AUSTFHU

HEBREW UNIVERSITY – THE INNOVATIVE WAY

Australian Friends of the Hebrew University of Jerusalem Newsletter Issue 60 Winter 2017

HEBREW UNIVERSITY IN TOP 15% SURVEYED GLOBALLY, #1 IN ISRAEL IN QS WORLD UNIVERSITY RANKINGS

Ranking positions Hebrew University among the top 1% of world's 26,000 institutions of higher education

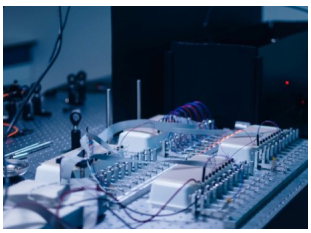
The Hebrew University of Jerusalem has maintained its #1 position in Israel in the new 2018 QS World University Rankings, rising 3 spots from 148 last year to #145 globally today.

The rankings place the Hebrew University among the top 15% of the 980 higher education institutions surveyed by QS, and among the top 1% of the more than 26,000 universities in the world.

Of the 7 institutions evaluated within Israel, the Hebrew University was ranked #1 for Academic Reputation and #1 in Overall Score.

HEBREW UNIVERSITY'S QUANTUM INFORMATION SCIENCE CENTER WINS TENDER TO BUILD NATIONAL QUANTUM COMMUNICATIONS SYSTEM

Research at Israel's leading quantum science centre paves the way for massive improvements in computation speed and secure communication



System to control light in optical fibres, shaping the wavefront of photons using a fibre piano. (Photo: Yitz Woolf for Hebrew University)

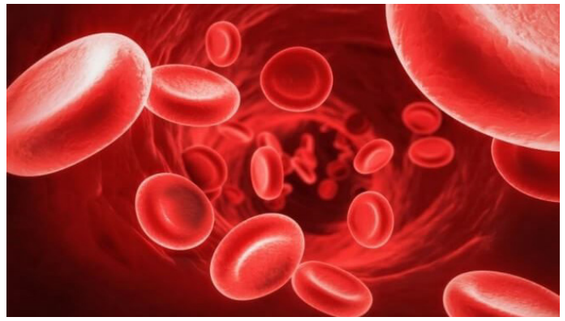
The Quantum Information Science Center at the Hebrew University of Jerusalem has won a NIS 7.5 million tender from the Government of Israel to lead the construction of a national demonstrator for quantum communications technologies.

The goal of this project is to develop homegrown Israeli expertise and technology for a national quantum communications system that will prevent eavesdropping, protect data privacy and secure national infrastructure.

Prof. Nadav Katz, director of the Quantum Information Science Center, and a researcher at the Hebrew University's Racah Institute of Physics, said: "This project to build a national quantum communications system will position Israel in the leading edge of research toward ultimately secured communication systems. With support from the Government of Israel and in cooperation with our research partners, this is the first Israeli national project in the emerging field of quantum information technologies."

Quantum information research is one of the hottest areas in 21st century science, promising dramatic improvements in computation speed and secure communication. Based on the inherent wave-like nature of matter and light, it will lead to massive leaps forward in our ability to fabricate, control, measure and understand advanced structures.

Prof Hagai Eisenberg and graduate student Daniel Istrati study a single photon experiment. (Photo: Yitz Woolf for Hebrew University)



THE BLOODY TRUTH ABOUT STRESS

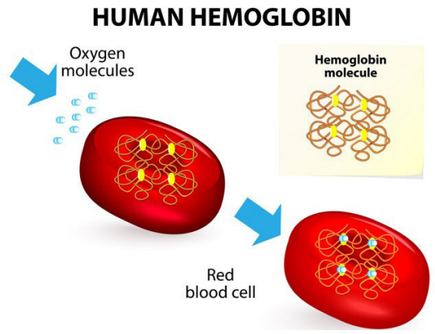
"Even at the cellular level, stress and the ability to mount a stress response are essential to our survival"

Our ability to breathe oxygen is critical to our survival. This process is mediated by the haemoglobin in our blood, which carries oxygen. Since air contains less oxygen on high mountains, the body is under pressure to make haemoglobin rapidly -- a stressful time. But what role does cellular stress play in the production of haemoglobin?

In a paper in the high-impact journal Cell Research, published April 4, 2017, researchers at the Hebrew University of Jerusalem report the discovery of an entirely new mechanism through which globin genes are expressed. Discovery of this hitherto unknown property of the haemoglobin genes shows that stress is absolutely needed to allow for the production of haemoglobin.

"Surprisingly, we have revealed an entirely new mechanism through which haemoglobin gene expression is regulated by stress. An intracellular signal, essential for coping with stress, is absolutely necessary to allow for haemoglobin production. That stress signal is activated by the haemoglobin gene itself. Although we have long known that this signal strongly inhibits protein synthesis in general, during haemoglobin gene expression it first plays its indispensable, positive role before being turned off promptly to allow for massive haemoglobin formation needed for breathing," said Prof. Raymond Kaempfer, the Dr. Philip M. Marcus Professor of Molecular Biology and Cancer Research at the Hebrew University of Jerusalem.

The realisation that stress is not only important but also essential may have important implications for how we understand haemoglobin expression. "What this boils down to is that even at the cellular level, stress and the ability to mount a stress response are essential to our survival. We have long known this in relation to other biological processes, and now we see that it is at play even for the tiny molecules that carry oxygen in our blood," said Prof. Kaempfer.



GLOWING BACTERIA DETECT BURIED LANDMINES

Researchers remotely detect buried landmines using fluorescent bacteria encased in polymeric beads illuminated by a laser-based scanning system

The potential application of a system developed at the Hebrew University to remotely detect buried landmines using a bacterial sensor. (Photo: Hebrew University)

The need for safe and efficient technologies for detecting buried landmines and unexploded ordnance is a humanitarian issue of immense global proportions. About half a million people around the world are suffering from mine-inflicted injuries, and each year an additional 15 to 20 thousand more people are injured or killed by these devices. More than 100 million such devices are still buried in over 70 countries.

The major technical challenge in clearing minefields is detecting the mines. The technologies used today are not much different from those used in World War II, requiring detection teams to risk life and limb by physically entering the minefields. Clearly, there is a critical need for an efficient solution for the ***remote*** detection of buried landmines and unexploded ordnance.

Researchers from the Hebrew University of Jerusalem now report a potential answer to this need. Writing in the journal Nature Biotechnology, they present a novel, functional system combining lasers and bacteria to remotely map the location of buried landmines and unexploded ordnance.

The system is based on the observation that all landmines leak minute quantities of explosive vapours, which accumulate in the soil above them and serve as markers for their presence. The researchers molecularly engineered live bacteria that emit a fluorescent signal when they come into contact with these vapours. This signal can be recorded and quantified from a remote location.

The bacteria were encapsulated in small polymeric beads, which were scattered across the surface of a test field in which real antipersonnel landmines were buried. Using a laser-based scanning system, the test field was remotely scanned and the location of the buried landmines was determined. This appears to be the first demonstration of a functional standoff landmine detection system.

"Our field data show that engineered biosensors may be useful in a landmine detection system. For this to be possible, several challenges need to be overcome, such as enhancing the sensitivity and stability of the sensor bacteria, improving scanning speeds to cover large areas, and making the scanning apparatus more compact so it can be used on board a light unmanned aircraft or drone," said Prof. Shimshon Belkin, from the Hebrew University's Alexander Silberman Institute of Life Sciences, who was responsible for genetically engineering the bacterial sensors.

HEBREW UNIVERSITY LAUNCHES MULTIDISCIPLINARY CENTRE ON CANNABINOID RESEARCH

The Hebrew University has announced the launch of a Multidisciplinary Centre on Cannabinoid Research (http://cannabinoids.huji.ac.il). The new Centre will serve as one of the world's leading institutes for conducting and coordinating research about cannabinoids, endocannabinoids and medical Cannabis. In addition, it will promote collaboration and disseminate information.

Staffed by some of the world's leading scientists and medical doctors from the Hebrew University and its affiliated Hadassah Medical Center, the Multidisciplinary Centre is already supporting exciting new research.

"We feel incredibly fortunate to team up with a vast number of scientists working together on this expanding field of medicine with the significant potential to discover new therapies based on cannabinoids," said Dr. Joseph (Yossi) Tam, Director of the Hebrew University's Multidisciplinary Center on Cannabinoid Research, and Head of the Obesity and Metabolism Laboratory at the Hebrew University's Institute for Drug Research in the Faculty of Medicine.

Until very recently, the Cannabis plant and its extracts (popularly called marijuana, hashish, weed, grass, and so on) were mostly frowned upon as purely recreational drugs. However, over the last 50 years, Prof. Raphael Mechoulam at the Hebrew University has spearheaded a new scientific era of Cannabis research. Prof. Mechoulam with his colleagues isolated the active constituent of the Cannabis plant, tetrahydrocannabinol, elucidated its structure and synthesised it. Later he identified the endogenous cannabinoids (formed in the mammalian body) and thus pioneered the field of cannabinoid research.

"It has been shown that modulating endocannabinoid activity has therapeutic potential in a large number of human diseases, hence research on cannabinoids may lead to very significant advances, not only in basic science but also in therapeutics. Our Multidisciplinary Center addresses many aspects in this promising area, such as cancer, head injury, addiction, bone formation, obesity and others," said Prof. Raphael Mechoulam, Head of the Academic Committee of the Multidisciplinary Center.

The Center's teams of highly qualified researchers comprise Heads of Labs and Research Groups ranging through Nano-Medicine & Nano Delivery Systems, Tumour Micro-environment, Neurobiology, Pain Relief & Plasticity, Molecular Modelling & Drug Design, Immuno-pharmacology, Free Radicals, Stress and Plant Pathogen Interactions.

Cannabis reverses aging processes in brains of mice

Memory performance decreases with increasing age. Cannabis can reverse these aging processes in the brain. This was shown in mice by scientists at the University of Bonn with their colleagues at the Hebrew University of Jerusalem. Old animals were able to regress to the state of two-month-old mice with a prolonged low-dose treatment with a cannabis active ingredient.

This opens up new options, for instance, when it comes to treating dementia. The results are now presented in the journal Nature Medicine.

Next step: clinical trial on humans

A low dose of the administered THC was chosen so that there was no intoxicating effect in the mice. Cannabis products are already permitted as medications, for instance as pain relief. As a next step, the researchers want to conduct a clinical trial to investigate whether THC also reverses aging processes in the brain in humans and can increase cognitive ability.

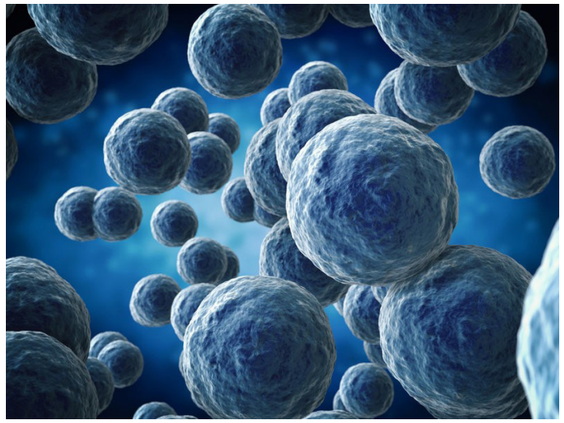


Photo: © phonlamaiphoto / Fotolia

‘SMART’ BACTERIA REMODEL THEIR GENES TO INFECT OUR INTESTINES

Hebrew University researchers describe how infectious bacteria sense they’re attached to intestinal cells and remodel their gene expression to exploit our cells and colonize our gut

Infectious diarrhoea, a common disease of children, is responsible for over 2 million infant deaths annually in developing countries alone. A primary cause of this and other devastating conditions is enteropathogenic bacteria, which attack the intestinal tract when contaminated food is consumed.

The infection process involves hundreds of genes and proteins, both in the infectious bacteria and the human host. However, the processes by which the pathogens establish themselves in our gut are poorly understood.

Now, a new study published in the prestigious journal Science, by researchers at the Hebrew University of Jerusalem’s Faculty of Medicine, describes how pathogens sense their host, and tailor their gene expression to exploit their host to cause disease. The research was led by led by Prof. Ilan Rosenshine, the Etta Rosensohn Professor of Bacteriology at the Hebrew University.

Working with a pathogenic strain of E. coli, the researchers found that the bacteria can sense attachment to the human intestinal cells and activate gene expression in response. This was demonstrated by engineering one of these genes to express a protein that stains the expressing bacteria to appear green under the microscope. Under microscopic examination, the researchers observed that only the attached bacteria fluoresce in bright green, whereas non-attached bacteria remain dark.

The researchers also deciphered how upon sensing that it has attached to intestinal cells, the pathogen reorganizes its gene expression, including genes involved in virulence and metabolism, to exploit the host cell. These findings may lead to the development of new strategies to combat bacterial infection.

“The next steps include mapping in detail the genes that change their expression upon attachment, and describing the precise effects of this expression remodelling,” said Prof. Ilan Rosenshine. “Another important issue is testing whether similar regulation is involved in the infection processes of other pathogens.”

RESEARCHERS FIND MICRO-GENE THAT PROTECTS THE BRAIN FROM DEVELOPING EPILEPSY

Increased levels of a micro-RNA could have a protective effect that explains why identical stressors trigger seizures in some people but not in others

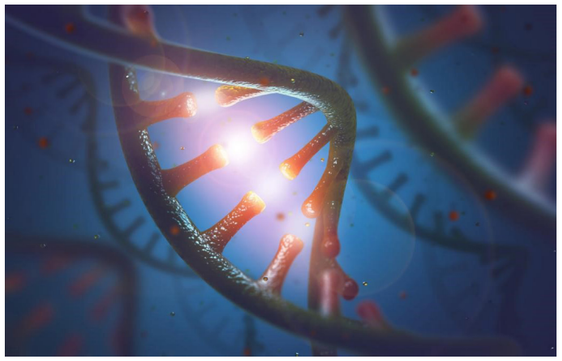
Prof Hermona Soreq
(Photo: Hebrew University)

On December 16, 1997, hundreds of Japanese children were brought to hospital suffering from epilepsy-like seizures. They all had one thing in common: they had been watching an episode of the Pokémon TV show when their symptoms began. Doctors determined that their symptoms were triggered by five seconds of intensely bright flashing lights on the popular TV program. But why did the lights affect a few hundred children while thousands of other viewers were unharmed?

In new research published in the Proceedings of the National Academy of Sciences, a team of researchers headed by Prof. Hermona Soreq at the Hebrew University of Jerusalem sought to answer this question. Drawing on her previous research, Prof. Soreq, the Charlotte Slesinger Professor of Molecular Neuroscience at the Edmond and Lily Safra Center for Brain Sciences and the Alexander Silberman Institute of Life Sciences, hypothesized that healthy brains may be protected from epileptic seizures by rapidly produced molecules called short RNAs, or microRNAs (miRs). MicroRNAs are a recently-discovered class of non-coding RNAs that can prevent genes from expressing particular proteins.

To test this idea, Soreq and her colleagues at the Hebrew University developed a transgenic mouse producing unusually high amounts of one micro-RNA called miR-211, which the researchers predicted was involved. The levels of this molecule could be gradually lowered by administering the antibiotic Doxycycline, enabling tests of its potency to avoid epilepsy.

Working with colleagues at Ben-Gurion University of the Negev in Israel and Dalhousie University in Canada, they suppressed excess miR-211 production in the engineered mice to the levels found in normal brains. Within four days, this caused the mice to display electrically-recorded epilepsy and hypersensitivity to epilepsy-inducing compounds. “Dynamic changes in the amount of miR-211 in the forebrains of these mice shifted the threshold for spontaneous and pharmacologically induced seizures, alongside changes in the cholinergic pathway genes,” said Prof. Soreq.



These findings indicated that mir-211 plays a beneficial role in protecting the brain from epileptic seizures in the engineered mice.

Noting that miR-211 is known to be elevated in the brains of Alzheimer’s patients who are at high risk for epilepsy, the researchers suspect that in human brains as well, elevated miR-211 may act as a protective mechanism to reduce the risk of epileptic seizures.

According to the researchers, recognizing the importance of miR-211 could open new avenues for diagnosing and interfering with epilepsy. By understanding how miR-211 affects seizure thresholds, scientists could potentially develop therapeutics that lead to greater miR-211–production.

HEBREW UNIVERSITY OPENS NEW HOME OF THE EDMOND AND LILY SAFRA CENTER FOR BRAIN SCIENCES (ELSC)

Philanthropist Mrs. Lily Safra, Architect Lord Norman Foster, and more than 400 people from Israel and abroad attend the opening of Israel’s largest neuroscience centre

The Hebrew University of Jerusalem dedicated the new home of The Edmond and Lily Safra Center for Brain Sciences (ELSC) in Jerusalem on June 13, 2017. More than 400 people from Israel and abroad attended the gala opening of the largest neuroscience centre in Israel and one of the most ambitious in the world.

Participating in the event was Mrs. Lily Safra, a leading supporter of neuroscience research projects around the world, and Chairwoman of the Edmond J. Safra Foundation, which pledged a lead donation of $50 Million of the Centre’s $150 Million initial budget.

“I am truly thrilled to join in celebrating this defining moment for ELSC when such an extraordinary new building becomes home to a remarkable community of researchers and students,” said Mrs. Lily Safra. “Their multi-disciplinary study of the brain’s secrets will surely make a profound impact on how we treat disease and care for patients. I know that my husband Edmond would share my deep sense of pride that our names are associated with such pioneering work, and with such dedicated and inspiring people.”

The Edmond and Lily Safra Center for Brain Sciences is at the forefront of the revolution in neuroscience research. Harnessing the extraordinary opportunities created by advances in technology and medicine, ELSC is shaping the next generation of researchers to advance the brain sciences and transform the treatment of neurological and psychiatric disorders.

“ELSC is unique in the way it brings together theoretical and experimental researchers to develop pioneering approaches to brain science,” said Prof. Menahem Ben-Sasson, President of the Hebrew University. “The Hebrew University is grateful to Mrs. Lily Safra and the Edmond J. Safra Philanthropic Foundation for their leadership in this historic initiative to unlock the mysteries of the brain.”

The 14,500 square-meter Centre includes state-of-the-art labs, classrooms, an innovative imaging centre, and areas for biological and pre-clinical research. Significant emphasis was placed on constructing an environmentally friendly building with a focus on conserving energy and reducing carbon dioxide emissions.

Prof. Israel Nelken, Co-Director of the Edmond and Lily Safra Center for Brain Sciences said: “At the Edmond and Lily Safra Center for Brain Sciences, scientists follow an interdisciplinary agenda to uncover the causal links between genes, neurons and circuits from which cognition and behaviour emerge, paving the way to a wide spectrum of future applications, from clever gadgets that improve quality of life to better health care.”

ELSC scientists have already paved a way towards fundamental understanding of brain processes in health and disease. At the Lab for Understanding Neurons, Prof. Idan Segev, the David & Inez Myers Professor in Computational Neuroscience, uses mathematical tools to digitally reconstruct a whole piece of cortical circuits using powerful computers. Using these models his team recently discovered rich structures or connectivity previously unknown. These “hidden” circuit structures pose constraints on how sensory information is processed in the neocortex. Prof. Merav Ahissar, the Joseph H. and Belle Braun Professor of Psychology, with longstanding interest in studying dyslexia, recently found that a central problem for dyslexics is forming prediction, a fundamental aspect of brain computing that governs our behaviours.

ELSC’s young generation of researchers are also studying the brain at unprecedented resolutions. Dr. Ami Citri, for example, received the prestigious $100,000 Adelis Brain Research Award for his outstanding work in the field of experience-dependent plasticity and its impact on diagnosis and treatment of psychiatric disorders. Most projects are led by ELSC’s PhD students, an elite group of young scholars.

NEWS FROM AROUND AUSTRALIA

NEW SOUTH WALES

Plans are well in hand for our 18 July function highlighting the groundbreaking developments in Scientific Research from the Hebrew University and how they affect us. Speakers will include Professor Menahem Ben-Sasson, President of the Hebrew University of Jerusalem, Professor Oded Shoseyov, expert in medical cannabis whose research delves into ***Harnessing the Super Power of Nature*** and Sarit Sternberg, a gifted high school student, who at the age of 15, via her research as part of the Alpha Program for Gifted Students at the Hebrew University, used viruses to kill the bacteria that cause Anthrax.

COMMITTEE FOR STUDENT SUPPORT

In addition to our meetings, in April we were privileged to hear John Bear, member of Rostrum, speak on ***The Amazing Chiune ‘Sempo’ Sugihara – Japanese Consul to Lithuania during WW2***. Some 6,000 Jews in Lithuania and Poland were able to escape from the extermination planned by the occupying German army through transit visas to Japan which he issued.

Chiune ‘Sempo” Sugihara, Japanese consul general in Lithuania, issuing transit visas for Jewish refugees.

Forthcoming talk

In August, Cecily Abrahams will address our group on ***Health Promotion by Randwick Montefiore for outside participants at Club Monte Senior Day Centre.*** Register via our office.

HONOURS CLUB

Federal Executive Director and graduate of the Hebrew University, Ilana Den inspired all present when she spoke on The Hebrew University of Jerusalem – Yesterday, Today and Tomorrow at our April meeting.

Suzanne Rutland OAM, PhD was our May speaker. In 2008-9, Suzanne received a government grant from the Australian Prime Ministers Centre for research on Australia and the campaign for Soviet Jewry – the topic of her talk.

In Obesity and in Health was the topic chosen for June by Dorit Samocha-Bonet, Researcher at the Garvan Institute of Medical Research and graduate of the Hebrew University.

Rachele Schonberger

We are excited to announce the inaugural North Shore Honours Club meeting to take place on Thursday, 27 July. The meeting will be held at the Teperson Centre, Masada College and will be addressed by Rachele Schonberger, Educator and Co-President of the Australian Friends of the Hebrew University, NSW Division.

Topic: ***The Changing Face of Education –*** Register via our office.

VICTORIA

PROFESSOR CHAIM LOTAN VISIT TO MELBOURNE APRIL 3-15

In April Professor Chaim Lotan, Professor of Medicine (Cardiology), Hebrew University-Hadassah School of Medicine, completed a well received and very successful visit to Melbourne, jointly supported by AUSTFHU (Vic) and University of Melbourne. The visit included a Research Leadership Dinner at the University of Melbourne and seminar presentations in the University of Melbourne BioDesign Program.

Professor Leon Mann (Melbourne School of Psychological Sciences and Honorary Life Governor of HUJ) and Prof David Grayden (Melbourne School of Engineering) co-hosted the Research Leadership Dinner at University House, attended by 25 research and innovation leaders and guests including Grahame Leonard (Co-President AUSTFHU Vic) Eitan Drori (Executive Director AUSTFHU Vic), and Dr Ron Finkel (President Hadassah Australia)

At the Dinner, Professor Lotan and Professor Jim McCluskey, Deputy Vice Chancellor-Research at University of Melbourne, spoke about their respective research interests, what drives their passion for research, and lessons from Israel and Australia in collaboration in biomedical research and innovation. The research Leadership Dinner was the tenth in a series that began in 2006 sponsored by The Pratt Foundation.

Professors Sharon Lewin (Doherty Institute), Chaim Lotan (Hebrew University), Jim McCluskey (DVC-R University of Melbourne), Fiona Karet (Cambridge University), and Leon Mann (University of Melbourne).

Professors Peter Lee (Engineering) and Michael Vitale (Melbourne Business School) and Grahame Leonard (Co-President AUSTFHU Vic).

Professor Lotan explains to BioDesign Program students why he wanted to become a medical innovator.
Photos: with thanks to Associate Professor Kwang Lim. http://kwanghuiseto.com

WESTERN AUSTRALIA

KOSHER CANINES MAY 2017

L: Lexi & Sam Starkowitz lead Bella down the red carpet
R: Honey Migdale and Madi Bennett with Spoodle

The Australian Friends of the Hebrew University, WA Division, held their third annual Kosher Canines event on Sunday 28 May 2017. There was perfect weather for the occasion and it was great to see so many happy canines and children running around in the autumnal sun enjoying themselves.

Yael Jacobson, the Public Relations Officer, arranged the event in the gardens of the Jewish Centre and Stephen from Splash Hounds did a wonderful job washing the dogs.

The judges, Dr Peter Winterton and Veterinarian, Dr Meg Braunstein, were faced with the daunting task of selecting prize winners from the selection of canines that attended.

The event, which has grown in attendance over the last two years, did allow those present to get to know each other and of course allow their canines to do the same. Gus, a black Cavoodle, won the prize of the blackest dog. Ollie, an Australian terrier, was well deserving of his prize as the most handsome dog, while Indie, a Dachshund dressed with ladybird wings, was the prettiest. Bella, a Shih Tzu-Pomeranian, was the best kisser of the day. Sissal and Gretel, Schnauzers, were awarded the price for the best matched pair, while Missy, a Jack Russell, was the dog with the waggiest tail. Pudding and Munchkin were joint winners of the shaggiest dog prize. Scout was the dog with the best smile, while Honey's enthusiasm in controlling her playful Spoodle, Buddy, won her the prize of being the best child handler of a dog. Kerry won the prize for most looking like his owner.

The event was arranged with fun as the key element for the day and there was certainly plenty of that.

SPONSORS MEET RECIPIENTS OF THE HUJ-UWA STUDENT EXCHANGE SCHOLARSHIPS

by Clinical A/Prof Peter Winterton AM, President, AustFHU WA Division

On a beautiful winter's afternoon at the University of Western Australia (UWA), the Australian Friends of the Hebrew University, WA Division and UWA staff "farewelcomed" the first two students who are recipients of the UWA-Hebrew University of Jerusalem (HUJ) student exchange scholarship.

Racheli Silver is a biological science student and worked at the Telethon Institute in addition to undertaking her studies in Psychology. She gave a short address in which she outlined her work and stated "my experience in Perth will stay with me forever". Racheli is nearing the end of her time in WA and after her exams, is planning to travel around Australia with her husband, before returning to Israel.

Jonty Franklin comes from Bunbury and is a UWA Arts student, studying Archaeology. He will be leaving for Israel in a few weeks' time. Jonty is very keen to see as much of Israel as possible, especially as it pertains to the scriptures of both the Old and New Testaments. The scholarship has made a dream come true for Jonty.

Jonty Franklin, Racheli Silver, Peter Winterton, Laura & Ike Raiter

Jonty Franklin, Peter Winterton & Barbara Brezger

Jeff & Estelle Lin, Racheli Silver & Yael Jacobson

This event was a great opportunity for sponsors to meet the recipients of the UWA-HUJ student exchange scholarships.

Only by building bridges and breaking down barriers can there be dialogue and better understanding between peoples of all faiths; this is important for both Israel and Australia. The Fund itself is open for donations. We would like to see as many smaller but regular contributions as possible. Five thousand dollars currently will fund two students for a semester. Donations are tax deductible in Australia.

2017 KAYE INNOVATION AWARDS

The Kaye Innovation Awards at the Hebrew University of Jerusalem have been awarded annually since 1994. Isaac Kaye of England, a prominent industrialist in the pharmaceutical industry, established the awards to encourage faculty, staff and students of the Hebrew University to develop innovative methods and inventions with good commercial potential, which will benefit the university and society.

A SIMPLE TEST TO IDENTIFY DISEASES FROM DYING CELLS COULD SAVE LIVES

Prof. Yuval Dor and Dr. Ruth Shemer receive Kaye Innovation Award for developing a way to detect specific tissue damage from a blood sample

One of the holy grails of medical research is the development of a simple non-invasive test that can detect a variety of diseases with high accuracy. However to date there is no single diagnostic test that fulfils this function.

To solve this problem, Prof. Yuval Dor and Dr. Ruth Shemer at the Hebrew University of Jerusalem (together with Prof. Ben Glaser, Head of the Endocrinology Department at the Hadassah Medical Center) developed a new blood test that looks for the remnants of dying cells cast off by specific tissue types throughout the body.

When cells die, they release DNA fragments into the circulatory system. The DNA of each type of dying cell carries a unique chemical modification called methylation. By detecting the unique methylation signatures of DNA from the fragments of dying cells, Prof. Dor and Dr. Shemer have established a way to detect multiple disease processes —including diabetes, cancer, traumatic injury and neurodegeneration — in a highly sensitive and specific manner.

Goal: a rapid blood test to assess multiple diseases simultaneously

A test that accurately pinpoints tissue damage from dying cells' DNA fragments could hold the key to a variety of medical advances — from a deeper understanding of human tissue dynamics, to earlier detection of life-threatening illnesses, to more efficient monitoring of responses to medical therapies.

In recognition of their work, Prof. Dor and Dr. Shemer were awarded the Kaye Innovation Award for 2017.

ALGORITHM LEADS TO A DRAMATIC IMPROVEMENT IN DRUG DISCOVERY METHODS

An algorithm developed at the Hebrew University cuts through the immense number of possible solutions to shorten drug discovery times from years to months

Discovery earns Prof. Amiram Goldblum a 2017 Kaye Innovation Award

Antibiotics for treating particularly resistant diseases, molecules that block immune system overreactions, molecules that inhibit the growth of cancer cells by removing excess iron, molecules that may increase the digestion of fats: all these and more have been discovered in recent years using a unique computerized approach to solving particularly complex problems.

Over the past five years, an Iterative Stochastic Elimination (ISE) algorithm developed in the laboratory of Prof. Amiram Goldblum, at the Hebrew University of Jerusalem's Institute for Drug Research, has been applied to the discovery of potential drugs. First tested to solve problems in the structure and function of proteins, the algorithm has since been used to reduce drug discovery times — from years to months and even to weeks.

For the development of this algorithm, Prof. Goldblum won an American Chemical Society Prize in 2000. Since then, the algorithm has solved many problems related to understanding various biological systems. These and other discoveries stem from collaborations between Goldblum's laboratory, where his students employ the algorithm to solve various problems, and laboratories and pharmaceutical companies in the world that test Goldblum's predictions in Germany, Japan, the United States and of course in Israel.

Wide Applications

The algorithm can be applied to other types of problems, in which the number of possibilities is immense and are not solvable even if the world's most powerful computers would work on it together. These include problems in which the number of possible outcomes are 10 to the power of 100 (10100) and more, such as problems of land transport, aviation, communications and biological systems.

CONTACT US

- Do you want to know more about the activities of the Friends?
- Interested in upcoming events?
- Going to Israel soon and keen to visit the Hebrew University?
- Interested in studying at the University, or do you know someone who is?

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