qatar with propionic acidemia (PA) was transferred in serious condition to Children's Hospital of Pittsburgh of UPMC in the United States for evaluation and care. A team of specialists determined that his metabolic disease was causing his heart to fail, and liver transplant was identified as a solution. His mother, a viable candidate, stepped forward as a living donor, providing a segment of her liver to be transplanted into her son. Today, the mother's liver function is fully recovered as her son continues to recuperate. His cardiac condition is significantly improved.

This example illustrates two significant developments with regard to liver transplantation – the ability for liver transplants to be used as a treatment for metabolic disorders, such as PA, and the growing impact of living donor transplants to help resolve critical medical situations in a timely fashion.

Liver transplants have been successfully performed in humans since the 1980s and were initially developed as a therapy for liver diseases that had a high risk of near-term mortality, such as biliary atresia, tumours, or acute liver failure.

Today, however, liver transplantation is finding an expanding role as treatment for a growing number of inborn metabolic diseases. Rather than viewing liver transplants exclusively as a life-saving procedure, it can now be seen as a “life-improving” therapy, providing a new pathway to health by dramatically reducing symptoms of primary disorders and, in some cases, even providing a complete cure. Concurrent with this is the greater reliance on and positive outcomes derived from transplanted liver tissue from living donors.

The use of tissue from living donors, in particular, helps achieve success in multiple ways, including: reduced wait times; more positive outcomes, which may be related to genetic matching from healthy living related donors; and providing an alternative to use of tissue from deceased donors, which are a scarce resource.

Metabolic conditions treated by liver transplant

Metabolic diseases are generally caused by a defect in a single or multiple genes that are supposed to instruct enzymes to convert one substance into another. Here, liver transplantation can help for disorders that are liver-specific as well as for systemic disorders, where liver replacement can result in sufficient metabolic support to normalize metabolism.

Known examples where liver transplants can provide a therapeutic option include methylmalonic acidemia (MMA), Maple Syrup Urine Disease (MSUD), urea cycle disorders (UCDs), Crigler-Najjar Syndrome, selected mitochondrial disease, alpha-1 antitrypsin disease, as well as PA. Additionally, certain glycogen storage diseases (GSD) and phenylketonuria (PKU) show potential for improvement through liver transplantation.

Many of these conditions can be medically managed, but they can have serious and sometimes fatal consequences if not treated. In some cases, medical management may be done through a very carefully controlled low-protein diet that includes special supplements required for the rest of the patient's life. Such medical therapy can mean life-limiting compro-

mises for the patient, including vigilant blood monitoring, dietary restrictions, travel limitations, and ongoing concerns that a misstep in therapeutic adherence may have dire health consequences.

With a history of paediatric liver transplants, spanning back to 1981, Children's Hospital of Pittsburgh of UPMC has conducted more than 320 liver transplants for metabolic disease alone and more than 1,700 paediatric liver transplants in all, more than any other paediatric centre in the United States. Building on its experience with liver transplants for metabolic disorders, Children's collaborated with the Clinic for Special Children in Strasburg, Pennsylvania, to create the first elective liver transplantation protocol for patients with MSUD in 2004, and has since conducted more than 65 transplants for MSUD patients with 100 percent graft and patient survival rates.

Conclusion

Today as the risks of liver transplant have decreased and post-operative outcomes have improved, the procedure has evolved into an attractive approach for improving life for patients with a growing number of metabolic diseases. The range of disorders suitable for this approach continues to evolve as the medical community, patients, and their families balance traditional medical management versus surgical intervention that may favourably impact their disease. And, while living-donor transplants can help overcome the ongoing demand shortfall for traditional cadaveric organs, their greater role may ultimately be in helping to provide better long-term outcomes for the patients who receive them. **MEH**



swallow following complications from an earlier car accident which had left him partially paralysed. Despite several surgeries, the defect in the oesophagus was too large to repair.

The team hypothesised that if the three-dimensional shape of the oesophagus could be maintained in its natural environment for an extended period of time while stimulating regeneration using techniques previously validated in animals, oesophageal reconstruction may be possible.

They used commercially available, FDA-approved, materials to repair the defect. To maintain the shape of the oesophagus and bridge the large defect, they used an endoscope to place self-expanding metal stents. The defect was then surgically covered with regenerative tissue matrix and sprayed with a platelet-rich plasma gel produced from the patient's own blood to deliver high concentrations of growth factors that not only stimulate growth but also attract stem cells to stimulate healing and regeneration. The sternocleidomastoid, a muscle running along the side of the neck, was placed over the matrix and the adhesive platelet-rich plasma gel.

The team planned on removing the stent 12 weeks after reconstruction, but the patient delayed the procedure for three and a half years because of fears of developing a narrowing or leakage in the oesophagus. One year after the stents were removed, endoscopic ultrasound images showed areas of fibrosis (scarring) and regeneration of all five layers of the oesophageal wall. Full recovery of functioning was also established by swallowing tests showing that oesophageal muscles were able to propel water and liquid along the oesophagus into the stomach in both upright and 45° sitting positions. But, how long the regeneration process took is unclear because the patient delayed stent removal for several years.

Researchers identify new predictive tool for assessing breast cancer risk

Harvard Stem Cell Institute (HSCI) researchers at Dana-Farber Cancer Institute (DFCI) and collaborators at Brigham and Women's Hospital (BWH) have identified a molecular marker in

normal breast tissue that can predict a woman's risk for developing breast cancer, the leading cause of death in women with cancer worldwide.

The work, led by HSCI principal faculty member Kornelia Polyak and Rulla Tamimi of BWH, was published in the April 1 issue of *Cancer Research*.

The study builds on Polyak's earlier research finding that women already identified as having a high risk of developing cancer – namely those with a mutation called BRCA1 or BRCA2 – or women who did not give birth before their 30s had a higher number of mammary gland progenitor cells.

In the latest study, Polyak, Tamimi, and their colleagues examined biopsies, some taken as many as four decades ago, from 302 participants in the Nurses' Health Study and the Nurses' Health Study II who had been diagnosed with benign breast disease. The researchers compared tissue from the 69 women who later developed cancer to the tissue from the 233 women who did not. They found that women were five times as likely to develop cancer if they had a higher percentage of Ki67, a molecular marker that identifies proliferating cells, in the cells that line the mammary ducts and milk-producing lobules. These cells, called the mammary epithelium, undergo drastic changes throughout a woman's life, and the majority of breast cancers originate in these tissues.

Doctors already test breast tumours for Ki67 levels, which can inform decisions about treatment, but this is the first time scientists have been able to link Ki67 to precancerous tissue and use it as a predictive tool.

"Instead of only telling women that they don't have cancer, we could test the biopsies and tell women if they were at high risk or low risk for developing breast cancer in the future," said Polyak, a breast cancer researcher at Dana-Farber and co-senior author of the paper.

"Currently, we are not able to do a very good job at distinguishing women at high and low risk of breast cancer," added co-senior author Tamimi, an associate professor at the Harvard T.H. Chan School of Public Health and Harvard Medical School. "By identifying women at high

risk of breast cancer, we can better develop individualized screening and also target risk reducing strategies."

Screening for Ki67 levels would "be easy to apply in the current setting," said Polyak, though the researchers first want to reproduce the results in an independent cohort of women.

Cornell researchers report blood-brain barrier breakthrough

Cornell researchers have discovered a way to penetrate the blood-brain barrier (BBB) that may soon permit delivery of drugs directly into the brain to treat disorders such as Alzheimer's disease and chemotherapy-resistant cancers.

The BBB is a layer of endothelial cells that selectively allow entry of molecules needed for brain function, such as amino acids, oxygen, glucose and water, while keeping others out.

Cornell researchers report that an FDA-approved drug called Lexiscan activates receptors – called adenosine receptors – that are expressed on these BBB cells.

"We can open the BBB for a brief window of time, long enough to deliver therapies to the brain, but not too long so as to harm the brain. We hope in the future, this will be used to treat many types of neurological disorders," said Margaret Bynoe, associate professor in the Department of Microbiology and Immunology in Cornell's College of Veterinary Medicine. Bynoe is senior author of the study, which appears in *The Journal of Clinical Investigation*.

Bynoe's team was able to deliver chemotherapy drugs into the brains of mice, as well as large molecules, like an antibody that binds to Alzheimer's disease plaques, according to the paper.

The lab also engineered a BBB model using human primary brain endothelial cells. They observed that Lexiscan opened the engineered BBB in a manner similar to its actions in mice.

Because Lexiscan is an FDA-approved drug, "the potential for a breakthrough in drug delivery systems for diseases such as Alzheimer's disease, Parkinson's disease, autism, brain tumours and chemotherapy-resistant cancers is not far off", Bynoe said. MEH

Cancer care centre dedicated to excellence



The front face of the new MacNair campus at Baylor St. Luke's

Using a mix of modern technology, world renowned physicians, and the latest and greatest research, CHI St. Luke's Health – Baylor St. Luke's Medical Center (Baylor St. Luke's) physicians treat cancer patients from more than 75 countries.

CHI St. Luke's Health's has a unique educational, clinical, and research alliance with Baylor College of Medicine – one of the nation's top medical schools. Both institutions collaborate through their dedication to provide comprehensive care while creating healthier communities across the globe.

"When patients have a difficult medical illness or condition, this is where you come," said Steven Curley, MD, Chief of Surgical Oncology at Baylor College of Medicine and Chief of Oncology at Baylor St. Luke's. "Taking care of cancer patients is tough, but we're willing and able to treat and perform aggressive surgeries that other facilities in the world can't do."

The unparalleled success and expertise of Baylor St. Luke's physicians and Baylor College of Medicine's Dan L. Duncan Comprehensive Cancer Center in the world renowned Texas Medical Center are backed by national recognition for cutting-edge cancer research and treatments. Baylor St. Luke's is a recipient of the Outstanding Achievement Award for top performance in cancer, and is designated as a four-time ANCC Magnet® Designation for Nursing Excellence – the highest honour bestowed to a hospital for nursing.

Additionally, the Dan L. Duncan Comprehensive Cancer Center is designated as a Comprehensive Cancer Center by the National Cancer Institute – the highest possible designation in an elite class of 45 centres from around the country with programs that demonstrate significant clinical research and leading-edge treatments. The

NCI-designation also includes a \$14.5 million grant over the next five years, which enables Baylor College of Medicine to continue its cancer treatment research.

"We have the best clinical genetics program in the country, if not in the world," Dr. Curley noted. "We perform – right here, in-house – advanced genetic testing with access to world-class researchers and clinicians who are seeking new opportunities for: medications, treatments for cancer patients, and clinical and immunotherapy trials. All of these groups have been recognized among the nation's best in their respective fields, and they exist here."

In addition to exceptional cancer care, patients with other conditions and illnesses besides cancer can be treated by renowned physicians at Baylor St. Luke's.

"We have world-class physicians in non-cancer areas as well," Dr. Curley noted. "If our patients have other diseases, such as heart disease or neurological problems, we have physicians who can treat those illnesses. We provide care across a full spectrum of maladies."

For more than 60 years, Baylor St. Luke's has been home to the Texas Heart® Institute – one of the nation's best programs for cardiology and heart surgery, and one of the world's most renowned centres for cardiovascular diseases. The Texas Heart Institute's world-wide legacy began with Denton A. Cooley, MD, who performed the nation's first successful heart transplantation and implantation of the world's first artificial heart in a human. Baylor St. Luke's is also named as one of the nation's top 100 hospitals for neurosurgery and spinal care.

Baylor St. Luke's recently unveiled the design for its \$1.1 billion medical campus, Baylor St. Luke's McNair Campus, which will become home to the collaboration



Steven Curley, MD, Chief of Surgical Oncology at Baylor College of Medicine and Chief of Oncology at Baylor St. Luke's.

between Baylor College of Medicine and Catholic Health Initiatives, and the Texas Heart Institute. All clinical services currently provided at the Texas Medical Center location of Baylor St. Luke's will be moved to the new campus. The Campus will feature a 650-bed hospital built across two bed towers, a medical office building and ambulatory care complex, and new facilities for basic science and translational research. Expected completion of hospital construction is early 2019.

"Physicians and scientists will work together on one integrated campus that creates a state-of-the-art infrastructure for advanced patient care, basic and translational science, and education," said Wayne Keathley, President, Baylor St. Luke's. "This establishes a unique and best-in-class environment unlike any other institution in the Texas Medical Center."

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

Cerebral palsy – the most common physical disability in children

Cerebral palsy (CP) is the name for a series of neurological disorders caused by abnormalities in parts of the brain that control muscle movement. It is the most common form of physical disability in childhood, being present in two of every 1,000 children. Symptoms can range from mild to severe both in physical and mental capacities. In mild cases a single limb may be affected. In more severe cases, all four limbs and almost all functional aspects of the child are affected. CP is usually caused by brain damage that occurs before or during a child's birth, or during the first 3 to 5 years of a child's life. The brain damage that leads to cerebral palsy can also lead to other health issues, including vision, hearing and speech problems and learning disabilities.

Cerebral palsy affects muscle control and coordination, so even simple movements – or standing still – are difficult. Other vital functions that also involve motor skills, such as breathing, bladder and bowel control, eating, and learning, also may be affected when a child has CP. Cerebral palsy does not get worse over time.

The causes of most cases of CP are unknown, but many are the result of problems during pregnancy. This can be due to infections, maternal health problems, a genetic disorder, or something that interfered with normal brain development. Problems during labour and delivery can cause CP, but this is the exception.

Premature babies – particularly those who weigh less than 3.3 pounds (1,510 grams) – have a higher risk of CP than babies that are carried full-term, as are other low-birth-weight babies and multiple births (twins, triplets, etc.). Brain damage in infancy or early childhood can also lead to CP. A baby or toddler might suffer damage because of lead poisoning, bacterial meningitis, malnutrition, being shaken as an infant, or being in a car accident while not properly restrained.



Associated medical problems

Children with CP have varying degrees of physical disability. Some have only mild impairment, while others are severely affected. The brain damage that causes CP can also affect other brain functions, and can lead to further medical issues. Associated medical problems may include visual impairment or blindness, hearing loss, food aspiration, gastroesophageal reflux, speech problems, drooling, tooth decay, sleep disorders, osteoporosis and behaviour problems.

Seizures, speech and communication problems, and mental retardation are more common among kids with the most severe forms of CP. Many have problems that may require ongoing therapy and devices such as braces or wheelchairs.

Collaborative approach

Currently there's no cure for cerebral palsy, but a variety of resources and therapies can provide help and improve the quality of life for kids with CP. Children with neuromuscular disabilities require the collaborative approach of a multidisciplinary team. Because cerebral palsy symptoms can vary

from child to child, children with cerebral palsy need specialized care tailored to their own individual needs.

As soon as CP is diagnosed, patients should begin therapy for movement, learning, speech, hearing, and social and emotional development. Paediatric cerebral palsy treatment also may include medication, surgery or braces to help improve muscle function. Different kinds of therapy can help them achieve maximum potential in growth and development.

Orthopaedic surgery can help address deformities of hips, knees, feet and scoliosis (curvature of the spine), which are common problems associated with CP. Severe muscle spasticity can sometimes be helped with medication taken by mouth or administered via a pump implanted under the skin.

A variety of medical specialists might be needed to treat the different medical conditions. If several medical specialists are needed, it's important to have a primary care doctor or a CP specialist help you coordinate the care. **IMEH**

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Clinical efficacy and safety of Eucarbon combined drug in patients with chronic constipation



■ By A.K. Kairbekov, M.M. Kaliyeva, N.B. Baizhigitova, M.I. Ordakhanova

Chronic constipation, one of the most common complaints in clinical medicine, holds a most unique position among the gastrointestinal tract disorders. This is a constantly growing problem in modern society⁽¹⁾.

Constipation is a decrease in the frequency or complete cessation of bowel movements, hard stool with low water content. Constipation is an unpleasant persistent feeling of having a bloated belly, accompanied by flatulence, pain, and colics. Gastrointestinal tract disorders, such as irritable bowel syndrome, which can become chronic and are characterized by recurrent abdominal pain and changes in bowel function, can develop in many patients.⁽²⁾

Constipation occurs in 1-6% of healthy and in 80% of the elderly people. Approximately, one-fifth of all adults in industrialized countries suffer from chronic constipation⁽³⁾.

In most cases, the cause of constipation in adults and adolescents is a failure of the motor (motion) function of one or more bowel segments. Motor function of the intestines is a coordinated contraction of the intestinal smooth muscle cells, ensuring the movement of the intestinal contents (peristalsis).

Constipation is developed by a number of reasons, chief among them is primarily faulty diet and improper daily routine. The most common reasons related to dietetic factors are consumption of food with a low fiber content, resulting in insufficient filling of the intestine, or fast-absorbing food with a low water-binding capacity, or a lack of physical activity. Other reasons are related to dysfunction or organ damage, including gastrointestinal tract disorders, metabolic disorders, endocrine disorders, as well as functional and organic disorders of the nervous system, and can be caused by side effects of drugs⁽⁴⁾.

Constipation itself is diagnosed if peristal-

sis is absent for three or more days or if stool is infrequent for more than six days⁽⁵⁾.

By itself, constipation is not life-threatening, but its effects can be serious: chronic intoxication, digestive disorders, worsening of the hemorrhoid symptoms, deterioration in the general state of health, and even an increased risk of cancer, as shown by recent studies. Therefore, frequent chronic constipation requires mandatory treatment⁽⁶⁾.

One of the most common drugs used for treatment of chronic constipation is Eucarbon, developed in 1909 by pharmacist F. Trenka. The drug is a unique balanced combination of herbal ingredients, such as senna, rhubarb and charcoal, which prove their worth in the treatment of constipation. These components stimulate accumulation of water and electrolytes into the intestinal lumen, but also increase intestinal motility. A number of clinical studies have been performed and clinical data have been systematically collected for Eucarbon. In all indications investigated Eucarbon could prove its efficacy, namely in the relief of complaints in constipated patients and in patients suffering from irritable bowel syndrome⁽⁷⁾.

Study goal: To assess the clinical efficacy and safety of Eucarbon combined drug in patients with chronic constipation.

Materials and methods

40 patients were selected for the study in the department of gastroenterology of the City Clinical Hospital No.1 (CCH No.1) Almaty with various diseases of the gastrointestinal tract, and the most common symptom was chronic constipation.

The inclusion criterion was constipation, especially in combination with complaints of spasms, which is an approved indication for the administration of Eucarbon tablets.

The study included 32 men (73.3%) and 8 women (26.7%), aged 50 to 70 years old; mean age was 60 ± 1.7 years old. Each patient had three visits: 1st visit was basic, all patients had clinical examination by physicians and gastroenterologists in the department of gastroenterology of CCH No.1. 2nd visit was control, in six weeks and in 12 weeks (3rd visit).

Before the start of the monitoring study and at 6 and 12 weeks, patient's condition was evaluated for symptoms and general health using questionnaire results; overall assessment of the efficacy and safety/tolerability, which summarizes current symptoms, localization of pain, flatulence, and bowel dysfunction were classified as mild, moderate or severe.

Each patient took the registered Eucarbon drug, which produced and marketed by "Vivo pharm" trade organization. The tablets have the following composition: charcoal 180 mg, senna leaves 105 mg, sulfur 50 mg, rhubarb extract 25 mg, fennel essential oil 0.5 mg and peppermint essential oil 0.5 mg.

The recommended dose of Eucarbon in such indication was 1 tablet three times a day during or after a meal with a certain amount of liquid depending on the symptoms of the patient with the ability to change the dose according to the patient's symptoms and complaints.

Since this study had an open and uncontrolled character, the evaluation was carried out using descriptive statistical methods.

Results

The clinical picture of disease in the enclosed patients was typical and respectively characterized by pain symptoms and various manifestations of gastric and intestinal dyspepsia.

The clinical picture before treatment, regardless of age and sex, was in all patients characterized by the main complaints: spasmodic abdominal pain, enhanced intestinal motility, flatulence, and gaseous eructation.

Objectively, the following symptoms were most often observed: pain on palpation, hyperperistalsis, and tympanitis.

Palpation of the epigastrium and mesogastrium found hypersensitivity of the skin, the protective effect of muscular tension, and the localized pain.

Safety and tolerability were assessed by the development and dynamics of side effects during the observation period. None of the patients had side effects of the drug in the form of a gastric or intestinal dyspepsia or signs of central nervous system disorders (headache, dizziness, skin manifestations: rash and itching). Furthermore, no side effect of the drug was confirmed by blood indicators: transaminase (AST, ALT), glucose, amylase, plasma, RBCs and hemoglobin.

The blood tests did not find any change in the dynamics and showed no side effects of the drug taken by the patients.

All principal symptoms and the results were comparably improved after treatment. Regarding the actual specific symptoms, such as abdominal pain, flatulence, stool frequency, and change in stool consistency, the number of patients on each symptom was reduced to less than 1% during the treatment period.

In the analysis of the results of the 12-week treatment period with Eucarbon, all principal symptoms and complaints (pain on palpation, hyperperistalsis, and tympanitis) were significantly lowered after treatment (Figure 1).

Very good tolerability was determined by physicians and patients in 75% of cases, and good - in the remaining 25%. There were no reports of side effects.

All 40 patients, who administered the drug, showed a good or very good tolerability (Figure 2).

All principal symptoms and complaints, such as abdominal pain, stool frequency, flatulence, hyperperistalsis, and pain on palpation were significantly decreased after treatment.

The overall efficacy assessment of the treatment with Eucarbon after 12 weeks by the physicians and the patients was the same; physicians assessed the efficacy of

Figure 1. Dynamics of the principal symptoms

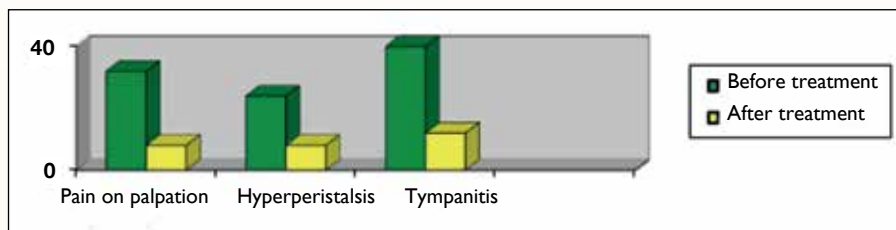


Figure 2. Tolerability of the “Eucarbon” drug [%]

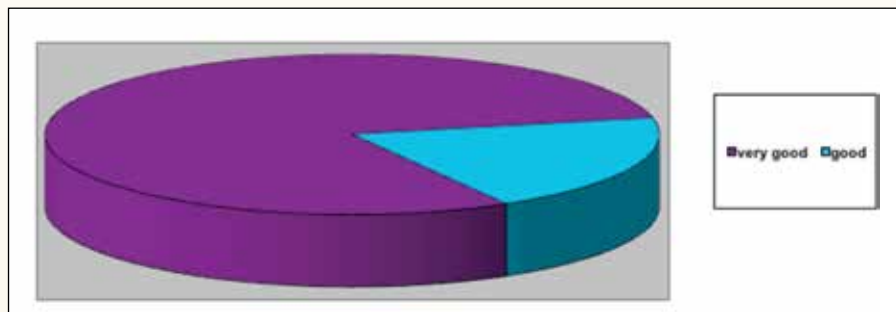
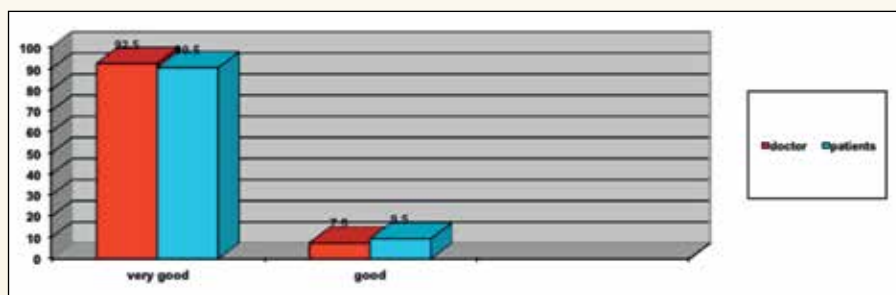


Figure 3. Overall efficacy assessment of the treatment in 12 weeks [%].



the drug as “very good» in 92.5% of cases and patients – in 90.5% of cases, patients assessed the efficacy of the drug as “very good» in 7.5% of cases and patients – in 9.5% of cases (Figure 3).

Thus, the “Eucarbon” drug showed excellent efficacy, safety and tolerance in the treatment of the symptoms of constipation.

No patient, who was administered the drug, showed any side effects.

Based on our own observations and literature data, we can estimate the results of treatment with Eucarbon as very good and make the following conclusions:

1. Results of the study confirm the efficacy and safety of Eucarbon drug, containing a unique combination of herbal and mineral components, in constipation and flatulence.

2. In 6 weeks of treatment, the principal symptom of the disease - abdominal pain –

was reversed in 78% of patients, and significantly reducing its severity is observed in 27%.

3. Due to the good tolerability and a lack of drug interactions, it is particularly suitable for the elderly and long-term therapy.

4. The drug is well tolerated by patients.

5. No side effects were reported.

Eucarbon can be recommended for routine use in clinical practice in patients with chronic constipation. MCH

The Authors

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Managing the menopause



Management of the menopause has gone through significant and dramatic changes in the past 20 years. With the recent publication from NICE, the National Institute for Health and Care Excellence, in November 2015, 'Menopause: diagnosis and management', this important area has been addressed. It will hopefully allow both healthcare providers and women to have a better understanding of what options are available to manage symptoms. **Malini Sharma** BSc MRCOG, reports.

Menopause is defined as the time in a woman's life when she stops menstruating, thereby reaching the end of her reproductive life. It is usually said to occur when a woman has not had menstruation for 12

consecutive months. In the Western world the typical age of menopause is between 40 and 61, with the average age being 51 years in the UK and Australia. In India and the Philippines, the median age of meno-

pause is considerably younger at 44 years. Changes take place as a result of a cessation of ovarian activity, with decrease in production of oestrogen and progesterone.

Perimenopause, or the climacteric is



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the time preceding this during which a woman may experience irregularity of her cycles, and continues until 12 months after her final period. Hormonal changes and clinical symptoms occur during this time, and physiological changes in responsiveness to gonadotrophins and their secretion occurs, with wide variations in hormone levels.

Iatrogenic menopause can be as a result of bilateral oophorectomy, or as a result of chemo-radiation therapy. Premature ovarian insufficiency is menopause occurring before the age of 40, and this may be natural or medically induced.

Symptoms

Symptoms of the menopause can begin as early as 6 years before the final menstrual period and can continue for a number of years afterwards. The ovaries gradually become less responsive to gonadotrophins and eventually associated affective symptoms of menopause begin to decline. Around 80% of women will experience some symptoms, and in up to 10% of women these symptoms may persist up to 12 years.

A range of symptoms may be reported, the commonest of which is vasomotor symptoms (hot flushes and night sweats). Other symptoms include sleep disturbance, mood changes, irregular menses, memory changes, reduction in libido, and symptoms of urogenital atrophy. Prolonged lack of oestrogen affects bone and cardiovascular health, and post-menopausal women are at increased risk of osteoporosis.

Management options include hormone replacement therapy (HRT), lifestyle modifications, dietary changes and complementary therapies.

Hormone replacement therapy

HRT first became available in the 1940s, but became more widely available in the 1960s, and it revolutionized the management of the menopause. However, with the publication of two large studies from the USA, in 2002 and 2003, the Women's Health Initiative (WHI) Study and the Million Women's Study, concerns were raised about its safety. There were two main issues: that HRT may increase the risk of heart disease and, extended

use may increase the risk of breast cancer. These findings were widely discussed in the media with resultant uncertainty and confusion amongst prescribers and users. Many women abandoned HRT immediately and there was uncertainty amongst doctors. HRT prescribing dropped by more than 60%, and remains low to this day.

With further analysis of the data from the WHI subsequently reported that the apparent increased risk for breast cancer appeared to be in the group of women who had been taking HRT before entering the study. They also reported that there was no increase in heart disease in those women starting HRT within 10 years of the menopause. The reporters retracted some of the findings originally reported, though this received less publicity.

Since then, the evidence has shifted favourably for the use of HRT in recent years. It can be prescribed to alleviate symptoms of the menopause, and should be given at the lowest effective dose. If women commence HRT around the time of menopause the risks are small, but there is limited data for continued use after the age of 60. It is not usually appropriate to commence HRT in women over the age of 60, as the risks are increased. However, this does not mean that women who started HRT earlier need to stop once they reach the age of 60.

NICE guidance on HRT

The new guideline from NICE focuses on making the diagnosis and individualizing care. It addresses the benefits and risks of treatment. The diagnosis of menopause can be made without laboratory tests in women over the age of 45 who have had not had a period for at least 12 months, and are not on any hormonal contraceptive treatment. FSH can be measured to diagnose menopause only in women who are aged 40-45 with menopausal symptoms and a change in their menstrual cycle, and in women under the age of 40 in whom menopause is suspected.

Women should be given appropriate verbal and written information about diagnosis, lifestyle changes and treatment options. Short and long-term benefits and risks of HRT must be discussed. Oestrogen-only HRT in hysterectomised

A range of symptoms may be reported, the commonest of which is vasomotor symptoms (hot flushes and night sweats). Other symptoms include sleep disturbance, mood changes, irregular menses, memory changes, reduction in libido, and symptoms of urogenital atrophy.

women and combined oestrogen and progesterone preparations can be given to women with a uterus for the management of vasomotor symptoms. SSRIs (selective serotonin re-uptake inhibitors), SNRIs (serotonin-norepinephrine reuptake inhibitors) or clonidine are not recommended as first line options.

For psychological symptoms, HRT and cognitive behavioural therapy (CBT) are advocated. The evidence for mood stabilisers is currently unclear for these symptoms in women who have not been diagnosed with depression.

Urogenital symptoms can be treated with vaginal oestrogen, even if concurrent with systemic HRT. Symptoms can recur with discontinuation of treatment. Vaginal lubricants and moisturisers can be used alone or in conjunction with vaginal oestrogens for symptoms of vaginal dryness.

Bioidentical hormones

Women should be informed that the

efficacy and safety of bioidentical hormones is not known. A lot of press has been given to bioidentical hormones which are identical to those produced by the body, and they are marketed to be safer than traditional HRT. Some types of traditional HRT actually use natural hormones such as those containing 17-beta oestradiol and micronized progesterone which are both natural human hormones. To date there is no existing safety data to support bioidentical hormones being safer than traditional HRT, and it is important to note that the production of bioidentical hormones is not monitored by government drug regulatory authorities, therefore doses may be inaccurate or inconsistent.

St Johns wort has been shown to be of benefit for vasomotor symptoms though there is no published data on appropriate doses, sustained effect or potency of various preparations. There may be potential interactions with other types of medication (such as anticoagulants and anticonvulsants)

HRT and risks

Women on HRT should be kept under regular review and adhere to regular screening programs for breast and cervical cancer. They should seek medical advice if they experience unscheduled bleeding whilst on HRT. When considering discontinuation of HRT, women can be advised they can stop immediately or with a gradual decrease in dose. The latter strategy may limit recurrence of symptoms in the short term.

● Venous thromboembolism

Venous thromboembolism risk is increased in users of oral HRT compared to baseline population, though there is less risk with transdermal HRT.

● Cardiovascular disease

There is no increase in the risk of cardiovascular disease in women commencing HRT before the age of 60.

● Breast cancer

Fear of breast cancer stops many women from considering HRT. With the data available to date, breast cancer risk is no different to non-users in those women on oestrogen-only HRT, but there is an increased risk in those using HRT with both oestrogen and progesterone.

● Osteoporosis

Regarding osteoporosis, HRT-use is associated with a reduction in the risk of fragility fractures whilst on treatment, but this benefit decreases once treatment is stopped.

Lifestyle

There is some evidence from randomized studies that women with a more active lifestyle suffer with less menopausal symptoms. Moreover, aerobic exercise may improve psychological health, quality of life and sleep disturbance in those with vasomotor symptoms.

Non-hormonal medication

Clonidine is an alpha-2 agonist that has been used to treat vasomotor symptoms, though there is limited evidence for its efficacy. Moreover, NICE does not recommend it as a first line option for vasomotor symptoms.

There is some evidence for the use of SNRI venlafaxine and its analogue desvenlafaxine, but it is limited and more studies are required to secure licensing.

Complementary therapies

These tend to be perceived as being more natural and safer, although efficacy and safety data has not yet been properly evaluated. Herbal medicines may have the potential to cause unwanted side effects and have dangerous interactions with other medicines (herbal and conventional), and there is less regulation in the manufacture of these products

Phytoestrogens

These are plant substances that have similar effects to oestrogen. The most important groups are lignans and isoflavones.

Lignans are found in flaxseed, cereal bran, whole cereals, cruciferous vegetables and fruits. Isoflavones are found in soybeans, chickpeas and red clover, as well as other legumes.

A number of European randomized studies are in progress, looking at the role of phytoestrogens in osteoporosis, cancer and heart disease.


Data is conflicting in the literature regarding the safety and efficacy of soy, red clover and black cohosh.

A meta-analysis of 30 studies with a total of 2,730 participants assessed efficacy and safety of foods and supplements high in phytoestrogens, and the effect on vasomotor symptoms. The review found no difference in the frequency of hot flushes between red clover and placebo. Of the other trials, two reported a reduction in hot flushes with dietary soy compared to regular diet and placebo, and five with soy extract. The remaining trials reported no difference between phytoestrogen treatment and placebo. Many studies were underpowered.

As phytoestrogens have oestrogenic actions there are concerns about safety in hormone-sensitive tissue such as breast and uterus. More evidence is required.

Despite research into alternative preparations, their efficacy remains lower than that of traditional HRT (maximally 50-60% reduction in symptoms compared to 80-90% with traditional HRT. With more robust research it is hoped that some of these alternatives may have a role in managing menopausal symptoms in women.

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The Author

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A white surgical glove is shown on the left side of the image, with a blue surgical instrument handle visible at the bottom. The background is a light gray gradient.

Robotic Surgery Program at AUBMC

Robotic precision meets surgical expertise.

The Robotic Surgery Program at AUBMC offers minimally invasive surgery to patients while securing shorter hospitalization, reduced pain, and discomfort and faster recovery time. Led by a dedicated team of surgeons and nurses, the program boasts a multidisciplinary approach to care thus ensuring patients' satisfaction and positive outcomes.

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AMERICAN UNIVERSITY of BEIRUT MEDICAL CENTER

المركز الطبي في الجامعة الأميركية في بيروت

Our lives are dedicated to yours.



AUBMC leads in robotic surgery, a minimally invasive surgery for gynaecological disorders and other surgical disciplines

Robotic surgery, also called robot-assisted surgery, is a form of minimally invasive surgery that allows surgeons to perform complex procedures through small keyhole incisions. It enhances precision, flexibility, and control during the operation and allows surgeons to better see the operative site, compared with traditional techniques. Using robotic surgery, surgeons can perform delicate and complex procedures that may have been difficult or impossible with other methods.

The American University of Beirut Medical Center (AUBMC) is a tertiary care centre of excellence with a long-standing tradition of providing state-of-the-art medical care for the population of Lebanon and region. In 2013, AUBMC launched the Robotic Surgery Program which included urology, obstetrics, and gynaecology. The program is led by a multidisciplinary team of surgeons dedicated to providing patients with robotic assisted surgery. It offers patients all the benefits of minimally invasive surgical techniques while securing less postoperative pain, shorter hospital stay, faster recovery, and smaller abdominal incisions. Over 200 successful cases of robotic surgical proce-


dures have been performed by the surgeons in the various divisions at AUBMC since the introduction of the program with excellent outcomes that compare favourably with those of the best centres in the world.

Robotic surgery at AUBMC has served various surgical disciplines. In the field of urological surgery, it has led to a tremendous increase in the rate of minimally invasive removal of the prostate gland and kidney tumours. In general surgery, robotic systems have assisted in performing a wide variety of surgical procedures including surgical removal of colorectal and gastric cancer and myotomy to treat achalasia.

Every woman is unique

As we focus our attention on women's health in this issue of the magazine, we cannot but highlight the increasingly important role robotic surgical systems are playing in the management of gynaecologic disorders. We understand every woman is unique in her health needs. It's one of the many reasons we work closely with each patient to understand her condition and personal wishes, especially for women of child-bearing age. Minimally invasive robotic surgery is particularly

We understand every woman is unique in her health needs. It's one of the many reasons we work closely with each patient to understand her condition and personal wishes, especially for women of child-bearing age.

promising for women suffering from fibroids who would like to have children in the future. In addition, our expert surgeons offer a wide range of robotic surgical procedures that include hysterectomies, treatment of vaginal and uterine prolapse, ovarian surgery and surgical treatment of endometriosis. Our multidisciplinary team of highly skilled surgeons with American Board certification and advanced training are proud to offer this service to the people of Lebanon and the region. 

Healthpoint Hospital offers specialised services for women

Healthpoint Hospital is a multi-specialty, elective hospital located in Zayed Sports City, Abu Dhabi that is helping to address some of the Emirate's most pressing healthcare concerns by reducing local patients' need to travel abroad for world-class care. It is part of Mubadala's network of world-class healthcare facilities and Regional Healthcare Partner to Manchester City Football Club.

As a community health provider, women's health is a key area of focus for Healthpoint Hospital. The newly expanded Department of Gynaecology includes four UK and international board-certified practitioners with diverse experience in all facets of women's health ranging from reconstructive vaginal surgeries to early detection and treatment of gynaecological cancers. Healthpoint Hospital, in collaboration with Cleveland Clinic Abu Dhabi, also part of the Mubadala Healthcare network, is also one of the region's few providers to offer comprehensive treatment of uterine fibroids.

Gynaecology

The Head of Gynaecology at Healthpoint Hospital is Dr Osman Ortashi, a UK board-certified Consultant Gynaecologist who brings 10 years of practice in the UK to the benefit of regional patients. Dr Ortashi is accredited by the British Society of Cervical Pathology and Colposcopy (BSCCP) and is a member of the UK Royal College of Obstetricians and Gynaecologists, in addition to his roles on the Health Authority Abu Dhabi (HAAD) and UAE National Cancer Committees.

"Healthpoint Hospital's specialised Department of Gynaecology offers a wide range of services to women in the community, scaling from routine obstetric care to highly complicated laparoscopic procedures. Under our integrated practice model – which brings physicians and surgeons across multiple disciplines together to deliver coordinated care – our Depart-



ment of Gynaecology works closely with our colleagues in the Department of Urology and Department of General Surgery to deliver advanced laparoscopic treatments and other services previously unavailable in our region," says Dr Ortashi.

Community education

Complementing Healthpoint Hospital's medical offerings for women is its community education program, the Women's Wellness Initiative. Led by Dr Mai Aljaber, Deputy Medical Director and Head of Public Health at Healthpoint Hospital, the Women's Wellness Initiative promotes healthy living amongst women through an ongoing series of informational seminars and fitness-related events that emphasize the importance of both physical and mental wellness to overall health, as well as relationship-building.

Healthpoint Hospital routinely partners with the Fatima Bint Mubarak Ladies Sports Academy, the UAE's premiere organisation for women in sports, to conduct workshops and lectures on proper training, rehabilitation and recovery for female athletes. Healthpoint physicians are also reg-

ular speakers at women's health events at ladies-only universities and corporations looking to create awareness about topics including plastic surgery options, breast cancer prevention and the importance of the HPV vaccine and early detection of gynecological cancers.

"Women's health is a family issue, as the health of the wife or mother impacts the whole family," says Dr Mai Aljaber. "Healthpoint Hospital is proud to contribute to the UAE Government's call to increase women's participation in our nation's advancement by playing our humble role to safeguard their health and to encourage their participation in sports and other lifestyle activities."

Alongside gynaecology, Healthpoint Hospital offers approximately 20 outpatient clinics and inpatient services such as aesthetic and plastic surgery, bariatric surgery, cardiology, dentistry (including oral surgery, orthodontics and paediatric dentistry), dermatology, diagnostic imaging, ENT, family medicine, gastroenterology, general surgery, paediatrics, podiatry, respiratory and sleep medicine, rheumatology, urology and vascular surgery. **MEH**

Relief “Ludwigs Erbe” by Peter Lenk, Hafenstrasse 5, Ludwigshafen am Bodensee, Germany. Researchers in Germany have shown for the first time that an acquired metabolic disorder can be passed on epigenetically to the offspring via oocytes and sperm.



You are what your parents ate

Scientists at Helmholtz Zentrum München, in collaboration with researchers from Technical University of Munich and the German Center for Diabetes Research (DZD), have shown that diet-induced obesity and diabetes can be epigenetically inherited by the offspring via both the oocytes and the sperm. The results were published in the journal *Nature Genetics*.

In contrast to genetics, the term epigenetics refers to the inheritance of traits that are not determined in the primary sequence of the DNA (the genes). So far, RNA transcripts and chemical modifications of the chromatin (e.g. on the DNA or the histones) have been considered as carriers of this epigenetic information.

For its studies, the team of the Institute of Experimental Genetics (IEG) used mice that had become obese and had developed type 2 diabetes due to a high-fat diet. Their offspring were obtained solely through in vitro fertilization (IVF) from isolated oocytes and sperm, so that changes in the offspring could only be passed on via these cells. The offspring were carried and born by healthy surrogate mothers.

This enabled the researchers to rule out additional factors such as the behaviour of the parents and influences of the mother during pregnancy and lactation.

“The results showed that both oocytes and sperm passed on epigenetic information, which particularly in the female offspring led to severe obesity,” said Professor Johannes Beckers, who directed the study. In the male offspring, by contrast, the blood glucose level was more affected than in the female siblings. The data also show that – like in humans – the maternal contribution to the change in metabolism in the offspring is greater than the paternal contribution

Rapid spread of diabetes worldwide

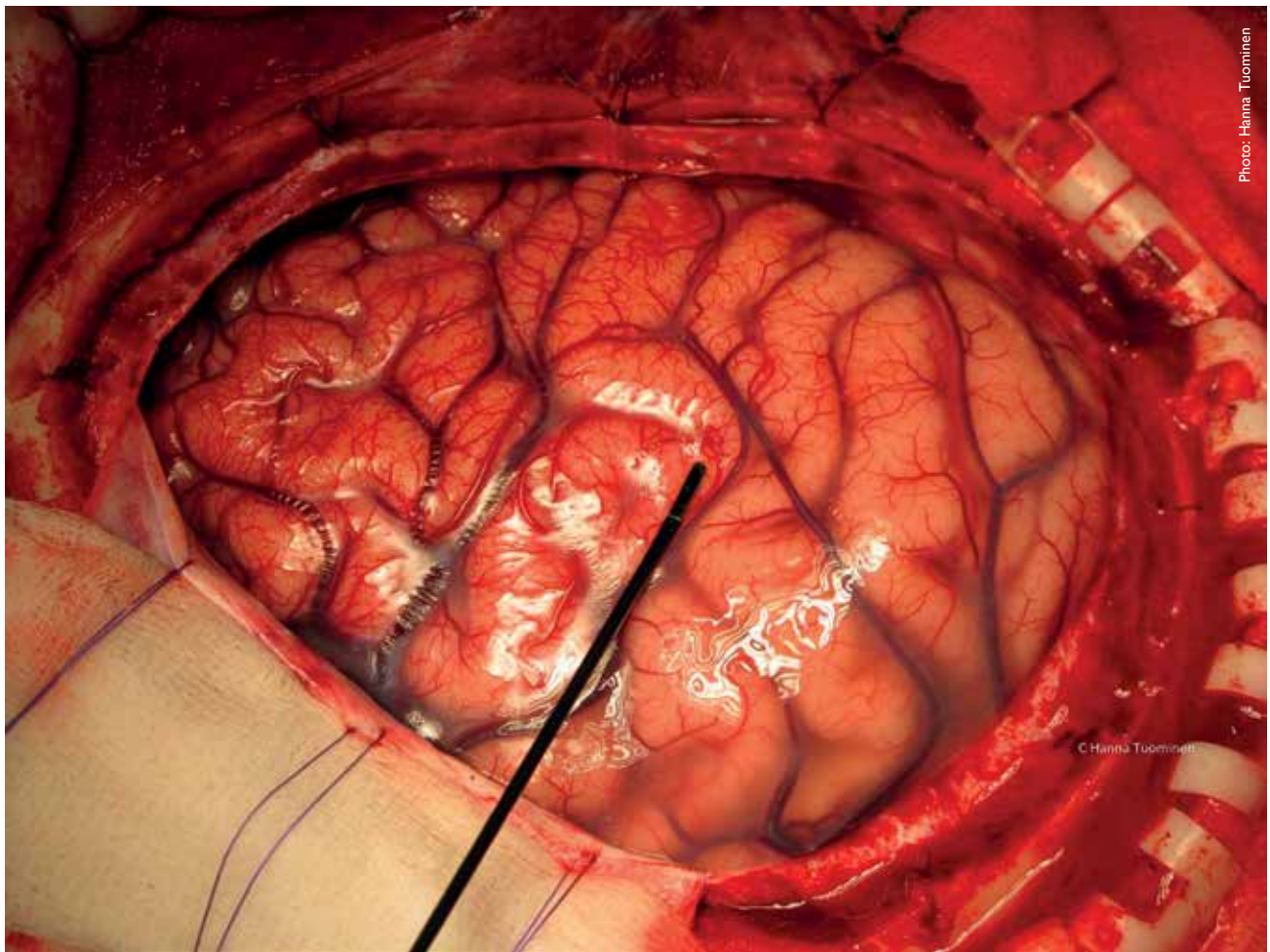
“This kind of epigenetic inheritance of a metabolic disorder due to an unhealthy diet could be another major cause for the dramatic global increase in the prevalence of diabetes since the 1960s,” said Professor Martin Hrab de Angelis, director of the IEG and initiator of the study. The increase in diabetic patients observed throughout the world can hardly be explained by mutations in the genes themselves (DNA)

because the increase has been too fast. Since epigenetic inheritance – as opposed to genetic inheritance – is in principle reversible, new possibilities to influence the development of obesity and diabetes arise from these observations, according to the scientists.

In their theories on heredity and evolution, both Jean-Baptiste Lamarck and Charles Darwin explicitly stated that characteristics and traits that parents acquire during their lifetime through interaction with the environment could be passed on to their offspring. It was not until the neo-Darwinist “Synthetic Theory of Evolution”, which combines the theories of natural selection by Darwin and of genetics by Gregor Mendel, that the inheritance of acquired traits was rejected.

“From the perspective of basic research, this study is so important because it proves for the first time that an acquired metabolic disorder can be passed on epigenetically to the offspring via oocytes and sperm – similar to the ideas of Lamarck and Darwin,” said Prof Beckers.

■ doi: 10.1038/ng.3527



The surface of the brain, pictured during surgery.

“Wrong” scale used to evaluate results of brain surgery

The most common scale used to evaluate outcome of neurosurgical procedures, the modified rankin scale (mRS) – does not measure what is commonly assumed, concludes a study conducted at the Department of Neurosurgery of Helsinki University Hospital. The researchers state that previous treatment results must now be re-evaluated.

Surgery has become a volatile field dur-

ing the past few years, with study after study challenging prevailing treatment practices. For example, surgical treatment of acute appendicitis (JAMA 2015) and arthroscopic surgery on degenerative knees (NEJM 2013) have been called into question by recent research results reached by Finnish researchers.

In neurosurgery, the evaluation of the success of treatment is challenging. Many

patients undergoing surgery are either practically asymptomatic or extremely ill, meaning that the patient cannot himself or herself explain the impact of the surgery.

Consequently, the modified Rankin Scale (mRS) has been commonly used to evaluate outcome and even success of neurosurgical treatment. However, the scale was originally created to monitor the recovery process of stroke victims, not to as-

We were astonished to see the results which indicate that mRS is very poorly suited to evaluating and reporting on the quality of neurosurgical treatment and related complications.

sess the success of neurosurgery. The mRS runs from 0 to 6, and describes the patient's ability to function in broad terms, with 0 indicating no symptoms and 6 meaning that the patient is deceased. For example, a patient classified as mRS 2 exhibits slight disability, caused by whatever reason.

At least three outcome studies on cerebrovascular surgery which resulted in significant changes to neurosurgical treatment everywhere in the world used the modified Rankin Scale to compare and evaluate treatment results (Lancet 2002; Lancet 2014; Lancet 2003).

A study at the Department of Neurosurgery at the Helsinki University Hospital – one of the largest neurosurgical units in the Western world – has now for the first time studied whether mRS is suitable for measuring the treatment results of brain surgery.

“We were astonished to see the results which indicate that mRS is very poorly suited to evaluating and reporting on the quality of neurosurgical treatment and related complications,” says Dr Elina Reponen, principal investigator and specialist in anaesthesiology and intensive care medicine.

According to the results, 24% of patients who underwent a normal procedure with no complications were classified with a worse mRS score 30 days after the procedure than before the surgery. This is to say that according to the mRS score, their ability to function decreased even when the treatment had been excellent and free from complications. On the other hand, 28% of

patients who had experienced significant complications after surgery received an identical or better mRS score upon release. This means that the mRS score did not reflect the fact that the treatment may have been less than perfect and safe.

“The next surprise came when we found out how difficult it was to get these negative results published,” Dr Reponen says.

The non-selective follow-up study monitored patients who underwent brain surgery at the Helsinki University Hospital during one year. This means that the study is based on real patient data from a major academic neurosurgical unit.

“This is the first study examining the applicability of mRS for the assessment of neurosurgical treatment results. Based on the research, we should perhaps re-evaluate the previous studies in which the modified Rankin Scale has been used to measure treatment results and even to compare different forms of treatment. In any case, we are likely to see changes in outcomes reporting,” says Dr Reponen.

“Neurosurgeons rarely conduct extensive research themselves, since their work is hectic and they have scant time

for research. Many neurosurgical studies are led by neurologists and radiologists, who understandably choose to employ research methods and indicators which are accepted and established in their own field. However, neurosurgeons should be aware of this and consider participating in the development of the indicators used to measure their work and not outsource this task to people who are less familiar with the field,” reasons neurosurgeon Miikka Korja, one of the authors of the new study.

According to Dr Hanna Tuominen, specialist in anaesthesiology and one of the authors of the study, anaesthesiologists have been pivotal in improving and measuring patient safety in many areas of surgery, and they also have a crucial role to play in neurosurgery.

“The anaesthesiologist is on the side of both the patient and the surgeon. It is in the anaesthesiologist's interests to provide the best possible working conditions for the surgeon and the best possible outcome for the patient. This is why anaesthesiologists have been active in measuring patient safety and the quality of treatment.”

■ doi: 10.1016/j.wneu.2016.03.102



A microscope which can be controlled with the mouth is one of the most important tools of the neurosurgeon.

What is deep brain stimulation surgery?

On Monday, 30 November 2015, Cook Children's marked an important milestone in its quest to improve the quality of life for children struggling with debilitating movement disorders with its hundredth deep brain stimulation (DBS) surgery in Cook Children's history.

Deep brain stimulation surgery involves two parts: implanting electrodes into the brain and a pacemaker under the skin of the chest. The two devices are connected by the surgeons and electrical impulses are sent from the pacemaker to the brain to correct the abnormal impulses of the movement disorder. The two surgeries take place about a week apart from each other. Following both procedures, the child usually goes home the next day.

The path to asleep DBS

When neurosurgeons at Cook Children's first began performing DBS, patients had to be awake, which can be a traumatic event for kids to go through, even after the efforts to keep them pain free while awake in previous surgeries. Now, thanks to enhanced technology, patients can be under anesthesia and asleep. This change in the treatment's technique came with the addition of an iMRI, which is essentially a giant magnet, at Cook Children's. The iMRI allows neurosurgeons to have pinpoint accuracy while performing a delicate brain surgery.

"With all the technology we have, I know I am in the exact spot I want to be," said John Honeycutt, M.D., medical director of Neurosurgery and co-director



of the Jane and John Justin Neurosciences Center at Cook Children's. "My accuracy for DBS is 0.5 millimeters."

Dr Honeycutt is one of the world's leaders when it comes to using DBS on patients with dystonia and performed the hundredth surgery. It will be the fifteenth asleep surgery for Cook Children's.

Building a DBS program

Warren Marks, M.D., a neurologist and medical director of the Movement Disorder and Neurorehabilitation Program at Cook Children's, says Cook Children's DBS program grew as part of an evolution of the movement disorders program at the medical center.

Dr Marks said it took two years of hard work to develop the DBS program at Cook Children's. It involved assembling and organizing two entire teams – one to do the evaluations and postoperative management and another to do the surgery.

Cook Children's performed its first DBS surgery in 2007.

"We have slowly and methodically grown the program so we try and do it in the best way we can and try to provide for the most kids we can," according to Dr Marks. "The program is somewhat unique in that we are really focused on children. When we started our program there was no adult program to work off of. Virtually all DBS programs where surgeries are performed on children are in conjunction with adult programs. We really did start from ground zero."

Both Dr Honeycutt and Dr Marks take the hundredth procedure in their stride. The milestone reinforces their success, but they say they never looked at this program as a race. They have been very careful in their approach to the surgeries and the patients they are treating.

What excites them is the fact that the last 15 cases were performed while the children were asleep.

There will still be some surgeries where the patient has certain disorders that will require him or her to be awake. But for the most part, the surgeries will be done with the patients asleep.

■ For more information, visit:

cookchildrensinternational.org

Tel: 01-682-885-4685

The surgeon: Helping kids like his own

A profile of Cook Children's medical director of Neurosurgery

Several key life experiences helped lead John Honeycutt, M.D., to become the chief neurosurgeon at Cook Children's in Fort Worth. But none really shaped the doctor he is like the birth of his children.

"People told me everybody wants to work in pediatrics until you have kids," Dr Honeycutt said. "They said, 'Then you won't want to work on kids any longer. It will be too much.' But it was the exact opposite. When I had my own kids I realized even more this was what I wanted. I wanted to help kids like my own. It gave me much more empathy. It made it much easier to take care of them. In my line of work, I'm asking parents to hand their kids off to me and take care of them. They entrust their kids' lives in my hands and I understand that."

As a teenager, Dr Honeycutt saw first-hand the role a surgeon can play in helping a family after a traumatic event.

One afternoon in his hometown of Paragould, Arkansas, while "horsing around" after football practice, the then 15-year-old broke his neck.

A surgical scar remains on Dr Honeycutt's neck and so do the memories of his time in the hospital. He describes the scene at the time like what you would see in a bad TV movie as he was placed in traction.

As a patient, he saw physicians changing patients' lives and making them better. The straight-A student discovered what he wanted to be when he grew up.

Then during medical school, Dr Honeycutt found his specialty.

"When I was doing my neurosurgery rotation, it all just clicked," he said. "It clearly had all the parts I really enjoyed. I liked being a surgeon. I liked the neurosciences. I liked the workings of the brain. I just loved everything about it."

While Dr Honeycutt is now an

experienced neurosurgeon, he still strives to be at the forefront of the latest technology and technique. Working on a child's brain requires not only a steady hand, but the latest in state-of-the-art technology.

Dr Honeycutt and his fellow neurosurgeons use their expertise to perform the most intricate and delicate surgeries, such as deep brain stimulation, iMRI-guided surgery and laser ablation surgery.

"It's an exciting time right now because we are learning so much about the brain and how it works and at the same time our technology continues to improve with micro instruments, with robotics and computers," Dr Honeycutt said. "If I don't keep learning and keep up with what's going on, I can get so far behind, rather quickly. One of the great things about Cook Children's is we are always on the leading edge."

Another aspect of Cook Children's that Dr Honeycutt said makes it unique is the relationship between the neurologists and the neurosurgeons. As surprising as it may be, Dr Honeycutt says it's rare for other hospitals to have the neurologists and neurosurgeons share a clinic together. He calls the working relationship between everyone involved in the Department of Neurosciences at Cook Children's unbelievable. A lot of it has to do with that communication and the skill of the surgeons and physicians. They push each other constantly to do better.

At Cook Children's, the neurologists and neurosurgeons can give each other immediate feedback on a patient. "You look at our situation and say, 'Why doesn't everyone do this?' It's so silly that people don't do this everywhere," Dr Honeycutt said. "It's one of the things that makes this place so special."

Global surgery experts issue roadmap for improving access to surgical care

New paper in *BMJ Global Health* puts forth recommendations to reach five billion people with safe surgery and anaesthesia.

BMJ Global Health, a new publication launched by the BMJ, published a roadmap to expanding access to surgical care around the world. According to a landmark 2015 report by the Lancet Commission on Global Surgery, nearly a third of the global disease burden can be attributed to surgically treatable conditions, but an estimated 5 billion people cannot access surgery due to a lack of infrastructure, insufficient numbers of trained surgeons and anaesthesiologists, or the prohibitive costs of receiving care. 143 million additional surgical procedures each year are needed to save lives and prevent disability. But the case for action isn't just humanitarian: investing in surgery would save developing countries approximately \$12.3 trillion in lost GDP by 2030. As Dr Jim Yong Kim, president of the World Bank Group, said in his address to the Lancet Commission in May 2015: "The stakes are high, because failing to fix this problem will have a substantial impact on people's lives, wellbeing, and even their economic health going forward."

Building on this report, the paper released 7 April, entitled "Global Surgery 2030: A Roadmap for High Income Country Actors" outlines a series of actions that universities, hospitals, surgeons, biotech companies, and the media in wealthy countries can pursue to help bring access to those who need it most in low- and middle-income countries (LMICs). Written by an international group of surgeons, anaesthesiologists, business and biotechnology leaders, journalists, and advocates, the paper prioritizes the role of health professionals and pol-

icymakers who live and work in LMICs. Authors state that unilateral action by high-income country groups without an ethos of partnership is unlikely to bring about sustainable change. Instead, high-income country resources can be brought into the service of local interests, building sustainable health systems and providing a durable solution for the world's poor.

"The goal is universal access to safe, affordable, surgical and anaesthesia care when needed," said John G. Meara, MD, DMD, MBA, director of the Program in Global Surgery & Social Change at Harvard Medical School, Plastic Surgeon-in-Chief at Boston Children's Hospital, and co-chair of the Lancet Commission on Global Surgery. "This reports demonstrates a common policy agenda between major actors and provides a roadmap for maximizing benefit to surgical patients worldwide."

The publication zeroes in on a series of actionable recommendations that those in high-income countries can take to enhance the world's capacity to deliver surgical and anaesthesia care. Specifically, the paper calls on:

- Colleges and academic medical centres to develop global partnerships for training and ongoing professional development and to support research efforts in quality, safety, and outcomes measurement
- High-income country surgery and anaesthesia trainees to develop long-term clinical and research relationships with colleagues in LMICs
- Academic surgeons and journals to support research by surgeons in LMICs and eliminate barriers to publishing and

The goal is universal access to safe, affordable, surgical and anaesthesia care when needed.

disseminating research in the communities where it was conducted

- Global health funders to aggressively invest in health systems strengthening with a specific focus on surgery as a critical component of universal health coverage
- The biomedical devices industry to design and manufacture user-centred equipment appropriate for resource-limited environments and to train LMIC health professionals and biomedical equipment technicians
- Press and advocacy groups to develop public support by telling the stories of those affected by surgical disease, and to independently investigate the state of surgery around the world

"We're thrilled to be launching this paper at such a crucial time for global surgery," said Dr Paul Farmer, co-founder of Partners in Health and a Lancet Commissioner. "We have an opportunity to turn surgery from the 'neglected stepchild of global public health' to a centrepiece of national health systems, averting millions of deaths and disabilities along the way." MEH

Be pro-active and avoid kidney disease



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

We are increasingly being reminded about the importance of practising healthy lifestyle habits such as clean eating and regular exercise. This is mainly due to the advances in research surrounding the effects that an unhealthy lifestyle can cause later in life, such as obesity, diabetes and cancer. As the cause of death to 38 million people each year, non-communicable diseases (NCD's) are being increasingly monitored. Durbin receives numerous requests annually to source medication and equipment used to treat a huge range of NCD's such as diabetes, and cardiovascular and respiratory diseases. The world's aging population and specifically the continual ascent in numbers of diabetes cases, has played a huge part in seeing kidney disease emerging more frequently as a recognised non-communicable disease worldwide. And, as kidneys are the most in-demand organ for transplantation, good kidney health is not something that should be taken for granted.

Chronic Kidney Disease (CKD) is usually caused by a long-term disease such as hypertension which slowly damages the kidneys and over time reduces their ability to filter the blood. Waste products which are not being excreted can cause

blood pressure to rise even more, creating a dangerous cycle. www.kidney.org – the website of the National Kidney Foundation in the US – notes that about 30% of patients with Type 1 diabetes and up to 40% of those with Type 2 diabetes will eventually suffer from kidney failure.

It is normal for kidney function to begin to decrease as we get older, but the increasingly overweight population in the Middle East has also resulted in a large number of younger patients suffering with diabetes, hypertension and ultimately CKD. Countries such as Iraq, Saudi Arabia, Jordan, Egypt and Bahrain have some of the highest percentages of kidney disease prevalence around the world.

The progression of CKD cannot be reversed, but it can be slowed by making healthier lifestyle choices and taking medication. Some recommended immediate changes – such as avoiding salt, drinking water and trying to eat a healthy and balanced diet – can lower the tendency of getting kidney disease. CKD can however ultimately progress to end-stage renal disease or kidney failure at which point the patient will need dialysis or a kidney transplant to survive. Dr Hareth Aljboury, head of nephrology at Al Qassimi Hospital in Sharjah believes cost is an important factor putting people off treatment. Three sessions of dialysis costing Dh2000 are needed per week in most end-stage kidney failure patients. About 40% of the patients having dialysis also have chronic blood sugar and blood pressure problems, which add to costs.

Also known as the 'silent killer', the disease usually displays few symptoms until it is at an advanced stage. Symptoms to look out for include swelling in the body, high blood pressure, changes in urination and feeling very nauseous or weak. A change in kidney function is usually discovered through a blood or urine test. The levels of creatinine in the blood are used to calculate glomerular filtration rate – how effective the kidneys are at filtering blood. Another test

observes the albumin to creatinine ratio in the urine – excess protein may also identify a problem. As warning signs are minimal, people with risk factors should be pro-active with requesting tests. The National Kidney Foundation suggests annual kidney screenings for those with high blood pressure, diabetes, a family history of kidney failure and those over the age of 60.

I read in the UK medical journal *The Lancet* that in 2013, nearly one million people died from CKD. Although this accounts for less than 2% of all deaths globally, it is actually a 135% increase over the number of CKD-related deaths in 1990. As the majority of causes of CKD are preventable, it's a shame to see this disease becoming so common. Although we are more clued up about the risk factors and causes of NCD's, arguably the rising obesity figures show there is a level of ignorance regarding the recommended measures that can be taken to counter them. We must remember that looking after oneself not only benefits us as individuals, but also our healthcare systems and future generations, and therefore ignorance is not always bliss. MEH

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

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- Email: bd@durbinglobal.com

Roche Diagnostics brings the power of knowing the value of diagnostics in healthcare

Diagnostics are becoming increasingly important for healthcare providers to deliver an objective source of information and the most optimized care to patients. With quality tools for diagnosis, clinicians can have access to accurate and reliable results in the right time; this equips them with the resources and knowledge to make the correct diagnosis, implement the best treatment and limit disease progression by predicting the care needed for the best patient outcome.

The value of diagnostics lies in having the right information available, which is why Roche Diagnostics believes in 'the power of knowing' – a term used to define the value diagnostics brings to our health.

Diagnostics are more than just a precursor to treatment; they are about intervention. The power of knowing allows healthcare professionals to manage disease and deliver the best possible patient care. As such, it is of paramount importance that the diagnostic tools used are reliable and accurate. Roche Diagnostics is fully committed to building strong and lasting partnerships with laboratories to provide fast and reliable results needed for life-changing decisions.

The broad range of tests offered by Roche Diagnostics, together with their cutting-edge technologies, contributes to a new phase of sustainable healthcare in disease prevention and management. This involves the integration of multiple areas: prevention, prediction and treatment, which can be found in Roche's broad range of solutions in areas such as oncology and women's health.

While cervical cancer is the second most common cancer in women between the age of 15 and 44¹, it can be prevented with early detection to improve patient outcomes. The average 5-year survival rate is estimated to be 90% for cervical cancer², demonstrating the value of early detection. Similarly, breast cancer is another common cancer in women worldwide, according to the World Health Organization (WHO). Approximately 15–25% of



breast cancers cases are positive for human epidermal growth factor 2 (HER2)³. With early detection, the average 5-year survival rate is estimated to be 89% for breast cancer⁴. With Roche's personalised healthcare tests cancer clinicians can better stratify their patients, depending on their diagnosis, into the best treatment decision, eliminating trial and error and saving time, costs, and most importantly, lives.

Early detection and diagnosis is also important in pre-eclampsia, which occurs in 3–5% of pregnancies during the second half of gestation⁵. It is usually difficult to diagnose due to variable features and un-specific symptoms, but with the test to detect soluble form of vascular endothelial growth factor receptor and placental growth factor (sFlt-1/PlGF), clinicians can predict the risk of complications at birth. Subsequent administration of special care and monitoring can then protect the health and safety of the mother and child.

Roche Diagnostics is investing in pushing the boundaries through innovation so that the development of products and solutions that help predict and prevent disease can be consistently delivered. Through the Power of Knowing, healthcare professionals can make the right decisions for their patients at the right time. Roche Diagnostics offers

the industry's broadest range of tests and pioneering technologies, the solutions can give an accurate diagnosis, detect risk of disease, predict how disease may progress, and enable the right treatment decision to be made at the first opportunity.

References

- 1 - World Health Organization. 1 in 100 women in Europe will develop cervical cancer. Available online: <http://www.euro.who.int/en/what-we-do/health-topics/noncommunicable-diseases/cancer/news/news/2013/04/1-in-100-women-in-europe-will-develop-cervical-cancer>
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- 3 - WebMD, Breast Cancer Health Centre. Last accessed March 2014 at <http://www.webmd.com/breast-cancer/breast-cancer-types-er-positive-her2-positive>
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Timesco leads the way with its reusable and single-use laryngoscopes

England-based Timesco Healthcare Ltd has been at the forefront of laryngoscope design, manufacture and innovative development in intubation for more than five decades.

Timesco manufactures the world's number one single-use disposable fibre optic laryngoscope system called "Callisto", which is complemented with Callisto single-use and Optima reusable LED handles.

The company provides complete ranges of single-use, "Callisto", "Europa" and reusable "Optima" and "Sirius" laryngoscopes systems for all requirements -- from neonate to adult intubation. Also available are specialist, Robert Shaw, Seward, and difficult intubation "Eclipse" tilting tip blades.

The Timesco laryngoscope programme is also available with a new rechargeable sys-

tem. Timesco has introduced innovative, award winning, energy savings systems for extended battery life, EES and ION.

The Timesco Laryngoscope programme is part of the Timesco product ranges, which cover all disciplines of surgery. Timesco surgical and medical ranges cover premium OR quality surgical instruments, dental, electro surgery, diagnostic, EMS, etc.

Timesco has been established since 1964 and is one of the largest privately owned quality surgical and medical companies in the UK. Timesco is an approved supplier to many ministries of health around the world, including the NHS in the UK.

Timesco has a regional distribution operation in the Middle East and has an office in Dubai.



Contact the Dubai office manager Mr Misbah Jabbar.

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● For more information, please visit: www.timesco.com

Revolutionary lightweight x-ray machines in production

Making x-ray machines smaller and lighter with carbon nanotube technology is being used to revolutionise the market in the medical devices industry.

Micro-X has established its headquarters in Adelaide, the capital of South Australia, in preparation for the production of its lightweight machines.

Managing Director Peter Rowland said Micro-X had successfully produced a 75kg mobile x-ray machine – just a fraction of the size and weight of the 600kg machines traditionally used in hospitals.

He said Micro-X had the rights to apply technology from a company in the United States that was commercializing the carbon nanotubes as the electron emitter within an x-ray machine.

"In one of these 600kg monsters, the x-ray tube itself weighs about 26kg and if you think about holding that over a bed safely you need a vertical and horizontal support arm that's quite strong and a cart that's quite strong."

"By comparison, our tube is one kilogram and is about the size of a large grapefruit. Our task has been to reduce the size of the overall cart in the same ratio."

Rowland said the portable x-ray ma-



chines, which are due to be released towards the end of the year, would address a real market need.

"A lot of medical devices are very clever but if they require a change to the way medicine is practiced – if it's a disruptive product – then sales are going to come very slowly because you not only have to sell the technology in the product but you also have to sell a whole new way of doing things," he said.

"That's not the kind of path to revenue

you need for a start-up company so our first product is simply a better mousetrap.

"That smallness and lightness translates to simplicity and simplicity translates to a lot cheaper. So we've got what we believe is a real game-changing first launch product.

"There's a clear market interest in a unit that's smaller, can get into tighter spaces, is easy to manoeuvre with less effort for radiographers and we're coming in at half the price."

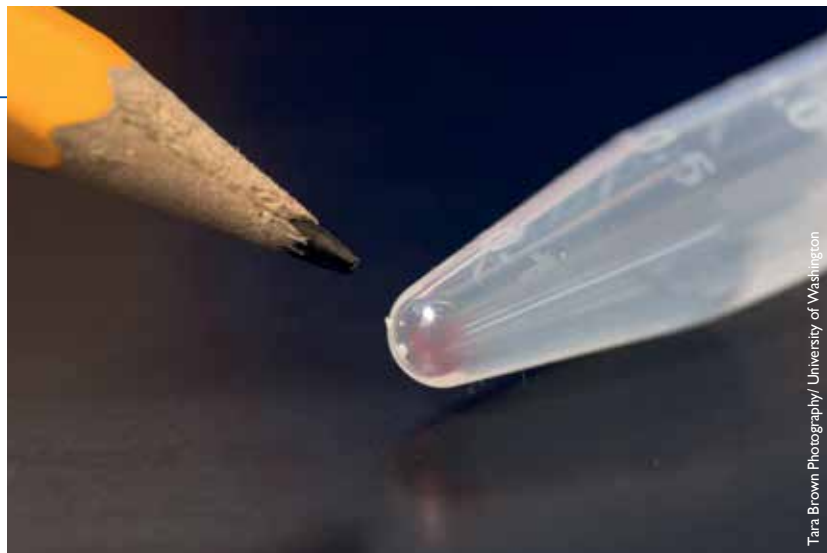
Rowland said mobile units could be stationed in radiography departments and easily wheeled to where they were needed within a hospital or they could be kept in areas such as intensive care or thoracic wards where they were needed regularly.

He said there was also an opportunity for aged care facilities or visiting radiologists to easily transport the units to where they were needed and then email x-rays to treating physicians to help keep patients out of hospitals and medical clinics.

Micro-X was given a one-year \$3 million loan by the South Australian Government to launch production and expects to build about 150 saleable units by the end of the year.

● For more information, email: prowland@micro-x.org

All the movies, images, emails and other digital data from more than 600 basic smartphones (10,000 gigabytes) can be stored in the faint pink smear of DNA at the end of this test tube.



Research team stores digital images in DNA – and retrieves them perfectly

Technology companies routinely build sprawling data centres to store all the baby pictures, financial transactions, funny cat videos and email messages its users hoard.

But a new technique developed by University of Washington and Microsoft researchers could shrink the space needed to store digital data that today would fill a hypermarket down to the size of a sugar cube.

In a paper presented in April at the ACM International Conference on Architectural Support for Programming Languages and Operating Systems, the team of computer scientists and electrical engineers has detailed one of the first complete systems to encode, store and retrieve digital data using DNA molecules, which can store information millions of times more compactly than current archival technologies.

Authors of the paper are James Bornholt, UW computer science and engineering doctoral student; Randolph Lopez, UW bioengineering doctoral student; Luis Ceze, UW associate professor of computer science and engineering; Georg Seelig, UW associate professor of electrical engineering and of computer science and engineering; and Microsoft researchers and UW CSE affiliate faculty Doug Carmean and Karin Strauss.

In one experiment outlined in the paper, the team successfully encoded digital data from four image files into the nucleotide sequences of synthetic DNA snippets. More significantly, they were also able to reverse that process – retrieving the correct sequences from a larger pool of DNA and reconstructing the images without losing a single byte of information.

The team has also encoded and retrieved data that authenticates archival video files.

“Life has produced this fantastic molecule called DNA that efficiently stores all kinds of information about your genes and how a living system works – it’s very, very compact and very durable,” said co-author Ceze.

“We’re essentially repurposing it to store digital data – pictures, videos, documents – in a manageable way for hundreds or thousands of years.”

The digital universe – all the data contained in our computer files, historic archives, movies, photo collections and the exploding volume of digital information collected by businesses and devices worldwide – is expected to hit 44 trillion gigabytes by 2020.

That’s a tenfold increase compared to 2013, and will represent enough data to fill more than six stacks of computer tablets stretching to the moon. While not all of that information needs to be saved, the world is producing data faster than the capacity to store it.

DNA molecules can store information many millions of times more densely than existing technologies for digital storage – flash drives, hard drives, magnetic and optical media. Those systems also degrade after a few years or decades, while DNA can reliably preserve information for centuries. DNA is best suited for archival applications, rather than instances where files need to be accessed immediately.

The team from the Molecular Information Systems Lab housed in the UW Electrical Engineering Building, in close collaboration with Microsoft Research, is

developing a DNA-based storage system that it expects could address the world’s needs for archival storage.

First, the researchers developed a novel approach to convert the long strings of ones and zeroes in digital data into the four basic building blocks of DNA sequences – adenine, guanine, cytosine and thymine.

“How you go from ones and zeroes to As, Gs, Cs and Ts really matters because if you use a smart approach, you can make it very dense and you don’t get a lot of errors,” said co-author Seelig. “If you do it wrong, you get a lot of mistakes.”

The digital data is chopped into pieces and stored by synthesizing a massive number of tiny DNA molecules, which can be dehydrated or otherwise preserved for long-term storage.

The UW and Microsoft researchers are one of two teams nationwide that have also demonstrated the ability to perform “random access” – to identify and retrieve the correct sequences from this large pool of random DNA molecules, which is a task similar to reassembling one chapter of a story from a library of torn books.

Currently, the largest barrier to viable DNA storage is the cost and efficiency with which DNA can be synthesized (or manufactured) and sequenced (or read) on a large scale. But researchers say there’s no technical barrier to achieving those gains if the right incentives are in place.



A DNA-Based Archival Storage System

<http://tinyurl.com/zzkgmwv>

Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
■ May 2016		
The GCC Healthcare Innovation Congress	15 – 18 May, 2016 Dubai, UAE	www.gcchealthcareinnovation.com
Saudi Health 2016 The fourth edition of Saudi Health Exhibition & Conference	16 – 18 May, 2016 Riyadh, Saudi Arabia	info@recepo.com info@saudihealthexhibition.com www.saudihealthexhibition.com
Arab African API Congress	17 – 18 May, 2016 Cairo, Egypt	www.aaapci.com
4th Biennial International Congress of Iranian Society of Knee Surgery, Arthroscopy & Sports Traumatology	17 – 20 May, 2016 Tehran, Iran	iskast@infoplusevents.com www.iskast2016.com
5th Physio Dubai 2016	19 – 20 May, 2016 Dubai, UAE	www.physiodubai.com
The Middle East Otolaryngology Conference and Exhibition 2016	24 – 26 May, 2016 Dubai, UAE	ayman.salem@informa.com www.me-oto.com/en
3rd International Advanced Orthopaedic Congress (IAOC)	26 – 28 May, 2016 Dubai, UAE	conference@uae.messefrankfurt.com www.aocongress.com/676/new-node.aspx
■ June 2016		
CPHI Istanbul 2016	1 – 3 June, 2016 Istanbul, Turkey	scott.donovan@ubm.com www.cphi.com/istanbul
Dubai 14th International Conference on Medical, Medicine and Health Sciences	24-25 June, 2016 Dubai, UAE	www.academicfora.com/mmhs-24-25-june-2016-dubaiuae
■ August 2016		
International Conference on Hypertension	10 – 11 August, 2016 Dubai, UAE	www.thescienceone.com/ich
2nd World Summit on Cancer Science and Therapy	31 August - 2nd September, 2016 Dubai, UAE,	www.bioleagues.com/conference/cancer-conferences
■ September 2016		
The 12th International Scientific Conference on Sport, Medical and Health Sciences	10-11 September, 2016 Dubai, UAE	www.scihost.org
Surgery and Anesthesia Summit	24 -26 September, 2016 Dubai, UAE	www.bioleagues.com/conference/surgery-anesthesia-conference
World Congress on Otolaryngology, Rhinology and Laryngology	24 -26 September, 2016 Dubai, UAE	www.bioleagues.com/conference/otorhinolaryngology-meetings-
The Middle East Health Care Facility Design Projects Conference	25 – 27 September, 2016 Dubai, UAE	www.healthcarefacilityprojects.com
Oman Health	26 – 28 September, 2016 Muscat, Oman	info@omanexpo.com www.omanhealthexpo.com



Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
■ October 2016		
International Conference on Molecular Biology	10 – 11 October, 2016 Dubai, UAE	www.molecularbiology.conferenceseries.com
8th Annual Pharma Middle East Congress	10 – 12 October, 2016 Dubai, UE	www.middleeast.pharmaceuticalconferences.com
3rd World Congress on Hepatitis and Liver Diseases	10 – 12 October, 2016 Dubai, UAE	www.hepatitis.omicsgroup.com
MENA Physical Medicine and Rehabilitation Congress	13-15 October, 2016 Dubai, UAE	www.menaphysicalrehab.com
Dubai Otology, Neurology & Skull Base Surgery Conference	12 – 14 October, 2016 Dubai, UAE	http://dubaioto.com
Men's Health Exhibition & Conference	15 – 16 October, 2016 Dubai, UAE	www.menshealthexhibition.com
International Psychology Conference Dubai 2016	21 – 22 October, 2016 Dubai, UAE	www.psych-me.com
KISOG 2016 The Second International Conference of the Kurdistan-Iraq Society of Obstetricians and Gynecologists	26 – 28 October, 2016 Erbil, Kurdistan, Iraq	toc@theorganizers-iraq.com www.kisogconference.com
■ November 2016		
International Nursing and Healthcare Conference	1 – 3 November, 2016 Dubai, UAE	www.nursing.conferencesus.com
World Congress On Neurology and Brain Disorders	1 – 3 November, 2016 Dubai, UAE	www.neurology.conferencesus.com
13th Global Vaccines & Vaccination Summit and Expo	8-9 November, 2016 Istanbul, Turkey	www.vaccines.global-summit.com/middleeast
International Conference on General Practice & General Medicine	10-11 November, 2016 Istanbul, Turkey	www.generalpractice.conferenceseries.com
8th Global Obesity Meeting	14 – 15 November, 2016 Dubai, UAE	www.obesitymeeting.conferenceseries.com
15th Global Diabetes Summit and Medicare Expo	14 – 16 November, 2016 Dubai, UAE	www.diabetesexpo.com/middleeast
International Conference on Chest	17 – 18 November, 2016 Dubai, UAE	www.chest.conferenceseries.com
8th Global Summit on Healthcare	17 – 19 November, 2016 Dubai, UAE	www.healthcare.global-summit.com/middleeast
Gastro 2016 EGHs-WGO International Congress	17 – 19 November, 2016 Abu Dhabi, UAE	www.gastro2016.com
Arab Diabetes Medical Congress	17 – 20 November 2016 Doha, Qatar	info@arabdiabetescongress.com www.thedasil.org/

List your conference:

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

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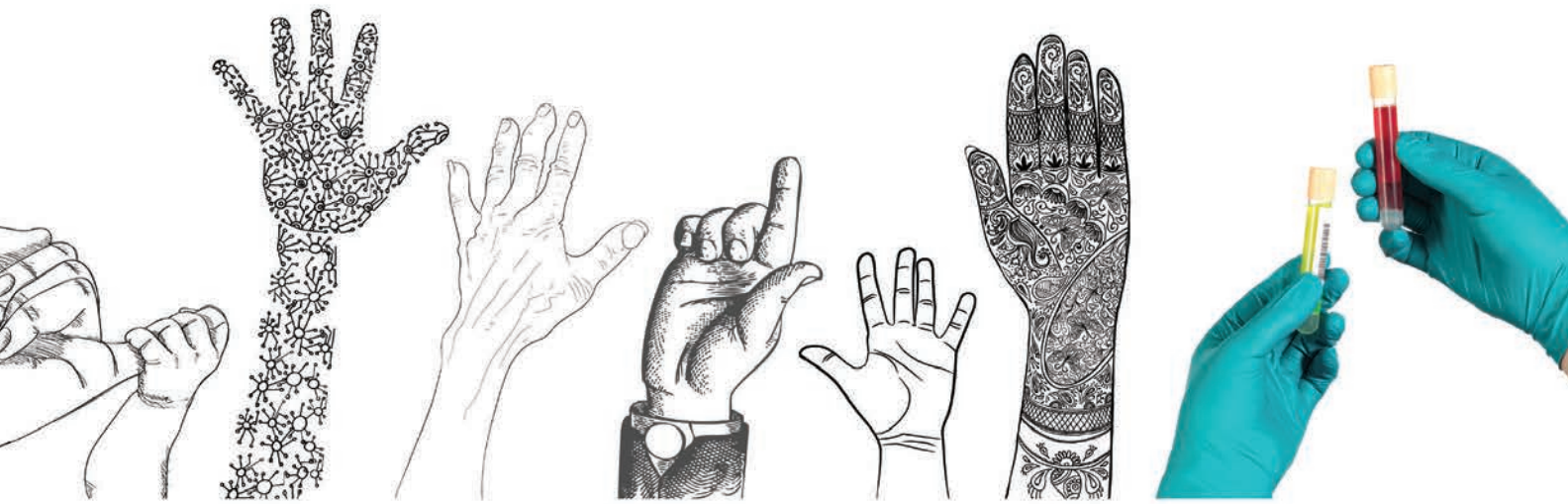
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Giving new hope to children with metabolic disease

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.

