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November - December 2023

## Lifestyle diseases

Physical activity lowers  
risk of heart disease  
irrespective of genetics

## Growth opportunities in Saudi Arabia

Changing demographics drive  
long-term care, rehabilitation

## Climate Change and Health

200 health journals call on WHO  
to declare global health emergency

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- Scientists develop magnetic gel that accelerates healing of diabetic wounds



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# Prognosis

## Preventable disease

This issue of *Middle East Health* focuses on diseases of lifestyle and looks at some of the latest research in this field. Lifestyle diseases are a group of health conditions that primarily result from an individual's daily habits and choices. These diseases have emerged as a significant public health concern, contributing substantially to the global burden of morbidity and mortality. Unlike infectious diseases, lifestyle diseases are largely preventable through modifications in behaviour and lifestyle.

Common examples of lifestyle diseases include cardiovascular diseases, diabetes, obesity, and certain types of cancers. These conditions are often linked to modifiable risk factors such as poor dietary choices, sedentary behaviour, tobacco use, and excessive alcohol consumption. The intricate interplay between genetics and lifestyle factors further amplifies the susceptibility to these diseases.

Diet plays a pivotal role in the development of lifestyle diseases. High intake of processed foods, saturated fats, and refined sugars contributes to obesity and metabolic disorders. Sedentary lifestyles, characterized by a lack of physical activity, exacerbate these issues, leading to cardiovascular complications and insulin resistance. Smoking and excessive alcohol consumption are additional risk factors that compound the likelihood of developing these diseases.

The global prevalence of lifestyle diseases has risen sharply in recent decades, driven by urbanization, technological advancements, and changes in dietary patterns. The economic burden associated with treating and managing lifestyle diseases is substantial, placing strain on healthcare systems worldwide.

Preventive measures, such as public health campaigns promoting healthy lifestyles, are crucial in mitigating the prevalence of lifestyle diseases. Education on balanced nutrition, regular physical activity, and smoking cessation can empower individuals to make informed choices that foster long-term health. Additionally, healthcare policies and interventions targeting the reduction of risk factors contribute to the overall effort in curbing the rise of lifestyle diseases.

Lifestyle diseases represent a complex intersection of genetic predisposition and environmental factors, with behavioural choices playing a central role in their development. Addressing these diseases requires a multifaceted approach that encompasses individual responsibility, community engagement, and policy-driven interventions to foster a culture of health and well-being.

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# middle east monitor

Update from around the region

## KFSH&RC's Health Outreach Programme serves as a leading model for improving access to healthcare

At a time when the demand for specialized healthcare is rising, and the challenges of accessing it outside major cities in the Kingdom of Saudi Arabia are increasing, the Health Outreach Program at King Faisal Specialist Hospital and Research Center has emerged – since its establishment 27 years ago – as a pioneering model in facilitating access to healthcare services and improving the patient experience.

Through 35 offices distributed throughout the Kingdom, the programme aims to provide healthcare services to patients in their regions, reducing the need for travel and its associated financial and emotional costs. It also aims to enhance clinical, educational, and training experiences in partnership with the Ministry of Health and national healthcare institutions.

Through the Global Health Exhibition held in Riyadh from 29 to 31 October, in which KFSH&RC participated as a strategic health

partner, the hospital showcased the qualitative shift in experience that the programme has brought to patients through the various services it includes.

The services provided by the programme, include coordinating appointments for clinics, operations, and hospitalization, following up on patient referrals, medical reports, and medication refill services, in addition to the blood drawing programme, which sends the patient's blood sample to the hospital's main laboratory within a period not exceeding 24 hours to conduct the necessary analyzes and provide him or her with their results without the need to leave the city. The health outreach offices conducted approximately 14,000 blood sample withdrawals last year.

The programme also provides telemedicine and remote intensive care services, in addition to medical second opinion for local and regional health institutions, where specialist doctors review medical reports for patients in



other cities or countries and provide recommendations on methods of diagnosis and treatment to bridge the gap in specialized doctors.

However, the health outreach programme is not limited to providing healthcare services, it also extends to organizing virtual educational lectures and coordinating accredited medical conferences with continuing medical education hours, targeting health practitioners to enhance their knowledge, transfer knowledge, and share distinguished clinical practices. **MEH**

## Report: GCC shows promising progress in diabetes clinical trials

The GCC is making remarkable strides within its portfolio of 180 active clinical trials for diabetes, with 70% of trials successfully completed, 25% currently active, and 4% having been withdrawn, according to new findings published by Diabetes in GCC <[www.global-diabetes.health/gcc](http://www.global-diabetes.health/gcc)>, a platform launched by Aging Analytics Agency, a subsidiary of Deep Knowledge Group.

In a remarkable development, 19 new trials were registered at the outset of 2022. The total number of trials in 2022 is nearly double that of a decade ago during 2010-2011. Saudi Arabia has taken the lead in clinical trials for diabetes within the GCC, with an impressive 60 ongoing trials out of the 180 total. The UAE follows with 48 clinical trials and Qatar with 30 clinical trials.

Over the past decade, more than 70% of clinical trials in the GCC have been successfully completed, totalling 133 trials. Approximately 25% of trials remain active, with 46 ongoing, while around 4% have been withdrawn.

In terms of international collaboration for ongoing clinical trials in 2023, the findings show that there are over 100 collaborations involving 25 countries worldwide. The GCC exhibits robust cooperation with the European Union, contributing to 25% of trials, followed by the United Kingdom at 11%, the USA at 10%, and Switzerland at 1%.

Aging Analytics Agency's report highlights the GCC's appeal to pharmaceutical companies for conducting clinical trials. Leading international companies, such as Novo Nordisk (Denmark), Sanofi (France), AstraZeneca (UK), Pfizer (USA), and others, are actively engaged

in research within the region.

The GCC houses a total of more than 45 research and development sites, with Saudi Arabia being the primary scientific hub, hosting 26 research centres dedicated to diabetes. The UAE follows as the second hub, with over 10 research centres. Oman and Qatar also contribute to diabetes research with a smaller number of scientific laboratories and research centres.

The leading universities conducting diabetes research in the GCC are Zayed University in the UAE and Taif University in Saudi Arabia. These institutions have amassed the highest number of patents related to diabetes disorders, as well as a robust track record of international collaboration. Their primary focus is on optimizing insulin delivery and developing new therapeutics for diabetes treatment. **MEH**



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## Abu Dhabi's Malaffi marks major milestone of connecting 2 billion unique clinical records

Malaffi, the region's first Health Information Exchange (HIE) platform and a strategic initiative of the Department of Health – Abu Dhabi (DoH), has marked a significant milestone of connecting 2 billion unique clinical records representing 7.9 million unique patient records in Abu Dhabi.

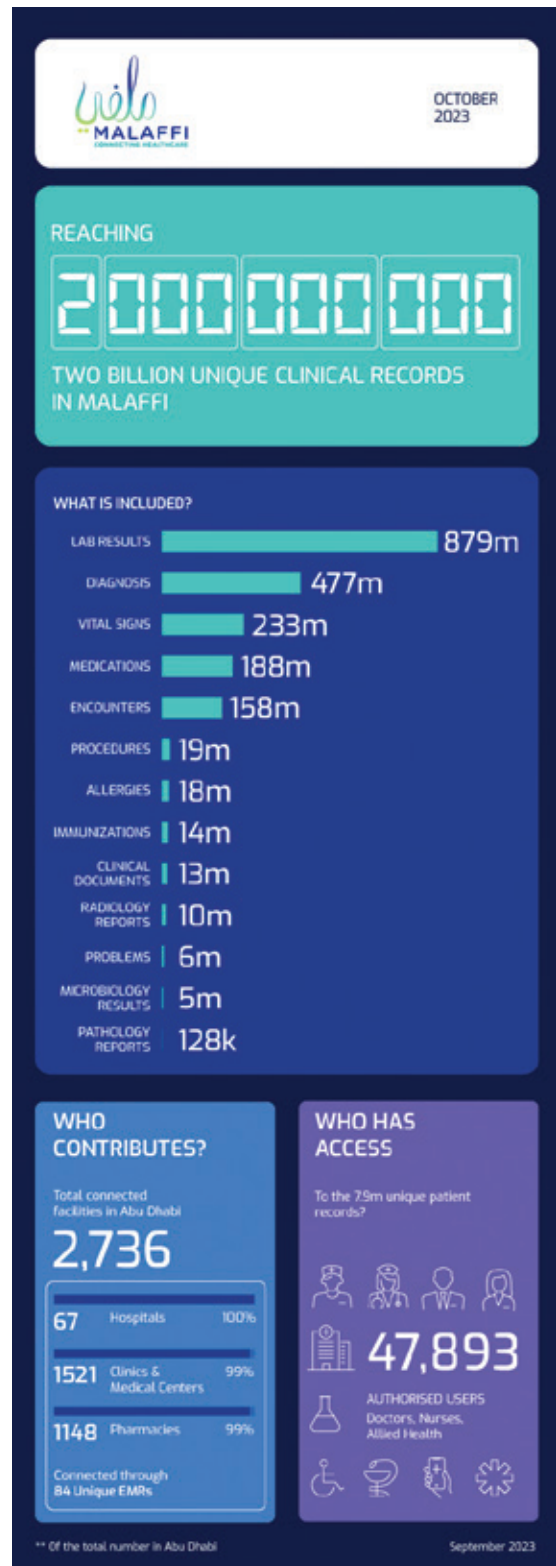
Malaffi provides access to a broad spectrum of clinical records covering encounters, allergies, laboratory results, radiology reports, radiology images, medications, problems and diagnosis, diagnostic test results of ECG and spirometry, procedures, clinical documents, immunisation records, and microbiology results.

Malaffi is now connected to nearly all healthcare facilities in the Emirate, serving more than 47,000 authorised users, including doctors, nurses, and allied health professionals, at more than 2,736 healthcare facilities across Abu Dhabi.

Commenting on the achievement, Dr Noura Khamis Al Ghaithi, Undersecretary of Department of Health – Abu Dhabi (DoH), said: “As the Department of Health – Abu Dhabi remains focused on ensuring the availability of seamless operations across the sector for both healthcare professionals and patients, we're proud to witness Malaffi soar in improving healthcare outcomes. In real life, the connection of over 2 billion unique clinical records translates to efficiency in providing care and effectiveness in delivering services. We continue to empower our partners across the sector with means that support them in integrating the latest solutions and breakthrough technologies that will further reiterate the Emirate's position as a leading destination for innovation in healthcare.”

Kareem Shaheen, the Acting CEO of Malaffi, said: “This achievement underlines our commitment to safely securing the exchange of patients' health information to enhance the quality of healthcare and patient outcomes. The joint efforts of the healthcare community and the Department of Health – Abu Dhabi and their vision to advancing the healthcare industry are truly inspiring as they work towards positioning Abu Dhabi as a world-leading destination for healthcare.”

Malaffi's achievement of connecting 2 billion unique clinical records is a transformative milestone, contributing to revolutionising Abu Dhabi's healthcare landscape by providing healthcare practitioners with comprehensive patient data for better-informed decisions. These records not only enhance AI-driven predictive solutions for precise risk identification and enhanced patient safety but also provide a trove of insights guiding the Department of Health - Abu Dhabi in further strengthening healthcare standards and fuelling innovative research for advanced treatments and medicines. **MEH**



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## Moro Hub collaborates with DHCC to provide advanced security

Moro Hub, a subsidiary of Digital DEWA, the digital arm of Dubai Electricity and Water Authority (PJSC), announced its strategic collaboration with Dubai Healthcare City Authority (DHCA), the governing body of Dubai Healthcare City (DHCC), to offer its Integrated Physical Security Platform (IPSP) solutions. The agreement was signed between Mohamed Bin Sulaiman, Chief Executive Officer of Moro Hub and Allae Almanini, Chief Financial Officer from DHCA on the sidelines of GITEX Global 2023, held in Dubai in October.

This remarkable achievement marks a significant leap forward in healthcare security as DHCA becomes the first healthcare entity to adopt Moro Hub's cutting-edge IPSP, a platform that combines the power of Artificial Intelligence (AI) with advanced security technologies.

"We are honoured to associate with Dubai Healthcare City Authority. Moro IPSP epitomizes the future of integrated security solutions, harnessing the power

of state-of-the-art technologies to guarantee the enhanced levels of safety for healthcare institutions and all stakeholders involved. Our commitment is unwavering in delivering a robust security platform that aligns seamlessly with Dubai's vision as a global leader in healthcare excellence and safety," said Sulaiman.

This milestone agreement underscores Moro Hub's dedication to providing innovative digital solutions that contribute to the advancement of the healthcare industry in the UAE. The implementation of Moro IPSP in DHCC will provide support for a wide range of essential functions, such as Facial Recognition (FR), Automatic Number Plate Recognition (ANPR), and more. In addition, the platform will offer a comprehensive view of security data for efficient incident response. The aim is to protect the physical assets of patients, medical professionals, and all individuals visiting or working within the DHCC.

"We are pleased to partner with Moro Hub to spearhead our ecosystem with

digital services. We are confident that the implementation of Moro's IPSP will be a game-changer for DHCC. This cutting-edge technology will not only fortify our security measures but also enhance the overall safety and well-being of our community. With IPSP, we will be able to deliver an unmatched level of security, reinforcing our commitment to providing world-class healthcare destination in a safe and secure environment," said Almanini.

DHCC, renowned as a global healthcare hub, provides a comprehensive ecosystem for healthcare, wellness, and medical research. It is home to world-class hospitals, clinics, research centres, and healthcare professionals, offering a wide range of medical services and treatments. With this partnership in place, DHCC will have all its assets consolidated into a single platform, enabling it to not only streamline its security operations, but also improve operations and enhancing the overall experience within the Dubai Healthcare City free zone. **MEH**



## Mediclinic Middle East launches first private sector 'Healthy Ageing' programme for early detection of dementia

In recognition of the International Day for Older Persons on 1 October, Mediclinic Middle East launched its 'Healthy Ageing' programme, the first-of-its kind in the UAE's private healthcare sector. The initiative is part of Mediclinic's goal to improve services for the over-50 patient population in the UAE where, according to *The Lancet*, dementia-related illness is projected to increase by 1700% by 2050, and is designed to support the World Health Organization's healthy ageing agenda.

The programme, which is currently preparing for international accreditation and will focus on providing clear and coordinated pathways for the prevention, diagnosis and treatment of age-related illness, is initially being launched in Dubai, where dedicated services for adults of more advanced age from a specialised geriatric consultant are already available at Mediclinic City Hospital.

The first phase of the programme is the introduction of a new 'Healthy Ageing' screening package which is available to all clients aged 50+ on a self-pay basis, and focuses on the early diagnosis of age-related illnesses, in particular cognitive impairment conditions such as dementia and Alzheimer's disease.

The unique offering in this package is brain health screening using a tool called CognICA by Cognetivity, a digital health solution that integrates the latest research in brain sciences with artificial intelligence and machine learning to provide a holistic brain health score in five minutes. This assessment helps identify individuals with cognitive impairment or who are at risk of neurodegenerative conditions. Early intervention is crucial when it comes to cognitive decline, general health and well-being, and by leveraging artificial intelligence to enhance early intervention methods, the rate of development of dementia can be slowed and overall health outcomes improved.

Dr Pietie Loubser, Chief Medical Officer at Mediclinic Middle East, said: "At Mediclinic, we understand the importance of active, healthy ageing, as well as early detection of illnesses that may occur as we age. Our new evidence-based 'Healthy Ageing' screening package specifically for the 50+ population will play a critical role in maintaining good physical, mental and cognitive health in our clients as they age, as well as enabling early diagnosis of health issues which will allow our

consultants to recommend treatment and lifestyle changes to avoid or slow progression of age-related diseases. By promoting active ageing, we aim to empower our patients to take control of their health and wellbeing including their brain health. Doing so can lead to better quality of life, improved mental agility, reduced risk of developing age-related disorders such as dementia, Alzheimer's, cardiovascular issues or any other chronic disease."

Dr David Curran, Geriatric Consultant at Mediclinic City Hospital, commented: "This is a ground-breaking initiative, and the integration of CognICA will empower family medicine doctors, geriatricians and neurologists to conduct cognitive screenings on individuals aged 50 and above. Being able to identify cognitive impairments early on aligns with Mediclinic's dedication to preventative care, promoting optimal patient wellbeing and quality of life."

• The Healthy Ageing screening package is available at Mediclinic City Hospital, Mediclinic Parkview Hospital and Mediclinic Dubai Mall. For more information, visit [www.mediclinic.ae](http://www.mediclinic.ae)



## PRIME Healthcare UAE and Siemens Healthineers establish 'value partnership' to enhance healthcare

PRIME Healthcare UAE and Siemens Healthineers recently agreed on a nine-year partnership, closely collaborating across multiple areas to further enhance the hospital chain's patient services.

Jamil Ahmed, Founder and Managing Director at PRIME Healthcare Group, noted that "this partnership signifies a significant step forward in our commitment to delivering top-notch healthcare services in the UAE. Our collaboration with Siemens Healthineers is a testament to our dedication to staying at the forefront of medical technology and patient care. Over the next nine years, we will work closely together to leverage cutting-edge technology, optimize our clinical operations, and provide comprehensive education to our healthcare professionals. This endeavor is a reflection of our shared vision to elevate the standard of healthcare provision in our country."

For both organisations, the agreement marks a milestone in their partnership, defining a close collaboration for almost a decade while intensifying their joint efforts to achieve mutual objectives in enhancing and facilitating healthcare provision across the country.

Ole Maloy, Managing Director Siemens Healthineers for Middle East, Southern & Eastern Africa, pointed out that "this partnership is a trend-setting example of a joint vision manifested in a close long-term collaboration. We have worked hard together to create a roadmap addressing current and future challenges and prepare the healthcare facility to further elevate healthcare and patient experience, while streamlining workflows and en-



Ole Maloy (left), Managing Director Siemens Healthineers for Middle East, Southern & Eastern Africa and Jamil Ahmed, Founder and Managing Director at PRIME Healthcare Group sign the nine-year collaborative 'Value Partnership' agreement.

hancing clinical outcomes. We would like to thank PRIME Healthcare UAE as one of the leading healthcare providers in the region for their trust in our solutions and services and we look forward to further raising the bar of healthcare services in the UAE together."

Both parties agreed on a technological partnership entailing delivery and upgrading of multiple diagnostic imaging systems including computed tomography, magnetic resonance and X-ray systems, as well as the advancement of existing imaging software and servers while introducing a state-of-the-art streamlined digital

fleet management to one of their hospitals. In addition, the healthcare operator secured an eight years maintenance contract.

Siemens Healthineers team of experts will also provide consulting services for the healthcare operator's clinical radiology operations as a base for further optimization of equipment usage and workflow management. These optimizations will be complemented by a comprehensive education plan to ensure high quality training of the hospital's radiographers and biomedical engineers. **MEH**

# How CME helps healthcare professionals keep up with the pace of medical knowledge



Medical breakthroughs and ground-breaking discoveries happen regularly in healthcare – and while this is paramount to enhancing our understanding of diseases, improving standards of care, and, ultimately, patient outcomes, it poses one problem: it's becoming virtually impossible for healthcare professionals to keep up.

It's estimated that medical knowledge now doubles every 73 days. Compare that to 2010, when knowledge doubled every 3.5 years, it's becoming harder and harder for clinicians to remain current on the latest treatment best practices.

But in today's rapidly evolving healthcare landscape, staying up-to-date with the latest standards of care is paramount, especially when treating lifestyle diseases. In Saudi Arabia and many GCC states, the prevalence of lifestyle diseases like diabetes, hypertension, obesity, and cardiovascular diseases is rapidly increasing, and it's having a staggering impact on both quality of life and cost of healthcare delivery.

Healthcare professionals, including physicians and pharmacists, must stay informed on treatment advances and prevention strategies to help improve patient outcomes and reduce the economic burden.

In this article, we'll explore the incidence and impact of lifestyle diseases and strategies healthcare professionals can leverage to stay current on treatment recommendations to enhance patient outcomes.

## The impact of lifestyle diseases

In recent years, preventable lifestyle diseases in GCC states have sharply increased, fuelled in part by unhealthy behaviours, including smoking, lack of exercise, and poor diet. These lifestyle diseases claim thousands of lives each year. 2016 stats from the World Health Organization found that

37 percent of deaths in Saudi Arabia were caused by cardiovascular diseases, while diabetes contributed to 3 percent of deaths.

With obesity rates steadily increasing – almost 60 percent of Saudi Arabia's adult population is obese – the incidence of related chronic diseases will also exacerbate, further diminishing quality of life.

The rise in lifestyle diseases is also creating an economic burden - because they require a wide range of therapies to treat and manage, lifestyle diseases cost the healthcare system an estimated US\$18.6 billion annually, with an additional US\$13.1 billion lost due to absenteeism and diminished productivity.

To lessen the impact, clinicians must stay current on preventative measures and treatment best practices to support positive patient outcomes. Continuing medical education (CME) is an ideal way for physicians and pharmacists to keep their skills sharp.

## Staying current: The role of Continuing Medical Education

New treatments, drugs, and procedures offer the potential for improved patient outcomes - healthcare practitioners can stay current on evidence-based advances through continuing medical education (CME) courses. Available through MD-BriefCase, CME brings the latest discoveries and treatment guidelines to clinicians' fingertips, resulting in more effective management of lifestyle diseases.

CME is available in various formats, including online modules, self-directed learning, webinars, and in-person conferences and workshops, and provide many compelling benefits:

**1. Increased knowledge and expertise:** CME programs integrate the latest research and advancements in disease management, medication, and treatment, keeping clini-

icians up-to-date with recommended treatment options for their patients.


**2. Improved decision-making:** CME can help clinicians improve their decision-making skills through case-based discussions and interactive sessions and scenarios. This results in better treatment outcomes and improved patient satisfaction.

**3. Enhanced patient outcomes:** As clinicians become more knowledgeable and confident in their abilities, they become more capable of diagnosing, educating, and treating patients with lifestyle diseases, resulting in improved patient outcomes.

**4. Professional development requirements:** CME programs provide a convenient and effective way to earn these credits and comply with their professional development requirements while improving their knowledge and skills.

As the prevalence of lifestyle-related diseases continues to rise in the GCC, clinicians must stay informed on recommended treatment protocols. Join MD-BriefCase today for free to access a vast range of courses on a range of lifestyle diseases and other common conditions and ensure you're providing patients with the latest standards of care.

## About MDBriefCase

MDBriefCase Group Inc. provides accredited, online continuing professional development (CPD) to help healthcare practitioners enhance their professional practice and stay at the forefront of the latest evidence and protocols. 



# worldwide monitor

Update from around the globe

## 'A new era in brain science': Researchers unveil human brain cell atlas

Salk Institute researchers, as part of a larger collaboration with research teams around the world, analyzed more than half a million brain cells from three human brains to assemble an atlas of hundreds of cell types that make up a human brain in unprecedented detail.

The research, published in a special issue of the journal *Science*<sup>[1]</sup> on 13 October 2023, is the first time that techniques to identify brain cell subtypes originally developed and applied in mice have been applied to human brains.

"These papers represent the first tests of whether these approaches can work in human brain samples, and we were excited at just how well they translated," says Professor Joseph Ecker, director of Salk's Genomic Analysis Laboratory and a Howard Hughes Medical Institute investigator. "This is really the beginning of a new era in brain science, where we will be able to better understand how brains develop, age, and are affected by disease."

The new work is part of the United States' National Institute of Health's Brain Research Through Advancing Innovative Neurotechnologies Initiative, or The BRAIN Initiative, an effort launched in 2014 to describe the full plethora of cells – as characterized by many different techniques – in mammalian brains. Salk is one of three institutions awarded grants to act as central players in generating data for the NIH BRAIN Initiative Cell Census Network, BICCN.

Every cell in a human brain contains the same sequence of DNA, but in different cell types different genes are copied onto strands of RNA for use as protein blueprints. This ultimate variation in which proteins are found in which cells – and at what levels – allows the vast diversity in types of brain cells and the complexity of the brain. Knowing which cells rely on which DNA sequences to function is critical not only to understanding how the brain works, but also how mutations in DNA can cause brain disorders and, relatedly, how to treat those disorders.

"Once we scale up our techniques to a large number of brains, we can start to tackle questions that we haven't been able to in the past," says Margarita Behrens, a research professor in Salk's Computational Neurobiology Laboratory and a co-principal investigator of the new work.

In 2020, Ecker and Behrens led the Salk team that profiled 161 types of cells in the mouse brain, based on methyl chemical markers along DNA that specify when genes are turned on or off. This kind of DNA regulation, called methylation, is one level of cellular identity.

In the new paper, the researchers used the same tools to determine the methylation patterns of DNA in more than 500,000 brain cells from 46 regions in the brains of three healthy adult male organ donors. While mouse brains are largely the same from animal to animal, and contain about 80 million neurons, human brains vary much more and contain about 80 billion neurons.

"It's a big jump from mice to humans and also introduces some technical challenges that we had to overcome," says Behrens. "But we



Michael Nunn

An abstract representation of cell diversity in the brain. Individual nuclei are coloured in the bright hues of t-SNE plots used in epigenomics analysis to distinguish individual brain cell types. Layers of background colour represent the local environmental factors of each brain region that influence cell function.

were able to adapt things that we had figured out in mice and still get very high quality results with human brains."

At the same time, the researchers also used a second technique, which analyzed the three-dimensional structure of DNA molecules in each cell to get additional information about what DNA sequences are being actively used. Areas of DNA that are exposed are more likely to be accessed by cells than stretches of DNA that are tightly folded up.

"This is the first time we've looked at these dynamic genome structures at a whole new level of cell type granularity in the brain, and how those structures may regulate which genes are active in which cell types," says Jingtian Zhou, co-first author of the new paper and a postdoctoral researcher in Ecker's lab. MEH

### Reference:

1. Wei Tian, Jingtian Zhou, Anna Bartlett, et. al. Single-cell DNA methylation and 3D genome architecture in the human brain. *Science*, 2023; 382 (6667) doi: <https://doi.org/10.1126/science.adf5357>





# AUTISM WORKS WONDERS

## Inclusion changes the world

Let's celebrate World Autism Awareness Day on April 2<sup>nd</sup> along with the launch of our initiative to integrate individuals on the spectrum into the workforce.

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UNICEF/ Eyad El Babta

Mohammed Alattar, 8-year-old from Rafah City, sits on the rubble of his family's house, which was bombed in an Israeli airstrike.

## Women and children bear the brunt of the conflict in Gaza, UN agencies warn

Women, children and newborns in Gaza are disproportionately bearing the burden of the escalation of hostilities in the occupied Palestinian territory, both as casualties and in reduced access to health services, warn the United Nations Children's Fund (UNICEF), the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), the United Nations sexual and reproductive health agency (UNFPA), and the World Health Organization (WHO).

As of 3 November, according to Ministry of Health data, 2326 women and 3760 children have been killed in the Gaza strip, representing 67% of all casualties, while thousands more have been injured. This means that 420 children are killed or injured every day, some of them only a few months old.

The bombardments, damaged or non-functioning health facilities, massive levels of displacement, collapsing water and electricity supplies as well as restricted access to food and medicines, are severely disrupting maternal, newborn, and child health services. There are an estimated 50,000 pregnant women in Gaza, with more than 180 giving birth every day. Fifteen per cent of them are likely to experience pregnancy or birth-related complications and need additional medical care.

These women are unable to access the emergency obstetric services they need to give birth safely and care for their newborns. With 14 hospitals and 45 primary health care centres closed, some women are having to give birth in shelters, in their homes, in the streets amid rubble, or in overwhelmed healthcare facilities, where sanitation is worsening, and the risk of in-

fection and medical complications is on the rise. Health facilities are also coming under fire – on 1 November Al Hilo Hospital, a crucial maternity hospital, was shelled.

Maternal deaths are expected to increase given the lack of access to adequate care. The psychological toll of the hostilities also has direct – and sometimes deadly – consequences on reproductive

### WHO condemns attacks on Gaza hospitals

WHO condemns the attacks on 3 November near Al-Shifa Hospital, Al-Quds Hospital, and the Indonesian Hospital in Gaza City and North Gaza governorates.

According to reports, at Al-Shifa Hospital, ambulances were evacuating critically injured and sick patients to hospitals in the south of the Gaza Strip when there was an attack at the entrance of the hospital. According to early reports, at least 13 people were killed and more than 60 injured. The hospital infrastructure and one ambulance sustained damage. This was in addition to an earlier incident that had resulted in damage to another ambulance in the same convoy.

The Palestinian Ministry of Health had earlier sent an appeal for the safe passage of a convoy of ambulances carrying wounded and sick patients from the hos-

pital, in an effort to reduce the strain on the hospital, which is already far exceeding its bed capacity while also sheltering thousands of displaced people.

Two further attacks were reported on the same day at Al-Quds Hospital, resulting in at least 21 injuries. An additional attack was reported near the Indonesian Hospital.

Attacks on health care, including the targeting of hospitals and restricting the delivery of essential aid such as medical supplies, fuel, and water, may amount to violations of International Humanitarian Law.


WHO reiterates its call for an immediate ceasefire, emphasizing the urgent need to protect all health workers, patients, health transport, and health facilities. [WHO](#)

health, including a rise in stress-induced miscarriages, stillbirths and premature births.

The lives of newborns also hang by a thread. If hospitals run out of fuel, the lives of an estimated 130 premature babies who rely on neonatal and intensive care services will be threatened, as incubators and other medical equipment will no longer function.

Over half of the population of Gaza is now sheltering in UNRWA facilities in dire conditions, with inadequate water and food supplies, which is causing hunger and malnutrition, dehydration and the spread of waterborne diseases. According to initial assessments by UNRWA, 4600 displaced pregnant women and about 380 newborns living in these facilities require medical attention. Already more than 22,500 cases of acute respiratory infections have been reported along with 12,000 cases of diarrhoea, which are particularly concerning given the high rates of malnutrition.

Despite the lack of sustained and safe access, UN agencies have dispatched life-saving medicines and equipment to Gaza, including supplies for newborns and reproductive health care. But much more is needed to meet the immense needs of civilians, including pregnant women, children and newborns. Humanitarian agencies urgently need sustained and safe access to bring more medicines, food, water and fuel into Gaza. No fuel has come into the Gaza Strip since 7 October. Aid agencies must receive fuel immediately to be able to continue supporting hospitals, water plants and bakeries.

In particular, all parties must protect children from harm and afford them the special protection to which they are entitled under international humanitarian and human rights laws. 

#### My day as a doctor at Gaza's al-Shifa Hospital

• Watch: My day as a doctor at Gaza's al-Shifa Hospital | Close Up – Aljazeera (Nov 6, 2023) <https://bit.ly/3MzLgG7>

## UNRWA receives \$10m to provide mental health support to children of Gaza

On 3 November, Education Cannot Wait (ECW), the UN Fund for Education in Emergencies, announced a US\$10 million 12-month grant in support of the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) and UNICEF to provide children in Gaza with life-saving mental health and psychosocial support and access to protective learning process.

The ECW grant will be delivered by UNRWA and UNICEF in the Gaza Strip, and will contribute to safeguarding the basic right to education for children and youth in the Strip, even during times of active conflict. The First Emergency Response (FER) will focus on ensuring access to safe and secure learning environments, and providing education interventions to promote the safety and well-being of learners, teachers and other education personnel. This includes mental health and psychosocial support, and ensuring linkages to protection services, such as access to health, nutrition and food.

Nearly 73 per cent of those reported killed in the Gaza Strip are children and women. Save the Children reported on 29 October that nearly 3,200 children were killed in Gaza in just three weeks. This surpasses the number of children killed annually across the world's conflict zones since 2019.


“The scale of horrors and adversity endured by the children in Gaza for nearly four weeks is unfathomable. I have seen much human suffering over the past three decades, but never thought we would see anything of this intensity in our lifetime. Working together with UN organizations on the ground, we must immediately provide girls and boys with the mental health and psychosocial support and protective learning environments they desperately need now. Our independent, humanitarian partners on the ground have the capacity to deliver now. This support is absolutely crucial



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– Yasmine Sherif, Executive Director of Education Cannot Wait

to help them cope with the severe trauma and stress they are experiencing. I call on all public and private donors to join our efforts as much more funding is urgently required to meet the immense needs of the 1.1 million children and adolescents impacted by the ongoing war,” said Yasmine Sherif, Executive Director of Education Cannot Wait, the UN global fund for education in emergencies and protracted crises.

“In addition to calling for massive additional funding, ECW urges respect for the UN Charter and international humanitarian law, universal human rights and calls for an immediate humanitarian ceasefire,” Sherif said.

Expressing his appreciation for this vital contribution, Philippe Lazzarini, Commissioner-General of UNRWA, said: “The children in Gaza have gone through hell and have paid an unprecedented price in this war. Psychological support and education offer children a sense of hope. Together, let us ensure that every child in Gaza has the chance to learn, to dream, and to build a better future. They deserve nothing less. Thank you for standing in solidarity with Gaza's children.” 

# the laboratory

Medical research news from around the world

## Scientists develop innovative magnetic gel that accelerates healing of diabetic wounds

Diabetic patients, whose natural wound-healing capabilities are compromised, often develop chronic wounds that are slow to heal. Such non-healing wounds could cause serious infections resulting in painful outcomes such as limb amputation. To address this global healthcare challenge, a team of researchers from the National University of Singapore (NUS) engineered an innovative magnetic wound-healing gel that promises to accelerate the healing of diabetic wounds, reduce the rates of recurrence, and in turn, lower the incidents of limb amputations.

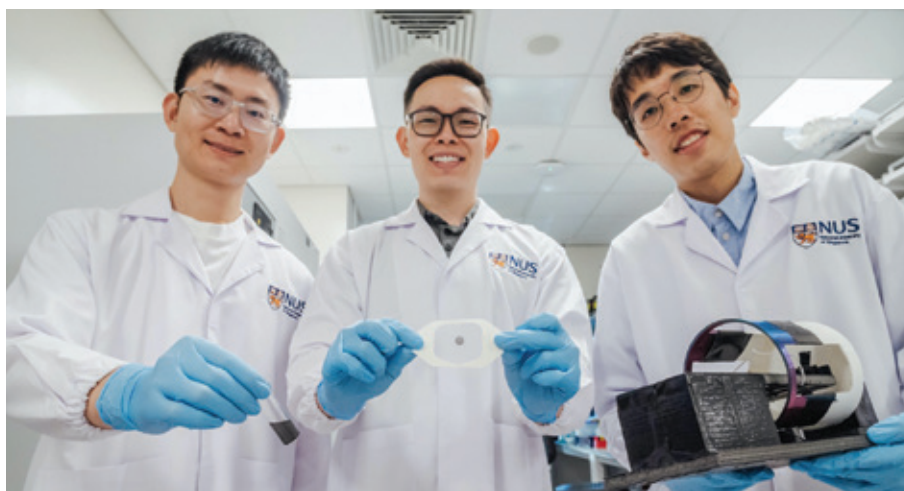
Each treatment involves the application of a bandage pre-loaded with a hydrogel containing skin cells for healing and magnetic particles. To maximise therapeutic results, a wireless external magnetic device is used to activate skin cells and accelerate the wound healing process. The ideal duration of magnetic stimulation is about one to two hours.

Lab tests showed the treatment coupled with magnetic stimulation healed diabetic wounds about three times faster than current conventional approaches. Furthermore, while the research has focussed on healing diabetic foot ulcers, the technology has potential for treating a wide range of complex wounds, such as burns.

“Conventional dressings do not play an active role in healing wounds,” said Assistant Professor Andy Tay, who leads the team comprising researchers from the Department of Biomedical Engineering at NUS College of Design and Engineering as well as the NUS Institute for Health Innovation & Technology. “They merely prevent the wound from worsening and patients need to be scheduled for dressing change every two or three days. It is a huge cost to our healthcare system and an inconvenience to patients.”

In contrast, the unique NUS invention takes a comprehensive ‘all-in-one’ approach to wound healing, accelerating the process on several fronts.

“Our technology addresses multiple critical factors associated with diabetic wounds, simultaneously managing elevated glucose levels in the wound area, activating dormant skin cells near the wound, restoring damaged



Asst Prof Andy Tay (centre) is holding a plaster pre-loaded with magnetic gel, which promises to accelerate the healing of diabetic wounds, while Dr Shou Yufeng (right) is holding the device for magnetic stimulation. Dr Le Zhicheng (left) is holding a sample of the magnetic gel in liquid form.

blood vessels, and repairing the disrupted vascular network within the wound,” explained Asst Prof Tay.

The NUS team described their innovation in a paper published in the scientific journal, *Advanced Materials*<sup>[1]</sup>, on 8 September 2023. The research was conducted in collaboration with scientists from the Agency for Science, Technology and Research, Nanyang Technological University, Sun Yat-sen University and Wuhan University of Technology.

### Gentle ‘work-out’ for skin cells

Skin cells experience mechanical forces continuously from normal daily activities. However, patients with wounds are usually advised not to carry out rigorous activities, such as walking, and this could kill the remaining cells essential for healing.

“What our team has achieved is to identify a sweet spot by applying gentle mechanical stimulation,” said Asst Prof Tay. “The result is that the remaining skin cells get to ‘work-out’ to heal wounds, but not to the extent that it kills them.”

The specially designed wound-healing gel is loaded with two types of FDA-approved skin cells – keratinocytes (essential for skin repair) and fibroblast (for formation of connective tissue) – and tiny magnetic particles. When combined with

a dynamic magnetic field generated by an external device, the mechanical stimulation of the gel encourages dermal fibroblasts to become more active.

Lab tests showed that the increased fibroblast activity generated by the magnetic wound-healing gel increases the cells’ growth rate by approximately 240 per cent and more than doubles their production of collagen – a crucial protein for wound healing. It also improves communication with keratinocytes to promote the formation of new blood vessels.

“The approach we are taking not only accelerates wound healing but also promotes overall wound health and reduces the chances of recurrence,” added Asst Prof Tay.

The NUS team worked on the project from 2021 to 2023 to demonstrate the viability of this new approach. A patent has been filed for this innovation.

### Potential game-changer in wound management

While the magnetic wound-healing gel has shown great promise in improving diabetic wound healing, it could also revolutionise the treatment of other complex wound types.

“The magneto-responsive hydrogel, combined with wireless magneto-induced dynamic mechanical stimulation, addresses fundamental challenges in wound healing, such as



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creating a conducive microenvironment and promoting tissue regeneration,” said co-first author of the research paper Dr Shou Yufeng, Research Fellow from the Department of Biomedical Engineering at NUS College of Design and Engineering.

“These principles and our technology’s adaptability, as well as its general ease of use for patients, means that it can be ap-

plied to improve wound healing in various situations beyond diabetes, including burns and chronic non-diabetic ulcers.”

The researchers are conducting more tests to further refine the magnetic wound-healing gel to improve its effectiveness. They are also collaborating with a clinical partner to test the effectiveness of the gel using diabetic human tissues.

“This is major step forward in active wound care,” said Asst Prof Tay. “Our goal is to provide an effective and convenient wound-healing solution that improves outcomes for millions around the world.” 

#### Reference:

1. <https://doi.org/10.1002/adma.202304638>

## Brain implant may enable communication from thoughts alone

A speech prosthetic developed by a collaborative team of Duke neuroscientists, neurosurgeons, and engineers can translate a person’s brain signals into what they’re trying to say.

Appearing 6 November in the journal *Nature Communications* <sup>[1]</sup>, the new technology might one day help people unable to talk due to neurological disorders regain the ability to communicate through a brain-computer interface.

“There are many patients who suffer from debilitating motor disorders, like ALS (amyotrophic lateral sclerosis) or locked-in syndrome, that can impair their ability to speak,” said Gregory Cogan, Ph.D., a professor of neurology at Duke University’s School of Medicine and one of the lead researchers involved in the project. “But the current tools available to allow them to communicate are generally very slow and cumbersome.”

Imagine listening to an audiobook at half-speed. That’s the best speech decoding rate currently available, which clocks in at about 78 words per minute. People, however, speak around 150 words per minute.

The lag between spoken and decoded speech rates is partially due the relatively few brain activity sensors that can be fused onto a paper-thin piece of material that lays atop the surface of the brain. Fewer sensors provide less decipherable information to decode.

To improve on past limitations, Cogan teamed up with fellow Duke Institute for

Brain Sciences faculty member Jonathan Viventi, Ph.D., whose biomedical engineering lab specializes in making high-density, ultra-thin, and flexible brain sensors.

For this project, Viventi and his team packed an impressive 256 microscopic brain sensors onto a postage stamp-sized piece of flexible, medical-grade plastic. Neurons just a grain of sand apart can have wildly different activity patterns when coordinating speech, so it’s necessary to distinguish signals from neighbouring brain cells to help make accurate predictions about intended speech.

After fabricating the new implant, Cogan and Viventi teamed up with several Duke University Hospital neurosurgeons, who helped recruit four patients to test the implants. The experiment required the researchers to place the device temporarily in patients who were undergoing brain surgery for some other condition, such as treating Parkinson’s disease or having a tumour removed. Time was limited for Cogan and his team to test drive their device in the OR.

The task was a simple listen-and-repeat activity. Participants heard a series of nonsense words, like “ava,” “kug,” or “vip,” and then spoke each one aloud. The device recorded activity from each patient’s speech motor cortex as it coordinated nearly 100 muscles that move the lips, tongue, jaw, and larynx.

Afterwards, Suseendrakumar Duraivel, the first author of the new report and a biomedical engineering graduate student

at Duke, took the neural and speech data from the surgery suite and fed it into a machine learning algorithm to see how accurately it could predict what sound was being made, based only on the brain activity recordings.


For some sounds and participants, like /g/ in the word “gak”, the decoder got it right 84% of the time when it was the first sound in a string of three that made up a given nonsense word.

Accuracy dropped, though, as the decoder parsed out sounds in the middle or at the end of a nonsense word. It also struggled if two sounds were similar, like /p/ and /b/.

Overall, the decoder was accurate 40% of the time. That may seem like a humble test score, but it was quite impressive given that similar brain-to-speech technical feats require hours or days-worth of data to draw from. The speech decoding algorithm Duraivel used, however, was working with only 90 seconds of spoken data from the 15-minute test.

Duraivel and his mentors are excited about making a cordless version of the device with a recent \$2.4M grant from the National Institutes of Health.

While their work is encouraging, there’s still a long way to go for Viventi and Cogan’s speech prosthetic to hit the shelves anytime soon.

“We’re at the point where it’s still much slower than natural speech,” Viventi said in a recent *Duke Magazine* piece <sup>[2]</sup> about the technology, “but you can see the trajectory where you might be able to get there.” 

#### References:

1. <https://doi.org/10.1038/s41467-023-42555-1>
2. <https://dukemag.duke.edu/stories/building-better-tools-decode-speech>



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## Eyes may be the window to your soul, but the tongue mirrors your health

A 2000-year-old practice by Chinese herbalists – examining the human tongue for signs of disease – is now being embraced by computer scientists using machine learning and artificial intelligence.

Tongue diagnostic systems are fast gaining traction due to an increase in remote health monitoring worldwide, and a study by Iraqi and Australian researchers provides more evidence of the increasing accuracy of this technology to detect disease.

Engineers from Middle Technical University (MTU) in Baghdad and the University of South Australia (UniSA) used a USB web camera and computer to capture tongue images from 50 patients with diabetes, renal failure and anaemia, comparing colours with a data base of 9000 tongue images.

Using image processing techniques, they correctly diagnosed the diseases in 94 per cent of cases, compared to laboratory results. A voicemail specifying the tongue colour and disease was also sent via a text message to the patient or nominated health provider.

Diabetes patients typically have a yellow tongue, cancer patients a purple tongue

with a thick greasy coating, and acute stroke patients present with a red tongue that is often crooked.

A 2022 study in Ukraine <sup>[1]</sup> analysing tongue images of 135 COVID patients via a smartphone showed that 64% of patients with a mild infection had a pale pink tongue, 62% of patients with a moderate infection had a red tongue, and 99% of patients with a severe COVID infection had a dark red tongue.

Previous studies using tongue diagnostic systems have accurately diagnosed appendicitis, diabetes, and thyroid disease.

MTU and UniSA Adjunct Associate Professor Ali Al-Naji <sup>[2]</sup> and his colleagues have reviewed the worldwide advances in computer-aided disease diagnosis, based on tongue colour, in a new paper in *AIP Conference Proceedings* <sup>[3]</sup>.

“Thousands of years ago, Chinese medicine pioneered the practice of examining the tongue to detect illness,” Assoc Prof Al-Naji says.


“Conventional medicine has long endorsed this method, demonstrating that the colour, shape, and thickness of the tongue can reveal signs of diabetes, liver



issues, circulatory and digestive problems, as well as blood and heart diseases.

“Taking this a step further, new methods for diagnosing disease from the tongue’s appearance are now being done remotely using artificial intelligence and a camera – even a smartphone.

“Computerised tongue analysis is highly accurate and could help diagnose diseases remotely in a safe, effective, easy, painless, and cost-effective way.

“It is possible to diagnose with 80% accuracy more than 10 diseases that cause a visible change in tongue colour. In our study we achieved a 94% accuracy with three diseases, so the potential is there to fine tune this research even further,” Assoc Prof Al-Naji says. 

### References:

1. <https://doi.org/10.1590/pboci.2021.109>
2. <https://people.unisa.edu.au/Ali.Al-Naji>
3. <https://doi.org/10.1063/5.0154231>

## Urinary bladder matrix skin substitute useful in reconstructing facial injuries

A dermal substitute called urinary bladder matrix (UBM) enables new approaches to surgical reconstruction of severe traumatic avulsion injuries of the head and face – reducing reliance on skin grafts, reports a paper in the November issue of *The Journal of Craniofacial Surgery* <sup>[1]</sup>. The journal is published in the Lippincott portfolio by Wolters Kluwer.

The use of UBM “minimizes donor-side morbidity, eliminates contraction, and offers a wide range of product sizes to cover a wide range of maxillofacial soft-tissue defects in a single-stage fashion”, according to the new research by Dina Amin, DDS, of Texas A & M University, Dallas, and colleagues.

Avulsion injuries of the head and neck pose difficult challenges for maxillofacial surgeons, due to the “intricate anatomy” of

the regions, the lack of adequate tissues to cover the wound, and the risk of later scarring and wound contracture. Various dermal substitutes have been used to restore various types of challenging defects, such as burns and chronic wounds.

Derived from pigs, UBM is a specially engineered “extracellular matrix” that provides a biodegradable scaffolding for tissue regeneration. Covering the wound with UBM supports regeneration of the patient’s native tissues, including differentiation of normal skin and subcutaneous tissue layers.

### Complete healing within six months

Dr Amin and colleagues outline their technique of reconstruction using UBM dermal substitute, including preparing the wound, applying two layers of UBM,

and dressing the wound. Frequent dressing changes continue until complete healing – complete coverage of the wound defect with new skin.

New tissue formation over the wound was observed within the second week after surgery. Average healing time was 36.5 days, with a range from 14 to 90 days. Although the healing process was “time-intensive,” all patients achieved complete healing within six months.

Dr Amin and colleagues believe their experience supports the use of UBM as a new and flexible option for difficult reconstructions in patients with severe head and neck injuries.

### • Reference:

- <https://doi.org/10.1097/SCS.0000000000009699>



# Innovative treatment for chronic bronchitis

The experts at Royal Brompton Hospital, London, have developed an innovative way to treat chronic obstructive pulmonary disease (COPD) with chronic bronchitis. The minimally invasive bronchoscopy procedure, called RejuvenAir® metered cryospray, and has been developed with device company, CSA Medical.

## Minimally invasive 30-minute COPD treatment

Many cases of COPD cases are caused by cigarette smoking, with air pollution, dust and genetics. Symptoms often do not appear until patients are in their 40s or 50s, leading to underdiagnosis of COPD and chronic bronchitis.

Professor Pallav Shah, consultant respiratory physician, explains, “RejuvenAir delivers medical-grade liquid nitrogen to the affected parts of the airways to freeze and destroy the diseased cells. Rather than managing symptoms, the 30-minute procedure treats the cause of the disease, allowing for new, healthy, and normal function-

ing cells to repopulate the lung lining.”

Conventional treatments for advanced COPD include oxygen therapy, lung volume reduction and even a lung transplant. The RejuvenAir procedure offers an outpatient bronchoscopic approach for chronic bronchitis, without the risks of an invasive surgery.

Using cryotherapy, the RejuvenAir System procedure delivers metered doses of liquid nitrogen to the airways at minus 196 degrees to target the source of the cough and mucous production. The liquid nitrogen freezes the diseased cells before they have time to dehydrate, therefore destroying the contents of the cell but keep the extracellular matrix in place to allow repopulation to occur.

Each lung is treated during a separate procedure, usually six weeks apart and we are the only centre internationally who can provide this treatment.


The two-step RejuvenAir procedure is performed under general anaesthetic and, as each step can be performed within half



an hour, the patient is usually able to return home within a few hours.

## Leading the way for chronic bronchitis treatment

RejuvenAir metered cryospray treatment offers a new approach for patients with chronic bronchitis. It is a minimally invasive approach, which treats the underlying cause of the disease.

“Previously there has been no cure for chronic bronchitis but this new procedure aims to treat the underlying cause, rather than just temporarily relieve symptoms,” says Professor Shah. “After the treatment, patients usually experience improved symptoms after two or three days, with an improved sense of wellbeing as a result,” he adds. 

• For more information visit: <https://www.rbhh-specialistcare.co.uk/news/rejuvenair-30-minute-treatment-for-copd-chronic-bronchitis>



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# ‘Inverse vaccine’ shows potential to treat multiple sclerosis and other autoimmune diseases



Photo by Matt Marston

Prof. Jeffrey Hubbell, Eugene Bell Professor in Tissue Engineering at the University of Chicago's Pritzker School of Molecular Engineering

A new type of vaccine developed by researchers at the University of Chicago's Pritzker School of Molecular Engineering (PME) has shown in the lab setting that it can completely reverse autoimmune diseases like multiple sclerosis and type 1 diabetes – all without shutting down the rest of the immune system.

A typical vaccine teaches the human immune system to recognize a virus or bacteria as an enemy that should be attacked. The new “inverse vaccine” does just the opposite: it removes the immune system's memory of one molecule. While such immune memory erasure would be unwanted for infectious diseases, it can stop autoimmune reactions like those seen in multiple sclerosis, type 1 diabetes, or rheumatoid arthritis, in which the immune system attacks a person's healthy tissues.

The inverse vaccine, described in *Nature Biomedical Engineering*,<sup>[1]</sup> takes advantage of how the liver naturally marks molecules from broken-down cells with “do not attack” flags to prevent autoimmune reactions to cells that die by natural processes. PME researchers coupled an antigen – a molecule being attacked by the immune system – with a molecule resembling a fragment of an aged cell that the liver would recognize as friend, rather than foe. The team showed how the vaccine could successfully stop the autoimmune reaction associated with a multiple-sclerosis-like disease.

“In the past, we showed that we could use this approach to prevent autoimmunity,” said Jeffrey Hubbell, the Eugene Bell Professor in Tissue Engineering and lead author of the new paper. “But what is so exciting about this work is that we have shown that we can treat diseases like multiple sclerosis after there is already ongoing inflammation, which is more useful in a real-world context.”

## Unwinding an immune response

The job of the immune system's T cells is to recognize unwanted cells and molecules –

from viruses and bacteria to cancers – as foreign to the body and get rid of them. Once T cells launch an initial attack against an antigen, they retain a memory of the invader to eliminate it more quickly in the future.

T cells can make mistakes, however, and recognize healthy cells as foreign. In people with multiple sclerosis, for instance, T cells mount an attack against myelin, the protective coating around nerves.

Hubbell and his colleagues knew that the body has a mechanism for ensuring that immune reactions don't occur in response to every damaged cell in the body – a phenomenon known as peripheral immune tolerance, which is carried out in the liver. They discovered in recent years that tagging molecules with a sugar known as N-acetylgalactosamine (pGal) could mimic this process, sending the molecules to the liver where tolerance to them develops.

“The idea is that we can attach any molecule we want to pGal and it will teach the immune system to tolerate it,” explained Hubbell. “Rather than rev up immunity as with a vaccine, we can tamp it down in a very specific way with an inverse vaccine.”

In the new study, the researchers focused on a multiple-sclerosis-like disease in which the immune system attacks myelin, leading to weakness and numbness, loss of vision and, eventually mobility problems and paralysis. The team linked myelin proteins to pGal and tested the effect of the new inverse vaccine. The immune system, they found, stopped attacking myelin, allowing nerves to function correctly again and reversing symptoms of disease in animals.

In a series of other experiments, the scientists showed that the same approach worked to minimize other ongoing immune reactions.

## Toward clinical trials

Today, autoimmune diseases are generally treated with drugs that broadly shut down the immune system.

“These treatments can be very effective, but you're also blocking the immune

responses necessary to fight off infections and so there are a lot of side effects,” said Hubbell. “If we could treat patients with an inverse vaccine instead, it could be much more specific and lead to fewer side effects.”

Initial phase I safety trials of a glycosylation-modified antigen therapy based on this preclinical work have already been carried out in people with celiac disease, an autoimmune disease that is associated with eating wheat, barley and rye, and phase I safety trials are under way in multiple sclerosis. Those trials are conducted by the pharmaceutical company Anokion SA, which helped fund the new work and which Hubbell co-founded and is a consultant, board member, and equity holder. The Alper Family Foundation also helped fund the research.

“There are no clinically approved inverse vaccines yet, but we're incredibly excited about moving this technology forward,” says Hubbell. MEH

## Reference:

1. Tremain, A.C., Wallace, R.P., Lorentz, K.M. et al. Synthetically glycosylated antigens for the antigen-specific suppression of established immune responses. *Nat. Biomed. Eng* 7, 1142–1155 (2023). <https://doi.org/10.1038/s41551-023-01086-2>

## Jeffrey Hubbell receives the 2023 Kabiller Prize in Nanoscience and Nanomedicine

In September this year, researcher Jeffrey Hubbell received the 2023 Kabiller Prize in Nanoscience and Nanomedicine, an annual award given by Northwestern University's International Institute for Nanotechnology (IIN) to one scientist for outstanding achievements in the field.

Hubbell's work has revolutionized the fields of nanoscale bioengineering and regenerative medicine.

# Long-term care, rehabilitation and home care set to provide growth opportunities in KSA

The Kingdom of Saudi Arabia, the largest country in the GCC, with an estimated population of over 30 million, is witnessing fundamental structural transformations across all sectors including healthcare, as part of its Vision 2030. In line with global and regional trends, the Kingdom's healthcare sector is experiencing an evolution driven by rapid advancements in technology and Research and Development (R&D).

Amongst the main focal points within the diversification and growth plans for Saudi Arabia's healthcare systems are Long-Term Care (LTC), rehabilitation and Home Care (HC). A main driver of this is the changing demographic profile of the Kingdom, where the population above 60 years is expected to increase from 4.5% in 2020 to 10.4% by 2030, due to decreased fertility rates and increased life expectancy.

Colliers' market report 'Growth Opportunities in Specialised Sectors in KSA', highlights how the development of Long-Term Care, rehabilitation and Home Care in Saudi Arabia can act as a driving force for change in the Kingdom's healthcare sector, encompassing elderly to acute care.

Mansoor Ahmed, Executive Director (MEA) and Head of Development Solutions, Healthcare, Education and PPP, Colliers in MENA notes: "Development of the Long-term Care, Rehabilitation & Home Care sectors in KSA can act as a change catalyst to the healthcare sector from elderly to acute care. This can be done through a gradual shifting of bed-bound patients from hospitals to specialised LTC and rehab facilities, ultimately treating the patients at home, thus reducing the pressure on both acute care, and LTC and rehabilitation hospitals. Based on Colliers' estimates, there will be a de-

mand for 22,600 LTC and 20,600 rehabilitation beds by 2035, which will require an additional investment of approximately US\$11.6 – 22.5 billion by 2035."

Due to the shortage of LTC, rehabilitation and HC services in Saudi Arabia, patients are obligated to utilise acute care facilities, creating a burden on these facilities. Based on various sources, patients who could be better served in LTC and rehab facilities occupy an estimated 20% to 30% of public hospital beds in the Kingdom. Compared to an LTC facility, the cost of patients who need LTC and rehab but are instead treated in general hospitals is significantly higher.

As part of the Kingdom's efforts to tackle these challenges, The Ministry of Health's (MoH), Private Sector Participation (PSP) initiatives aim to increase the share of the private sector in healthcare delivery via Public Private Partnership (PPP). These efforts are expected to improve the efficiency and quality of services provided to the elderly in the Kingdom, with better utilisation of tertiary care, LTC and rehab facilities.

"An important aspect will be improving Home Care (HC) services; an improved home care provision will reduce the pressure on both acute care and LTC and rehabilitation hospitals. The target under the MoH's Private Sector Participation (PSP) initiative is to increase home care coverage annually from 35,000 in 2019 to 133,000-145,000 by 2030," remarks Ahmed.

Ahmed notes that in 2023, the Ministry of Health Saudi Arabia, in collaboration with the National Center for Privatization & PPP launched the Expressions of Interest (EOI) for Long Term Care, Medical Rehabilitation and Home Healthcare Projects in the Riyadh & Eastern Regions. Some 200 companies submitted 424 expressions of interest in three healthcare



Mansoor Ahmed, Executive Director (MEA) and Head of Development Solutions, Healthcare, Education and PPP, Colliers in MENA

Public Private Partnership (PPP) projects in Riyadh and Eastern regions.

## Shortage of manpower

However, Ahmed points out that "the greatest challenge lies in the shortage of manpower as the number of physicians and specialised nurses and allied healthcare personnel for rehabilitation is insufficient. With new hospital developments underway the competition to hire experienced and skilled physicians, nurses and allied workforce is further set to intensify."

He concludes: "Currently, the market is in its nascent stage and many existing LTC, Rehab and HC facilities lack advanced medical capabilities. As the market matures, more centres providing specialised comprehensive rehabilitation such as neurorehabilitation, cardiopulmonary, paediatric and musculoskeletal rehabilitation will enter the market." ME+

## • Read the complete report:

"Colliers Overview of KSA LTC Rehabilitation and Home Care Sector"

[bit.ly/3QMO70Z](https://bit.ly/3QMO70Z)

# Over 200 health journals call on WHO to declare climate and nature crisis an indivisible global health emergency



Over 200 health journals across the world have come together to simultaneously publish an editorial calling on world leaders and health professionals to recognise that climate change and biodiversity loss are one indivisible crisis and must be tackled together to preserve health and avoid catastrophe.

The authors say it's a "dangerous mistake" to respond to the climate crisis and the nature crisis as if they were separate challenges, and urge the World Health Organization to declare this indivisible crisis as a global health emergency.

The editorial is published in leading titles from around the world, including *The BMJ*, *The Lancet*, *JAMA*, the *Medical Journal of Australia*, the *East African Medical Journal*, the *National Medical Journal of India* and *Dubai Medical Journal*. A full list of participating journals can be found here: <https://bit.ly/3QaJBrv>.

Human health is damaged directly by both the climate crisis and the nature crisis, with the poorest and most vulnerable communities often bearing the highest burden, they write. Rising temperatures, extreme weather events, air pollution, and the spread of infectious diseases are some of the major health threats exacerbated by climate change.

For example, access to clean water is fundamental to human health, yet pollution has damaged water quality causing a rise in water-borne diseases, and ocean acidification has reduced the quality and quantity of seafood that billions of people rely on for food and their livelihoods.

## Biodiversity loss

Biodiversity loss also undermines good nutrition and constrains the discovery of new medicines derived from nature, while changes in land use have forced tens of thousands of species into closer contact, increasing the exchange of pathogens and the emergence of new diseases and pandemics.

Communities are healthier if they have access to high-quality green spaces that help filter air pollution, reduce air and ground temperatures, and provide opportunities for physical activity. Connecting with nature also reduces stress, loneliness and depression while promoting social interaction – benefits that are threatened by the continuing rise in urbanisation.

In December 2022 the biodiversity conference (COP) agreed on the effective conservation and management of at least 30% percent of the world's land, coastal areas, and oceans by 2030. Yet the authors note that the climate and nature scientists who provide the evidence for COPs are largely separate and many commitments have not been met.

"This has allowed ecosystems to be pushed further to the brink, greatly increasing the risk of breakdowns in the functioning of nature," they warn. "Even if we could keep global warming below an increase of 1.5 °C over pre-industrial levels, we could still cause catastrophic harm to health by destroying nature."

This risk, combined with the severe impacts on health already occurring, means the World Health Organization should declare the indivisible climate and nature crisis as a global

health emergency, before or at the World Health Assembly in May 2024, they write.

Tackling this emergency requires the COP processes to be harmonised, they add. As a first step, the respective conventions must push for better integration of national climate plans with biodiversity equivalents.

## Health professionals must be powerful advocates

The authors write: Health professionals must be powerful advocates for both restoring biodiversity and tackling climate change for the good of health. Political leaders must recognise both the severe threats to health from the planetary crisis and the benefits that can flow to health from tackling the crisis. But, first, we must recognise this crisis for what it is: a global health emergency.

Kamran Abbasi, Editor in Chief of *The BMJ* says: "The climate crisis and loss of biodiversity both damage human health, and they are interlinked. That's why we must consider them together and declare a global health emergency. It makes no sense for climate and nature scientists and politicians to consider the health and nature crises in separate silos."

He adds: "Health professionals are highly trusted by the public, and they have a central role to play in articulating this important message and advocating for politicians to recognise and take urgent action to address the global health emergency. Over 200 health journals are sending an unequivocal message." MEH

• Read the joint editorial:

"Time to treat the climate and nature crisis as one indivisible global health emergency" <https://www.bmj.com/content/383/bmj.p2355>

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# Replacing sedentary time with physical activity lowers risk of heart disease irrespective of genetics

A research team from the University of Hong Kong have found that replacing sedentary time with an equivalent amount of physically active time is associated with a lower risk of coronary heart disease, regardless of one's genetic predisposition to the condition.

A research team led by Dr Youngwon Kim, Assistant Professor of Kinesiology from the School of Public Health at the Li Ka Shing Faculty of Medicine of the University of Hong Kong (HKU), in collaboration with the MRC Epidemiology Unit at the University of Cambridge School of Clinical Medicine, conducted a large-scale epidemiological study to examine the potential health benefits of substituting sedentary time for physically active time in preventing coronary heart disease across different genetic risk levels.

They found that replacing sedentary time, such as sitting, with an equivalent amount of physically active time is associated with a lower risk of coronary heart disease, regardless of one's genetic predisposition to the condition. In particular, individuals with a higher genetic risk of coronary heart disease may experience a more significant reduction in their absolute risk of developing the disease compared to those with a lower genetic risk when substituting physical activity for sedentary time. These findings are published in the *Journal of Internal Medicine* <sup>[1]</sup>.

## Background

The World Health Organization (WHO) Guidelines underscore the importance of minimising sedentary behaviour for achieving optimal cardiovascular health. While excess sedentary time is recognised as a modifiable risk factor, it remains unclear whether replacing sedentary time

with an equivalent amount of physical activity time is associated with lower risk of coronary heart disease across varying levels of genetic risk of coronary heart disease.

This research utilised extensive genotype and phenotype data including wrist-worn wearable device data from the UK Biobank study which is an ongoing prospective UK cohort of over 500,000 adults. The current analysis included 77,500 white British participants (57% female) without prevalent cardiovascular events and with valid wrist-worn accelerometry data. Each individual's genetic risk of coronary heart disease was assessed using polygenic risk scores based on 300 genetic variants. Sedentary time, light-intensity physical activity, and moderate-to-vigorous physical activity were quantified using wrist-worn wearable device data.

Three primary findings:

1. Greater wearable-device-measured sedentary time is associated with an increased risk of coronary heart disease, regardless of genetic risk of coronary heart disease.
2. Replacing 60 minutes/day of sedentary time with an equivalent amount of moderate-to-vigorous physical activity is associated with about 9% lower relative risk of coronary heart disease. Notably, even replacing as little as 1 minute/day of sedentary time with the same 1 minute/day of moderate-to-vigorous physical activity is associated with a <1% lower relative risk

of coronary heart disease, across all levels of genetic risk.

3. Replacing sedentary time with the same amount of moderate-to-vigorous physical activity may confer greater reductions in the absolute risk of developing coronary heart disease events in individuals at high genetic risk than in individuals at low genetic risk.

## Significance of the study

"Our study provides unique insights into the role that replacing sedentary time (such as sitting time) with an equivalent amount of physical activity time could play in preventing coronary heart disease in individuals of varying levels of genetic risk of coronary heart disease. Our findings corroborate the current WHO recommendations on sedentary behaviour and physical activity, but suggest that, compared with individuals at low genetic risk of coronary heart disease, those at high genetic risk may have greater reductions in absolute risk of developing coronary heart disease by substituting physical activity for sedentary time," said Dr Kim. MEH

## Reference:

1. Kim, Y, Jang, H, Wang, M, et. al. Replacing device-measured sedentary time with physical activity is associated with lower risk of coronary heart disease regardless of genetic risk. *J Intern Med.* 2023; 00: 1–13. <https://doi.org/10.1111/joim.13715>

# Study finds 20-25 minutes of daily physical activity lowers risk of death from sedentary lifestyle

Clocking up just 20-25 minutes of physical activity every day may be enough to offset the heightened risk of death from a highly sedentary lifestyle, suggests research published online in the *British Journal of Sports Medicine* <sup>[1]</sup>.

However, higher daily tallies of physical activity are linked to a lower risk, irrespective of the amount of time spent seated every day, the findings show.

In developed nations, adults spend an average of 9 to 10 hours every day sitting down – mostly during working hours. And a highly sedentary lifestyle is associated with a heightened risk of death, explain the researchers.

Much of the previously published research on the benefits of physical activity to counter prolonged sitting time have relied on aggregated data, which inevitably results in a broad brush approach, they suggest.

## Individual participant data

To try and overcome this, the researchers pooled individual participant data from four groups of people fitted with activity trackers to find out whether physical activity might modify the association between sedentary time and death, and vice versa, and what amount of physical activity and sitting time might influence risk.

They included individual participant data collected between 2003 and 2019 from the Norwegian Tromsø Study 2015-16; the Swedish Healthy Ageing Initiative (HAI) 2012-19; the Norwegian National Physical Activity Survey (NNPAS) 2008-09; and the US National Health and Nutrition Examination Survey (NHANES) 2003-06.

Just short of 12,000 people aged at least 50 were included in the analysis. They had a minimum of 4 days of 10 daily hours of activity tracker records, had been monitored for at least 2 years, and had provided details of potentially influential factors: their sex, educational level, weight, height, smoking history, alcohol intake, and whether they had current and/or previous cardiovascular disease, cancer and/or diabetes.

In all, 5943 people spent fewer than 10.5 hours sitting down every day; 6042 clocked up 10.5 or more sedentary hours.

Linkage with death registries showed that during an average period of 5 years, 805 (7%) people died, 357 (6%) of whom spent under 10.5 hours sitting down every day, and 448 of whom clocked up 10.5 hours or more.

## Study findings

The analysis of the activity tracker data showed that being sedentary for more than 12 hours a day was associated with a 38% heightened risk of death compared with a daily tally of 8 hours – but only among those totting up fewer than 22 daily minutes of moderate to vigorous physical activity.

More than 22 daily minutes of moderate to vigorous physical activity was associated with a lower risk of death.

While a higher amount of moderate to vigorous physical activity was associated with a lower risk of death, irrespective of the amount of sedentary time, the association between sedentary time and death was largely influenced by the amount of moderate to vigorous physical activity.

For example, an extra 10 minutes a day



Pauline Bernar/Unsplash

Moderate physical activity of 20-25 minutes a day, such as gardening, can offset the risk of death from a sedentary lifestyle

was associated with a 15% lower risk of death in those spending fewer than 10.5 sedentary hours, and a 35% lower risk among those spending more than 10.5 sedentary hours, every day.

Light intensity physical activity was only associated with a lower risk of death among highly sedentary people (12+ daily hours).

This is an observational study, and as such, can't establish cause and effect. And the researchers acknowledge that they weren't able to repeat measures of physical activity and sedentary hours, so precluding any changes in either over time.

Potentially influential factors, such as diet, mobility issues, and general health weren't accounted for either. And activity trackers may not correctly classify all activity types and their corresponding intensity – cycling, resistance exercises, gardening, for example.

Nevertheless, the researchers conclude: "Small amounts of MVPA [moderate to vigorous physical activity] may be an effective strategy to ameliorate the mortality risk from high sedentary time, where accumulating more than 22 mins of MVPA eliminates the risk of high sedentary time." WEH

## Reference:

1. Sagelv EH, Hopstock LA, Morseth B, et. al. Device-measured physical activity, sedentary time, and risk of all-cause mortality: an individual participant data analysis of four prospective cohort studies. *British Journal of Sports Medicine* Published Online First: 24 October 2023. doi: <https://doi.org/10.1136/bjsports-2022-106568>

# Decreasing physical activity increases risk factors for cardiometabolic diseases even in adolescence

The health benefits of physical activity don't concern just the older population. A study from University of Jyväskylä, UKK institute, and the network of Finnish Sports Medicine Centres examined what happens to physical activity in the transition to adulthood and how the changes in activity are associated with cardiometabolic risk factors. For the first time, longitudinal accelerometer data from Finnish adolescents were linked to health marker information collected in clinical examination.

"We compared young people who maintained physical activity or changed their activity to those participants who sustained relatively low level of physical activity throughout adolescence," says doctoral researcher Tuula Aira from the Faculty of Sport and Health Sciences. "The results showed that the changes in physical activity are reflected in health risk factors already in adolescence."

## Baseline level of activity and magnitude of change plays a role

The study revealed that highly active 15-year-olds who further increased their activity as young adults benefited from lowered blood pressure.

"Interestingly, the decline in activity resulted in different changes in risk factors which were dependent on the baseline physical activity and the magnitude of the decrease in activity," Aira says.

Adolescents who decreased their activity from a moderate to a low level encountered increases in the concentration of insulin, as well as in body mass index. In turn, those who reduced movement from a high level to an average level were observed to have an increase in fasting blood glucose and a decrease in HDL cholesterol.

In other words, increasing physical activity was followed by favourable changes and decreasing activity by unfavourable changes in the risk factors – even at such a young age.

"The results from blood samples were, on average, within the reference values for all young people, including those with low activity," Aira says. "So, the blood test results do not give much cause for concern."


"However, the study clearly shows that physical activity is important for health already in adolescence. Considering previous research data, it is known that in the long run, lifestyle diseases such as Type 2 diabetes start to emerge more commonly among inactive people."

The study adjusted the results for gender, smoking, snuff use, and dietary habits (fruit and vegetable intake). This means that the observed differences and changes in risk factors between the physical activity groups were independent of the other factors studied.



## The study

The cohort study included accelerometer and clinical examination data with blood samples from 250 adolescents at age 15 (2013–2014) and at age 19 (2017–2018). At baseline, the participants were recruited from 156 sports clubs and 100 schools in six large cities and surrounding communities from different parts of Finland.

The study is part of Diverging paths in physical activity and sports participation from adolescence to emerging adulthood: the Health Promoting Sports Club cohort study, which has been carried out as a collaboration between the Faculty of Sport and Health Sciences (University of Jyväskylä), the UKK Institute and the network of Finnish Sports and Exercise Medicine centres and funded by the Ministry of Education and Culture. 

## Reference:

Tuula Aira, Sami Kokko, Olli Juhani Heinonen, et. al. Longitudinal physical activity patterns and the development of cardiometabolic risk factors during adolescence. *Scandinavian Journal of Medicine & Science in Sports* (2023). doi: <http://doi.org/10.1111/sms.14415>





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# Study shows early treatment of child obesity is effective

The early treatment of obesity in children is effective in both the short and long term, researchers from Karolinska Institutet report in a study published 25 October 2023 in *International Journal of Obesity*<sup>[1]</sup>.

The researchers followed over 170 young children in Sweden who had received treatment for diagnosed obesity. The children were recruited to the randomised controlled study when they were between four and six years old via children's clinics in Region Stockholm.

The children and their parents were randomly assigned to one of three treatment conditions: standard treatment, parental support group, or parental support group with follow-up telephone support.

The children and parents in the standard treatment group had meetings focusing on diet and exercise with a doctor, paediatrician and/or dietician. The two parental support groups did not involve the children and focused on how the parents could promote healthy lifestyles in the family in a positive way and without conflict.

"Such conversations can centre on how to set boundaries, how to teach children new behaviours and how to communicate with preschools, grandmothers, neighbours and other adults in the children's world," says principal investigator Paulina Nowicka, Associate Professor in Pediatric Science at the Department of Clinical Science, Intervention and Technology, Karolinska Institutet, and professor of Food studies, nutrition and dietetics at Uppsala University.

After attending the parental support groups, half of the participants were then randomly assigned a follow-up phone call.

Studies have been done on children who have been treated for obesity before," says Professor Nowicka. "But most of them have only been followed up after six months or a year, so we have no data on how the children fared over a longer period than that."

The study that she and her colleagues have now published suggest that early obesity treatment has a lasting effect.

"The children in all three groups improved their weight status and saw a reduction in their degree of obesity," she says. "The children whose parents received parental support had the best results, especially so those who also received follow-up phone calls. We also found that more children in this third group showed a clinically relevant improvement of their weight status associated with better metabolic health, by which I mean better levels of blood lipids and glucose."

## Knowing what food to serve children

According to Professor Nowicka, most parents know what kind of food they are to serve their children: "They usually know this – but what do you do with a child who loves food and always wants to eat, or one that's always hungry? How do you go about it without making a taboo of food?" she says. "You have to try to build a clear structure at home, one that makes the child know that lunch is on its way and know that they'll be getting supper."

She continues: "But you also need to do things together to strengthen family bonds, like getting the child involved in the cooking, giving the child vegetables



Paulina Nowicka, Associate Professor in Pediatric Science at the Department of Clinical Science, Intervention and Technology, Karolinska Institutet, and professor of Food studies, nutrition and dietetics at Uppsala University.

if they're hungry and not rewarding them with food. It's also important to make sure that food isn't associated with emotions and achievement."

While obesity is difficult to treat, she explains, the study shows that intensive treatment is safe and efficacious for pre-school children: "Treating children at that age is much more effective than if you start treating them in their teens," she says. "Some adolescents are looking at possible bariatric surgery and we hope that this can be avoided with earlier treatment."

The study was a collaboration among researchers at Karolinska Institutet, Uppsala University, Warwick Medical School and Oxford University. It was financed by the Centrum for Innovative Medicine (CIMED) and the Masonic Home for Children in Stockholm Foundation. There are no reported conflicts of interest. MEH

## Reference:

Ek, A., Brissman, M., Nordin, K. *et al.* A long-term follow-up of treatment for young children with obesity: a randomized controlled trial. *Int J Obes* 47, 1152–1160 (2023). <https://doi.org/10.1038/s41366-023-01373-7>



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# TOP 30 LEADERS

## Diabetes in the UAE by Aging Analytics Agency



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# UAE's advanced infrastructure raises standard of diabetes care

UAE-based companies are leading the GCC healthcare market with unprecedented success in diabetes diagnosis, according to new findings published by Diabetes in the UAE, a platform launched by UK-based Aging Analytics Agency, a subsidiary of Deep Knowledge Group.

According to data on the platform, the UAE's diagnostic companies have emerged as trailblazers in the GCC healthcare landscape, offering state-of-the-art solutions to cater to a population with a growing demand for high-quality healthcare services, especially in diabetes.

Commenting on the findings, Sasha Korogodski, Senior Scientific Analyst at Aging Analytics Agency, said: "The UAE boasts the most advanced network of diagnostic laboratories specialising in diabetes testing across the Gulf region. This cutting-edge infrastructure has not only raised the standard of diabetes care but also set a benchmark for the entire GCC healthcare sector."

In the UAE, a dedicated approach to diabetes care is evident with the presence

of over 25 specialised medical centres and clinics. The medical facilities are equipped with the latest technologies and staffed by expert healthcare professionals, ensuring comprehensive and effective diabetes management.

According to the findings, the UAE is at the forefront of medical advancements, with more than 50 diabetes clinical trials conducted, of which an impressive 80% have been successfully concluded. This pioneering body of research is driving innovations in diabetes treatment and management.

International collaboration thrives as six leading pharmaceutical companies contribute to diabetes research in the country. This synergy underscores the UAE's reputation as a global hub for medical innovation and investment opportunities.

### Diabetes associations

Alongside government-led initiatives for diabetes management, the UAE has witnessed the establishment of four major diabetes associations actively promoting educational and awareness-raising cam-

paigns across the nation. Some of these associations have expanded their reach to other Gulf countries, making a significant impact on diabetes awareness and prevention.

The landscape of companies focused on diabetes is rapidly evolving in the UAE. Dubai and Abu Dhabi emerge as primary hubs for these companies, with more than 60% situated in Dubai and nearly 25% in Abu Dhabi. Other cities, including Al Ain, Sharjah, and Ajman, each host one diabetes-focused company.

### UAE hub for clinical trials

The UAE has established itself as a key hub for clinical trials, with 56 trials conducted since 2010. In 2022, three new trials were registered, highlighting the nation's commitment to advancing clinical research. The UAE's leadership in clinical research within the Gulf region is evident, with Saudi Arabia and Qatar following closely in its footsteps.

The Diabetes in the UAE platform identifies the 30 foremost diabetes leaders and celebrates their remarkable contributions to innovation in the sector. Among these distinguished professionals are renowned researchers, accomplished data scientists, eminent endocrinologists, and visionary technologists, all deeply committed to tackling the intricate challenges associated with diabetes management in the UAE. Through their collective expertise and collaborative endeavours, they play a pivotal role in shaping cutting-edge systems that revolutionise diabetes care.

The platform offers insights into the diabetes market and the utilisation of advanced technology in managing individuals with diabetes. Despite extensive campaigns aimed at raising awareness about the detrimental effects of fast-food consumption and sedentary lifestyles, the Arab population still faces a heightened risk of metabolic disorders.

### Analytical dashboard empowers professionals

Aging Analytics Agency has designed a dynamic analytical dashboard that sets the standard for defining, analysing, and forecasting trends within the diabetes industry. The dashboard empowers professionals with a comprehensive suite of analytical tools, featuring interactive, searchable, and customizable databases of companies, investors, and funding rounds. It also offers automated SWOT analysis and AI-driven smart-matching capabilities, providing users with a robust toolkit for insightful decision-making in this rapidly evolving field.

- Explore the Diabetes in the UAE platform: <https://www.global-diabetes.health/uae>

## Time-restricted diet is safe, effective for those with Type 2 diabetes

Time-restricted eating, also known as intermittent fasting, can help people with Type 2 diabetes lose weight and control their blood sugar levels, according to a new study published 27 October 2023 in *JAMA Network Open* from researchers at the University of Illinois Chicago (UIC).

Participants who ate only during an eight-hour window between noon and 8 p.m. each day actually lost more weight over six months than participants who were instructed to reduce their calorie intake by 25%. Both groups had similar reductions in long-term blood sugar levels, as measured by a test of haemoglobin A1C, which shows blood sugar levels over the past three months.

The study was conducted at UIC and enrolled 75 participants into three groups: those who followed the time-restricted eating rules, those who reduced calories and a control group. Participants' weight, waist circumference, blood sugar levels and other health indicators were measured over the course of six months.

Senior author Krista Varady said that participants in the time-restricted eating group had an easier time following the regime than those in the calorie-reducing group. The researchers believe this is partly because patients with diabetes are generally told to cut back on calories by their doctors as a first line of defence, so many of these participants likely had already tried – and struggled with – that form of dieting. And while the participants in the time-restricted eating group were not instructed to reduce their calorie intake, they ended up doing so by eating within a fixed window.

“Our study shows that time-restricted eating might be an effective alternative to traditional dieting for people who can't do the traditional diet or are burned out on it,” said Varady, a professor of kinesiology and nutrition. “For many people trying to lose weight, counting time is easier than counting calories.”

There were no serious adverse events reported during the six-month study. Occurrences of hypoglycaemia and hyperglycaemia did not differ between the diet groups and control groups.

The study was small and should be followed up by larger ones, said Varady, who is also a member of the University of Illinois Cancer Center. While it acts as a proof of concept to show that time-restricted eating is safe for those with Type 2 diabetes, Varady said people with diabetes should consult their doctors before starting this sort of diet. MEH

#### Reference:

Pavlou V, Cienfuegos S, Lin S, et al. Effect of Time-Restricted Eating on Weight Loss in Adults With Type 2 Diabetes: A Randomized Clinical Trial. *JAMA Netw Open*. 2023;6(10):e2339337.

doi: <https://doi.org/10.1001/jamanetworkopen.2023.39337>

# Every hour of exercise buys you up to three hours of life



Scientific literature seems unanimous in highlighting that people who exercise regularly effectively lengthen their lifespan, earning additional years of life.

Only part of our life expectancy is pre-defined and 'written' in our genes. One of the main ways that science points out to act on our ageing process, getting old healthy and fit ('healthy longevity') is committing to a physical exercise routine. When we talk about physical exercise being extraordinarily effective in maintaining a healthy body and helping us to live longer, we're talking about both aerobic and anaerobic activities. If exercise sessions aren't just a one-off but are continued over time in a systematic and structured way, the body will undergo positive changes in the long term.

Since its foundation, **Technogym's mission has been that to improve people's quality of life.** In 1993, Technogym's founder Nerio Alessandri developed the ground-breaking holistic concept of wellness, which unifies regular physical exercise, balanced and healthy nutrition and a positive mental approach.

This new model has transformed the way people approach fitness and has impacted countless lives around the world. It envisages a constructive modification of habits in all aspects of life, for drastic health improvement. As a matter of fact, wellness can be seen as a key tool for "treating healthy people", i.e., preventing chronic silent inflammation and oxidative stress linked to the excessive production of free radicals, ultimately guaranteeing people not only a long life, but a healthy longevity.

During a recent TV talk, 100-year-old American doctor John Scharffenberg – physician, nutritionist and Professor of Nutrition, graduate of Harvard University's School of Public Health – states that people suffering from specific health condition or with unhealthy habits who also exercise regularly will outlive healthier people who don't exercise. He ultimately points out that

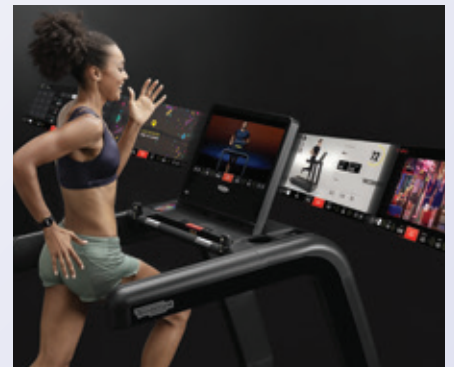
for every hour of physical exercise, up to 3 hours of life are gained. This comes from data interpretation of a landmark epidemiological study conducted on 17,000 Harvard alumni published in the New England Journal of Medicine in 1986, indicating that this information has been well known within the medical community for many years.

The Harvard Alumni Study suggests that people who exercise regularly can gain over 2 hours of life expectancy for each hour of exercise. Over the course of a lifetime, that adds about 2 extra years. That means that if someone exercises from 2 to 3 hours per week for 40 years, they'll gain 2 whole years of life.

Several studies within scientific literature point out the importance of physical exercise for lengthening one's life span. Two of the most important longitudinal studies launched 45 years ago in the USA – Nurses' Health Study and Health Professionals Follow-Up Study – evidence that adhering to the minimum dose of physical activity recommended by international guidelines (150 to 300 minutes of moderate physical activity or 75 to 150 minutes of vigorous physical activity per week) increases life expectancy by 21%. In addition to that, those who exercise 2 to 4 times a week increase their expectation by 31%.

Technogym has made both physical and mental well-being its mission, and so it's no surprise that it is a trailblazer in offering training options, both equipment and digital, to facilitate and encourage the maintenance of a training routine, at any age:

Technogym App is the ideal solution for achieving your fitness goals (losing weight, increasing muscle mass, improving sports performance, etc.): whether you're at home, travelling, at the park or in the gym, the digital coach suggests the workout most



suitable to your profile, combining scientific research, artificial intelligence, and engaging and challenging video content.

The robust and highly customisable Biocircuit offer (both cardio and strength) has been chosen by numerous clubs and rehabilitation-medical centres around the world: by simply logging in, the stations automatically adapt to the individual user, the user's profile and selected fitness goals. Biocircuit registers the user profile (age, physical details, fitness goal), and sets up all the stations in the circuit accordingly (weight, duration, pace, rest, etc.).

As far as strength training is concerned, Biostrength allows training with the right load, the right range of motion, the correct posture, the most suitable speed for the goal, and also indicates the number of sets, reps and optimum recovery time. The patented Biodrive system provides 6 different types of resistance (isotonic, no inertia, eccentric reduction, eccentric overload, viscous, elastic), improving the effectiveness of the exercise according to the goal the user wants to reach. **ME+**



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# Developing dosing recommendations for patients with liver disease

## Growing prevalence of liver disease and its impact on medication dosing

Providing optimal medication dosing recommendations for patients with liver impairment is challenging due to the lack of a single biomarker or laboratory value that reflects liver function and the limited availability of dosing recommendations in package inserts. **Nicole Pilch**, PharmD, MS, BCPS, CPHQ, FAST, discusses this issue.

In direct patient care, we know the probability of encountering a patient with a hepatic insufficiency is growing dramatically:

- According to the World Health Organization, liver disease rates have increased significantly over the past few years. It now is the 11th leading cause of the death worldwide.

- It's also become the fifth leading cause of death in the United Kingdom.

- Liver disease is the ninth leading cause of death overall and the second leading cause of mortality among all digestive diseases in the United States (US).

- Liver cirrhosis or irreversible liver damage continues to go unrecognized and impacts nearly 10% of the global population.

So, why does this matter?

The liver is sometimes affectionately referred to by medical professionals as the “garbage can of the body.” It's able to filter substances that come into a patient's system, removing toxins and processing the substance in the most effective way.

That includes the vital role of drug metabolism.

The liver is responsible for the metabolism and bioconversion of many drugs our patients are taking. If the liver is unable to do its job, the drugs we choose may not

become active to treat the patient's condition or they may accumulate and cause side effects or toxicity in the patient, leaving the patient vulnerable to unpredictable outcomes unless the dose is carefully selected and titrated based on their individual liver function.

### Why dosing for liver disease requires expertise

The challenge we encounter when trying to identify an appropriate drug dose for patients with liver impairment begins with the complexities of understanding liver dysfunction in the first place. Liver function tests such as AST (aspartate aminotransferase) and ALT (alanine transaminase) do not translate into a direct or definitive result that indicates a liver function level. They are usually grouped with a panel of tests to contribute to a wider picture of liver health and symptoms.

To help inform a patient's safe medication dosing adjustment concurrent with liver disease, healthcare providers must look at several patient factors:

- Identify the patient's Child-Turcotte-Pugh or MELD score.
- Identify hepatic biomarkers of synthetic functions such as international nor-

malized ratio (INR), coagulation parameters, or protein synthesis.

- Translate that into what you think their liver function is in order to adjust their medications.

These adjustments required for safe treatment and made by experience, expertise, and best practice are not available in the package insert most of the time, and they likely require a substantial evaluation of the existing literature about the drug's pharmacokinetics and dynamics and how they change with liver insufficiency. This can be very time-consuming and potentially delay getting the appropriate recommended dose to a patient.

### Evidence-based approach to dosing in liver impairment

Dosing recommendations in liver impairment are often missing because pre-marketing studies are not performed on patients with liver impairment, and post-marketing studies are also not required to include patients with any liver conditions. In the US, the FDA warns that despite extensive efforts, no single measure or group of measures has gained widespread clinical use to allow estimation in a given patient of how hepatic impairment will affect the





pharmacokinetics or dynamics of a given drug it has approved.

This is often why frontline clinicians are stuck making “educated guesses” about what to do with patients with liver impairment.

It is challenging for busy providers and pharmacists to navigate the available data and literature to simulate the best recommendation or guardrail for individual drugs and evaluate what the risks are of using that drug in a patient with liver insufficiency.

#### Lexicomp dosing recommendations for hepatic impairment

Based on feedback from users that ranked this challenge as one of the most important to address, Lexicomp® drug information solution is working to fill in those gaps to provide dosing recommendations for patients who have liver impairment. Our rigorous review process includes a team of four senior clinical experts, which includes two pharmacists and two hepatologists, along with 10 clinicians practicing at the bedside who sift through and synthesize the available literature to provide expert recommendations for using drugs in patients with liver insufficiency where there were not recommendations before.

These recommendations are made based

on the broad evaluation of the available literature, including the pharmacokinetics and dynamics of the medication and documented use of the medication in a patient with liver insufficiency. When there is no use data in this group, the experts provide a dosing recommendation based on years of clinical experience as well as their expert knowledge of the pharmacokinetics and dynamics of the drug and how that could be impacted by liver insufficiency.

We also try to dispel some of the inferences that are commonly held about certain medications.

Improving safe and effective use of medications in liver patients

October was National Liver Awareness Month in the United Arab Emirates, a time to recognize the importance of liver health and proper care for those who are

experiencing symptoms of liver cancers, cirrhosis, and diseases. While the bulk of attention is on the direct effects of liver dysfunction, we cannot forget that hepatic insufficiency can affect medications for a variety of comorbidities, including cardiology and psychiatry treatments. Expert recommendations are available to support decision-making at various stages of the patient’s journey, including:

- Initiation of a medication.
- Identifying the best course of action if liver function worsens.
- How to adjust during an acute event like hospitalization.

Having actionable recommendations and resources to fill in information where labels are lacking can be an essential support to clinicians seeking appropriate dose adjustments for patients with liver impairment. **MEH**

#### About the Author

**Nicole Pilch**, PharmD, MS, BCPS, CPHQ, FAST, is a senior clinical content consultant for Lexicomp® drug reference at Wolters Kluwer, Health. Prior to Wolters Kluwer, Nicole was a tenured professor at the Medical University of South Carolina where she maintained a clinical practice in the care of patients with end-stage kidney and liver disease and abdominal solid organ transplant for over 10 years.

- For more information, visit [www.wolterskluwer.com](http://www.wolterskluwer.com)



## ABHI set to bring leading MedTech to UK pavilion at Arab Health 2024

The healthcare sector in the Middle East and North Africa (MENA) region has undergone a remarkable transformation in the past decade. Fuelled by rapid population growth, a rising elderly demographic, and a surging prevalence of chronic and non-communicable diseases, demand for healthcare services in the region is set to surge in the coming years. According to the latest projections, the MENA healthcare market has grown by 11.7% over the past four years.

In recent years, greater investment by governments, coupled with greater involvement of the private sector, have helped cope with the booming demand and improve the quality of health infrastructure. Notably, the UAE and GCC region are enthusiastically and increasingly embracing public-private partnerships. The GCC's per capita spending on healthcare is now higher than the global average of US\$1,225. Meanwhile, even amidst pandemic-induced travel restrictions, Dubai remarkably doubled the number of health tourists in 2021 as it set its sights on becoming a leading regional hub for medical tourism.

The immediate future of healthcare and wellness delivery in the MENA region is being shaped by five major forces: a shift

towards holistic and preventative wellness, the need to build resilience and agility, the deployment of cutting-edge technologies, the strengthening of public-private partnerships, and managing the long-term ramifications of the COVID-19 pandemic. Digital health solutions are another powerful factor reshaping the healthcare sector in the region, creating a range of new opportunities for companies offering cutting-edge solutions in this space.

Meanwhile, the rising incidence of medical conditions – from lifestyle issues such as diabetes and obesity to cancer, cardiopulmonary, and cardiovascular disease – continues to guide the direction to governments and the private sector on the areas of excellence in which to invest. The creation of a world-class healthcare infrastructure remains a clear priority in the region.

Michelle Michelucci, the Association of British HealthTech Industries (ABHI)'s Head of International Events, comments: "The MENA region's healthcare landscape is not merely evolving; it is thriving. With regional governments' continuous focus on increasing investments and addressing difficulties, the region presents a fertile ground for those ready to seize the moment. Against this rapidly expanding landscape, there are many opportunities

for UK collaboration in fast-growing areas like HealthTech and life sciences."

Innovation, partnership, collaboration

Arab Health, the Middle East's premier healthcare conference and exhibition held annually in Dubai, continues to offer a dynamic platform for ideas, innovation, partnerships and collaboration. As one of the world's largest healthcare trade exhibitions, it is a significant event for the healthcare industry worldwide.

Each year the show brings the global healthcare community together to discover the way forward through sustainable and innovative solutions that can tackle our most important challenges and transform healthcare for future generations. From state-of-the-art imaging and diagnostic equipment to the most cost-effective disposables; the latest developments in surgery; to advances in orthopaedics, wellness and prevention, Arab Health continues to be at the heart of healthcare in the Middle East.

The 2023 show made history by being the most visited edition with 135,880 professionals visits from 183 countries and 3,358 exhibitors. Held in person, the show helped companies generate \$1.81 billion of business on the show floor. Overall, it was a resounding affirmation of the endur-

ing attraction and importance of in-person events, particularly at the heart of the healthcare ecosystem, where innovation and collaboration remain a cornerstone.

“In a world grappling with universal challenges – from staff shortages to the urgent need to address sustainability goals – trade shows such as Arab Health continue to be an important magnet for bringing together the brightest minds across industry to showcase their expertise, demonstrate their life-changing innovations, technologies and services, to tackle these challenges head-on. As the covid-19 pandemic has brought in unequivocally sharp focus, technology and innovation are pivotal to tackle the most pressing healthcare concerns of our time,” says Michelucci.

For UK companies, shows like Arab Health mean access to a diverse and extensive international audience all in one place. Each year the show offers a unique opportunity for visitors – who hail from all corners of the world – to explore the latest trends, advancements, and innovations in health technology over four action-packed days.

Last year there was presence from 39 country pavilions, including the United



Kingdom. For over 12 years the largest UK Pavilion has been organised by the Association of British HealthTech Industries (ABHI) – the leading industry association for the health technology sector in the UK. The UK Pavilion has been running an extensive programme, demonstrating the importance of UK and UAE relationships at the four-day exhibition for the past two decades.

Alongside record attendance, the ABHI UK Pavilion at Arab Health 2023 also reported its most successful year to date, showcasing the exceptional demand and interest in UK HealthTech innovations and the significance of Arab Health as a platform for international collaboration and business growth.

### UK innovation in action

With a strong UK delegation already committed to attending, the ABHI UK Pavilion at Arab Health 2024 will offer the chance for UK companies to showcase their innovative solutions, build international partnerships, and explore new business opportunities in the Middle East. Together, the delegation will demonstrate the strengths of UK health tech to a global audience of over 136,000, giving visitors a chance to see cutting-edge technologies and the latest product launches.

Over four days, the UK Pavilion will highlight how UK technology and expertise can help solve some of the biggest challenges for health systems in the MENA region and across the world.

## UK exhibitors coming to the Middle East

**Open Medical** is expanding its digital transformation services in partnership with Tamer Group in Saudi Arabia. The clinically-led team, founded by NHS clinicians, specialises in healthcare consultancy and digital transformation. Through their cloud-based platform, ‘Pathpoint’, they provide intelligent, value-driven software solutions that automate clinical workflows and digitise patient pathways. Pathpoint is versatile and adaptable to any clinical setting, with over 150 deployments in the UK and Europe, managing over 3 million patient pathways. Open Medical are committed to driving value-based care and supporting Vision 2030 for a healthier society in Saudi Arabia.

**Inciner8**, a global leader in incineration, manufactures state-of-the-art incinerators serving customers across 180+ countries, will be showcasing their latest offering. Inciner8’s I8-M70 model is a mid-range incinerator that has been engineered with medical waste in mind. Designed to burn Type I-IV pathological waste, infectious,

contaminated ‘red bag’, surgical dressings, plastic test devices and other wastes, it offers thorough, fast and cost-effective disposal for settings from dental and cosmetic clinics to blood banks and large-capacity medical facilities.

**BeaconMedaes**, a leading specialist in piped medical gas distribution systems, will be showcasing its Next-Generation Automatic Manifold Changeover System, the MAT-S. The medical gas supply system combines a proven design with innovative new features to deliver premium performance and reliability as well as lower operational and maintenance costs. The innovative system offers a higher utilization rate and uptime, so it can be used longer and more frequently. In addition, its smart features make it easy and efficient to operate and is compliant to all medical standards.

**Glucorx** is at the forefront of diabetes care, offering an unparalleled range of innovative products and glucose testing solutions. Their showcase features the revo-

lutionary ‘Glucorx’ CGM, a device that continuously monitors glucose levels every 5 minutes, 24/7, eliminating the need for fingersticks. The Glucorx X6 meter is a game-changer, providing precise measurements for a range of health indicators, from blood glucose to -Ketone, Triglycerides and Uric Acid. The groundbreaking Glucorx BioXensor employs patented radio frequency technology, enabling real-time, painless and non-invasive blood glucose monitoring.

Respiratory technology company **TidalSense** will be demonstrating their ground-breaking N-Tidal Diagnose medical device, designed to deliver earlier, accurate and quicker COPD diagnosis than is currently available to clinicians. The novel approach combines the use of a newly designed, highly sensitive carbon dioxide sensor, with a diagnostic AI algorithm – the first time AI has been used in COPD diagnostics – cutting appointment times for patients from 40 minutes down

to five and giving patients and clinicians a definitive outcome within that time.

### Showcasing London's excellence

Long-term owner and guardian of the Harley Street Medical Area (HSMA), The Howard de Walden Estate is returning to Arab Health for the seventh year, bringing with it 12 of the HSMA's world leading clinics and hospital groups. Uniting at the ABHI UK Pavilion, the HSMA collective will showcase the very best of London's healthcare, and the quality and variety of services the area has to offer patients in the Middle East and worldwide.

Amongst this year's impressive delegation are esteemed UK providers such as The Royal Marsden – one of Europe's largest cancer centres; Bader Medical Institute of London, an exclusive facility offering the latest in Anti-Aging, Aesthetic and Reconstructive Gynaecology; Phoenix Hospital Group, renowned for its patient centred care delivered through its state-of-the-art medical facilities and One Welbeck, one of the country's largest specialist facilities for diagnostics, therapies and minimally invasive surgery.

In the realm of mental health, the HSMA proudly features All Points North, who specialise in mental health, trauma therapy, addiction treatment, and physical fitness;

and Re:cognition Health who will feature its comprehensive range of brain and mind services covering conditions including Alzheimer's, Autism, ADHD, Traumatic Brain Injury, CTE, long Covid and other progressive neurodegenerative conditions.

Accompanying these esteemed institutions are a host of specialised clinics, including The London Clinic, pioneers in treatments spanning cancer care, orthopaedics, musculoskeletal, digestive diseases, and cosmetic services; Fortius Clinic, the UK's largest orthopaedic treatment group based in London.

Visitors to this year's Arab Health will have the opportunity to explore the HSMA stand, gaining insights into the collective strength of this remarkable collection of world-class healthcare institutions.

### Cutting-edge surgical simulations

Next year, the Association of British HealthTech Industries will run an extensive UK programme demonstrating the importance of UK and UAE relationships – with a series of presentations, seminars and live surgical simulations taking place across all four days. Throughout the event, the UK Pavilion – the second largest pavilion at Arab Health 2024 – will highlight the strengths of UK healthcare innovation and celebrated collaborations between health-

care providers, clinicians, NHS Trusts and healthcare technology companies.

As usual, the centrepiece will be a simulated operating theatre, which will bring together leading UK hospitals and clinicians to showcase surgical procedures using the latest medical technologies. The ABHI Operating Theatre, housed in the ABHI support stand, will provide a platform for world class UK clinicians to showcase their skills and leading providers to engage and educate visitors.

In addition, all exhibitors will be featured in the second edition of the UK Healthcare Pavilion Magazine. The dedicated brochure includes a full exhibitor directory, as well as articles and features that capture the UK's world-class health tech offerings. The magazine will be available to all visitors of the ABHI UK Pavilion at Arab Health and distributed electronically to thousands of people.

All UK activity from Arab Health 2024 will be captured on the UK Healthcare Pavilion virtual platform, a virtual platform enabling visitors to discover and connect with innovative UK life sciences companies, hospitals, clinics and key organisations from the UK.

- For the full activity programme and list of 2024 UK exhibitors, visit: <https://ukhealthcarepavilion.com/events/arab-health-2024>

## NHS rolls out world-first programme to transform diabetes care for under 40s

Around 140,000 people aged 18 to 39 years old will receive additional tailored health checks from healthcare staff, and support with diabetes management, such as blood sugar level control, weight management and cardiovascular risk minimisation.

Under the ambitious new programme, named 'T2Day: Type 2 Diabetes in the Young', patients will benefit from extra one-to-one reviews as well as the option of new medicines and treatments where indicated, to help better manage their diabetes.

Addressing the additional risks associated with the condition during pregnancy, there will also be dedicated support

available for women, including access to contraception and folic acid supplements.

Backed by £14.5 million, local health teams will be supported to roll out the new scheme to help minimise the risk of these people developing health complications and severe illness and to support a reduction in health inequalities.

Eligible individuals may also be able to access the NHS Type 2 Diabetes Path to Remission Programme – a year-long programme including 12 weeks of low-calorie total diet replacement products and support to re-introduce food, with the aim of supporting participants to improve their blood sugar levels, reduce diabetes-related medica-

tion and in some cases put their type 2 diabetes into remission.

The NHS is the first health system in the world to put in place a national, targeted programme for this high-risk group of people.

Early onset type 2 diabetes is more aggressive than later onset type 2 diabetes and is more prevalent in people living within deprived areas and individuals from minority ethnic groups.

Defined as a serious disease by medical experts, early onset type 2 diabetes is associated with premature mortality, worse long-term health outcomes, and higher risk of diabetes-related health complications, such as sight loss, kidney failure, amputation, heart attacks and strokes. **NHS**

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## More than half a million people make organ donations via NHS App

More than half a million people have made organ donations via NHS App

People across England are being encouraged to use the NHS App as an easy way to register their organ donation decision – as more than 7,000 patients actively wait for a transplant.

The total number of organ donation decisions registered for the first time through the NHS App has increased by over 20% over the last year to 546,825 (up 22% from 448,562 last August).

The latest figures, which are being highlighted on the back the recent Organ Donation Week, show that 98,263 new organ donation decisions were registered via the NHS App during the period September 2022 – August 2023.

Overall, organ donation preferences have been managed 4.1million times through the NHS App.

NHS England figures show that:

- the NHS App has now had more than 32.8 million sign-ups since its

launch in December 2018

- over 29.1 million repeat prescriptions were ordered via the app in the last year (around 500,000 every week)

- more than 13 million messages have been delivered to NHS patients in the NHS App from GP surgeries, hospitals and national services

- there have been over 480,000 COVID vaccinations booked on the NHS App since November 2022

- eligible patients will also receive flu and COVID vaccination invitations through the app this winter.

Registering a preference on organ donation helps NHS specialist nurses to quickly understand people’s wishes, which can ultimately save lives.

Martin O’Neil, NHS England’s delivery director for the NHS App, said: “In a time when more than 7,000 patients are actively waiting for a transplant, it’s really encouraging to see that the total number of organ donation decisions registered for

the first time through the NHS App has increased by over 20% in this last year.

“This is an important decision to make, and another way in which the NHS App is helping patients to manage their choices and access healthcare.

Vin Diwakar, NHS England’s national director for transformation, said: “Organ transplantation is one of the greatest achievements of modern medicine – with nearly 4,600 transplants facilitated across the UK last year.

“With more than 7,000 currently on the waiting list, there is however still lots to do.

“The fact that the NHS App is already sitting in the pockets of millions of people means it’s never been easier to make an informed decision on organ donation. And it’s fantastic to see more than half a million people have already done just that.” MEH

## 10,000 virtual ward beds

More than 240,000 patients have now been treated on virtual wards thanks to the world-leading initiative, with research showing people who are treated at home recover at the same rate or faster than those treated in hospital.

England’s top doctor has praised the work of local NHS teams in introducing 10,421 virtual ward beds for patients who can get expert treatment for illnesses such as chronic obstructive pulmonary disease (COPD), heart failure or frailty conditions at home.

Professor Sir Stephen Powis, NHS national medical director, said: “Our world-leading virtual ward programme is a huge leap forward in the way the NHS treats patients enabling them to receive hospital-level care in their own home.

“The NHS is embracing the latest technology, with regular check-ins from local

clinicians in daily ‘ward rounds’ while freeing up hospital beds for those that need them most – it is testament to the hard work and dedication of NHS staff across the country that we have delivered on our target and rolled out more than 10,000 virtual ward beds by the end of September.

Virtual wards allow patients to get hospital-level care at home safely and in familiar surroundings closer to family, friends, and carers, helping speed up their recovery while freeing up hospital beds for patients that need them most.

Patients are cared for by clinicians who can provide a range of different types of care, including blood tests, prescribing medication, or administering fluids through an IV drip. They are reviewed daily with a home or virtual visit as part of the ‘ward round’, as well as the use of technology like apps, wear-

ables, and other medical devices so staff can easily check in and monitor their recovery.

Steve Barclay, health and social care secretary, said: “Thousands of patients have benefitted from the NHS’s ‘hospitals at home’, which give them the opportunity to recover in the comfort of their own homes while being monitored remotely by clinical staff. This approach, also known as ‘virtual wards’, has been shown to benefit patients and eases pressure on the NHS by freeing up hospital beds.

“We have delivered on our promise to roll out 10,000 hospital-at-home places by winter – a key target in our Urgent and Emergency Care Recovery Plan and a testament to the hard work of NHS staff.

“These ‘hospitals at home’ will speed up recovery times for patients and help cut waiting lists”. MEH



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# Target-Controlled Infusion anaesthesia: New more universal models



■ By James Waterson, RN, M.Med.Ed. MHE.  
Becton Dickinson, Medical Affairs Manager,  
Middle East & Africa

In simple terms Target-Controlled Infusion (TCI) means that instead of setting a dose-rate on the pump, the pump is programmed to target a required plasma concentration or effect-site concentration. A TCI pump automatically calculates how much drug is needed during induction and maintenance to maintain the desired effect-site or plasma concentration.

A TCI algorithm (the 'target' and plan on which the pump relies to deliver appropriate induction and maintenance rates to maintain anaesthesia without overdosing the patient) is based on pharmacokinetic (PK) and pharmacodynamic (PD) models and on Absorption, Distribution, Metabolism, and Excretion of medications by the body.

For example, the effect-site concentration of Propofol required to produce loss of consciousness is about 3 to 6 mcg/ml, depending on the patients' demographics. Patients waking from anaesthesia generally have a blood concentration of around 1-2 mcg/ml, although this is dependent on other drugs given during anaesthesia.

Adequate analgesia with Remifentanyl is generally achieved with 3-6 ng/ml. A Remifentanyl infusion of 0.25-0.5 mcg/kg/min in an 'average' man – 70 kg, 170 cm, 40 years old – produces a blood concentration of around 6ng/ml after 25 minutes.

## PK models are based on body compartments

Conventionally the body compart-

ment that the drug is injected into is V1 (plasma/blood), the next compartment is the 'vessel-rich' or 'fast re-distribution' compartment and is characterized as V2 (heart, liver, etc.). The final compartment, which is anatomically 'vessel-poor' and 'slow' in terms of re-distribution, is V3 (fatty tissue).

Drug distribution and the metabolism/elimination of each drug in each compartment is also part of each TCI model, as is the pharmacodynamics of the time taken between the plasma and effect-site effect.

Computer simulations and mathematical modelling of infusion schemes based on the above theories of compartments and clearances give models for both Target Plasma Concentration (Cpt) and Target Effect Concentration (Cet) and these can be incorporated into specialist infusion pumps.

The Marsh model for Propofol requires only age and weight to be programmed in the pump. The Schnider model is an alternative model for Propofol and has advantages in elderly patients as it is based on a lean body mass (LBM) calculation for each patient. Elderly patients receive a lower induction and maintenance dose, which can assist with hemodynamic stability.

The Remifentanyl Minto model uses age, height, gender and weight, and determines LBM for its calculations.

TCI pumps deliver the infusion at a constantly altering rate, but it is useful to think of this one infusion as being a mean-average of three continually calculated infusion rates: a constant rate to replace drug elimination and two exponentially de-

creasing infusions to match drug removed from central compartments to other peripheral compartments of distribution.

## Key features of an ideal TCI infusion system or pump are:

- Critical information such as decrement time, current Cet or Cpt and respective targets, current dose rate and concentration and type of agent being infused can be displayed at the same time on one screen.
- Patient parameters used during the setting-up of infusions appear on one screen to avoid the need for shuttling through multiple screens to check vital information.
- An Induction Time adjustable from seconds to minutes to allow for a gentle induction for patients with cardiovascular conditions or established hypotension.

Obese patients have previously presented a problem for 'classic' TCI, and the physiological differences between paediatrics and adults had required separate models for children.

Now, however, we have the Eleveld model for both Propofol and Remifentanyl, and the Kim-Obara-Egan Remifentanyl model which are much more universal and can potentially allow TCI in age ranges from 6 months to 99 years of age, and from 2.5 to 215 kg.

TCI, with its emphasis on evidence-based anaesthesia, and new near-universal patient models seems primed to change our approach to the management of all patients receiving sedatives and analgesic agents. MEH





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