Highlights

A Holistic Understanding of Autism

Researchers at Duke-NUS are tackling the challenging puzzle that is Autism Spectrum Disorder (ASD) on different fronts...

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Building Research Skills for the Future

Duke-NUS' unique third-year program arms its students with the skills to make more informed analyses and incubate the passion for research.

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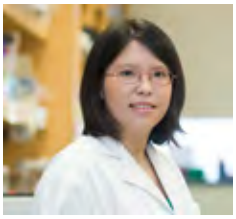

An Eco-system of Support for Post-Docs

In the often arduous journey that is the post-doctoral fellowship, strong mentorship, robust intellectual support and the development of lifelong professional relationships make for a sound, meaningful and successful formula.

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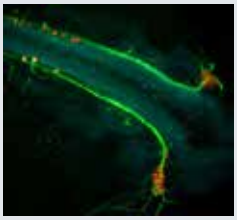

Amazing Science
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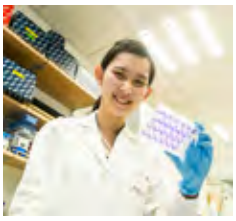

Reflections of an Unexpected PhD Student

First-year PhD candidate Esther Gan, did not even like scientific research at the start, but discovered otherwise by accident.

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In the News

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Learning in the 21st century

Dean Ranga Krishnan contributes to the ongoing conversation in Singapore on approaches to education.

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A better way to spend on healthcare

Singapore is in the midst of a major demographic transition. In light of this, Prof. Eric Finkelstein shares his views on healthcare spending.

TODAY, Apr 17, 2013

Chasing that elusive dengue vaccine

The scourge of dengue extends throughout the tropical world and subtropical areas, even in Singapore. Assoc. Prof. Ooi Eng Eong comments on the unrelenting fight against dengue.

VITAL SCIENCE

This e-communications update is produced by the Office of Communications and Development
Editorial team: Janice Tan, Wee Lai Ming (Duke-NUS) and Sheralyn Tay

Our banner story: A Holistic Understanding of Autism. Read the story here.

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DUKE NUS GRADUATE MEDICAL SCHOOL SINGAPORE

VITAL SCIENCE

MAY 2013

A Holistic Understanding of Autism

Researchers at Duke-NUS are tackling the challenging puzzle that is Autism Spectrum Disorder (ASD) on different fronts – and working to put together a holistic and in-depth picture of how the condition develops and ways to diagnose it.

When does a child with idiosyncratic behavior or who is socially-inept meet the criteria of a condition such as ASD – and is there a better way apart from observation to diagnose the problem? What genes are responsible for 'causing' ASD? How do these genes affect the way the brain develops such that it causes the social behavior and, communication abilities apparent in someone with ASD?

These are some of the questions that the Duke-NUS team of researchers is working to address. Autism is a disorder caused when there is a problem with the process (called neurogenesis) that grows and shapes the development of the brain. This impairment affects the way a person communicates and relates to others and results in a lower ability for social interaction and imagination. Other common outcomes of this neuro-impairment are repetitive behavior and a poor understanding of abstract ideas. Because the level of impairment ranges, the condition is termed a 'spectrum'.

Researchers Shawn Je, Brown Hsieh, Helen Zhou and Eyleen Goh from Duke-NUS' Neuroscience and Behavioral Disorders Program, are tackling the different dimensions of ASD. Their work stems from the foundational research of Associate Professor Steve Rozen, who is at the school's Cancer & Stem Cell Biology Program. He found a sequence of more than 700 genes taken from persons with ASD. This is a useful baseline from which to identify differences with control samples and to do comparisons. According to Assoc. Prof. Rozen, science has yet to pin point the causes and mechanisms of ASD. "We know that the diagnosis covers a diverse grab-bag of characteristics. We also know that ASD has a strong genetic component, but that the genetic component is also very diverse and probably involves hundreds of genes. [But] only a handful of these genes have been identified, and none accounts for more than a small fraction of ASD."

From left: Drs. Eyleen Goh, Brown Hsieh, Shawn Je and Helen Zhou

Understanding the cellular and biological basis of ASD is important to find therapies that will enable patients with ASD to lead more independent and satisfying lives, he added. “When we find a specific gene in which mutations cause (or strongly predispose) to ASD, then we have a tremendously powerful tool to investigate the biological mechanisms underlying ASD … Genetic understanding provides a powerful tool because it lets us build so-called models -- for example, neurons or even mice that are genetically engineered to have ASD-associated genetic variants. Obviously, it is much easier to study possible drugs in cells grown in the laboratory or in mice than it is to study them in humans!”

ASD researchers having a light-hearted conversation with Assoc. Prof. Steve Rozen

Assoc. Prof. Rozen’s sample sequence has been the basis for Assistant Professors Shawn Je and Eyleen Goh to identify the actual genes linked to ASD, and begin further exploration into how and why these genes affect neurogenesis. “With the genetic sequence mapped, the next step is to make sense of the code and understand which genes cause which outcomes,” explained Dr. Je. This is being achieved on three different fronts. Working on different areas and tapping on the different expertise of different researchers has been beneficial, said Dr. Goh, “By working together we can look at different angles and this makes the team stronger.”

How autism develops in the brain

To gain a better understanding of the way the brain develops in cases of ASD, Dr. Goh works with ASD models to identify what kind of structural differences there are in the brain. “We grow stem cells (derived from skin samples) in culture to model an ASD neuron to monitor the development. We also can compare this sample with non-ASD controls to see how the actual disease progresses and what the delays or defects there are,” she said. The models will also mean a better way to test for effective drugs, she added.

Together with other Duke-NUS researchers, she is working to obtain a Singapore-based sample to study the local population. “We hope to recruit more people into the study so as to generate more data – a better baseline – for an Asian population. The good thing for those involved in our study is that the research is done here and they can benefit from the support and the updates.”

Making a better diagnosis

Apart from understanding the way ASD develops in the brain, another facet of research is in how to better diagnose the disease in an objective and non-invasive way, said Dr. Je, as “Early diagnosis is the key for intervention.” Currently, diagnosis is based on observation and psychological tests which are not always accurate.

Dr. Brown Hsieh, elaborated, "Based on the current neurological findings of ASD, we can make some simple predictions about how they are going to behave/perceive in certain tasks, [so] we plan to examine whether these predictions are correct, and if so, we will try to standardize these tasks to help diagnose ASD.” The test is based on testing how well the different parts of the brain communicates, as those with ASD have an impairment of a part of the brain known as the corpus callosum – an area of the brain that links the right hemisphere of the brain with the left.

A test shows two dots travelling either up and down or left and right. The person undergoing the test has to press a button when he or she sees the change in the direction. Someone who can perceive the horizontal motion has a functioning corpus callosum because the brain can communicate between hemispheres. However, people with some problems in their corpus callosum tend to

perceive the up-down motion more frequently than the horizontal motion. The benefit of this approach is that even very young children can do the test easily.

Developing a picture of ASD brain function

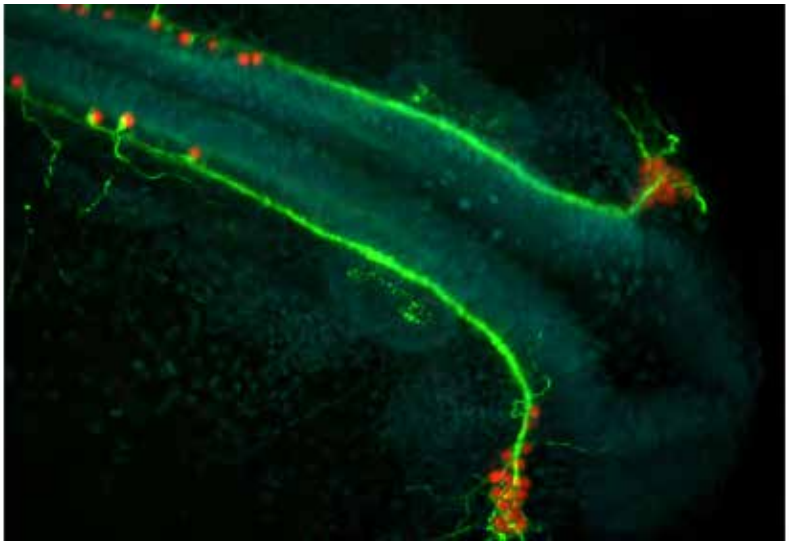
Adding to these areas of study, Dr. Zhou uses MRI and other neuro-imaging to evaluate the brain structure and function. “We have characterized the genetic sequence, but the question is, what are the changes in the brain underlying symptoms seen in ASD such as social-emotional disruptions or repetitive behavior?” She further explained, “We hope to use multi-model neuroimaging to how different parts of the brain communicate and connect to each other. By seeking knowledge between brain measures and behaviors/symptoms in ASD, we aim to develop these neuroimaging techniques as a biomarker to perform early diagnosis and progression monitoring in ASD.”

Autism Spectrum Disorder (ASD) has been adopted by Duke-NUS as its Corporate Social Responsibility (CSR) program. The aim is to provide avenues and opportunities for our faculty, staff and students to contribute to the ASD cause in their respective capacities. While our faculty continues to leverage on their research capabilities and genetic studies on ASD, our students from the Benjamin Sheares College recently organized the World Autism Awareness Week campaign from April 2 to 8, 2013, to highlight ASD knowledge, awareness and integration. Our staff and student volunteers in the CSR program can look forward to several upcoming activities for the year, such as organized outings and regular volunteer programs, which will make a difference to the lives of individuals affected by ASD.

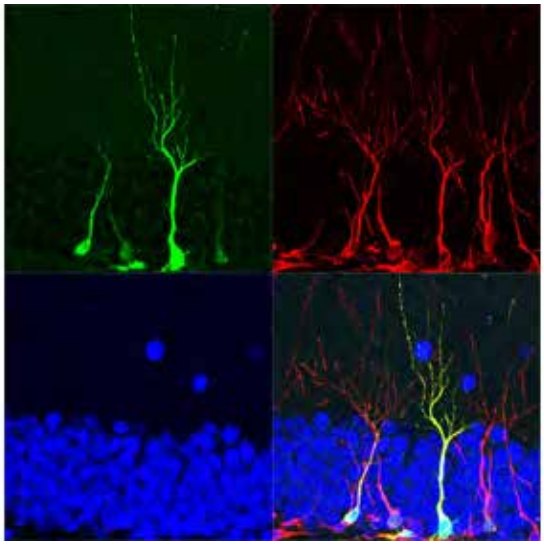
Light It Up Blue 2013

World Autism Awareness Week (WAAW) 2013

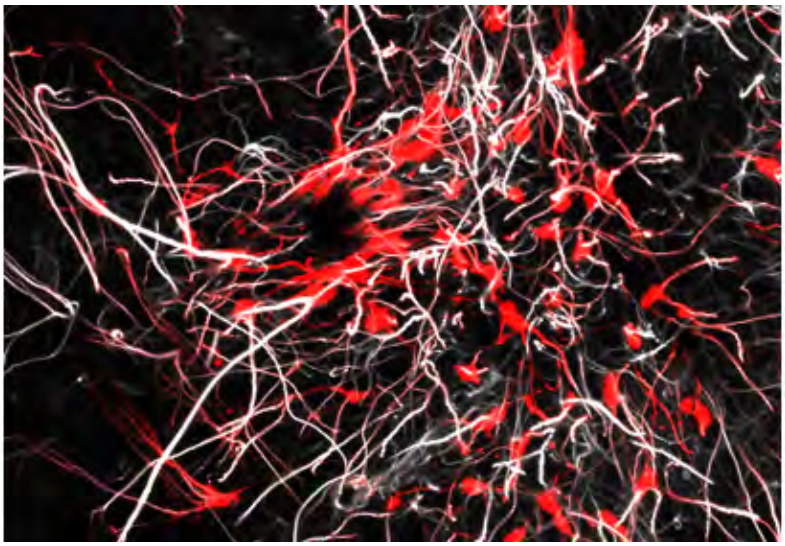
View gallery:



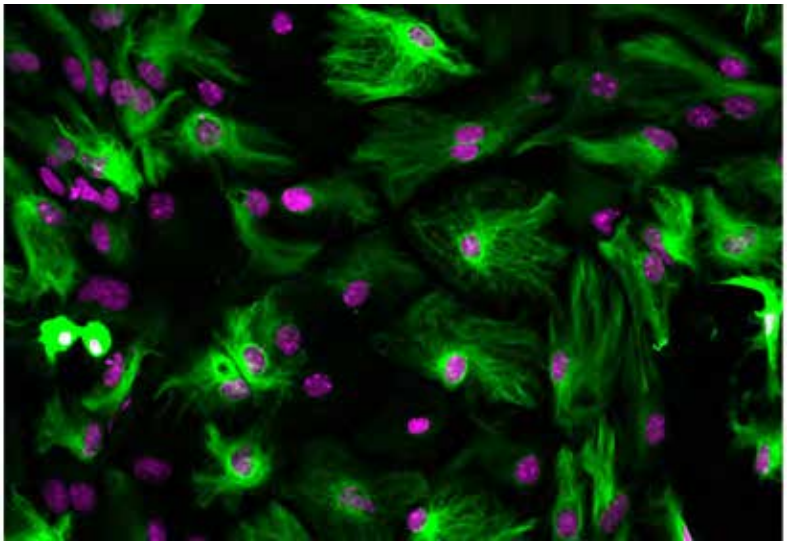
Sensory neurons in zebrafish Rett Syndrome model | Rett Syndrome patients have diminished response to sensations such as pain. Therefore, zebrafish Rett Syndrome (RS) model was established by silencing the expression of a specific protein responsible for this disorder. This allowed us to figure out that projections from sensory neurons in RS failed to project into the designed target causing diminished sensitivity to sensations.
Red – sensory neurons
Green – projections from sensory neurons
Blue – nuclei of all cells
Picture taken with Zeiss Light sheet fluorescence microscope



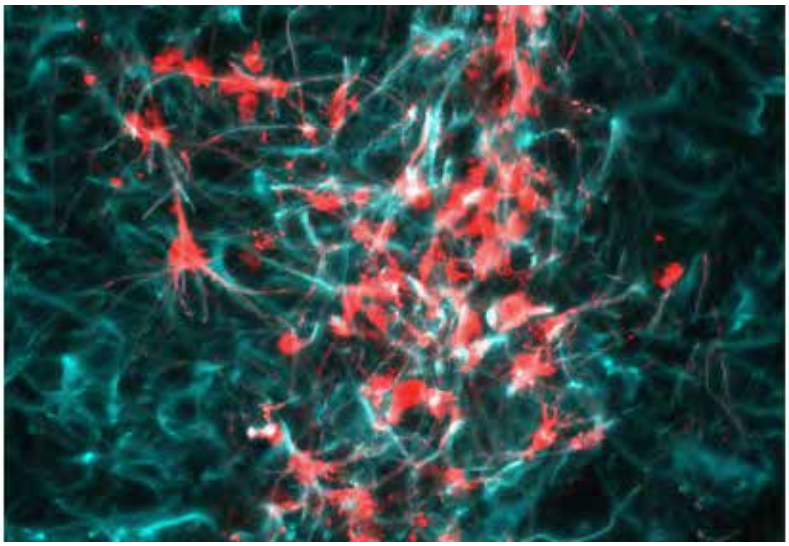
Newborn neurons in adult brains | New neurons in hippocampus are constantly being produced in brain throughout life. This is a process called “neurogenesis”. These new neurons can integrate into the existing brain circuitry and are involved in brain functions such as learning and memory. Neurogenesis can be affected by many factors. For example, stress decreases whereas exercise increases neurogenesis and hence exercise is able to enhance learning and memory.
Green – 14 day old neurons tracked by GFP
Red – Immature neurons in hippocampus
Blue – Nucleus of all cells in hippocampus
Picture taken with Zeiss Confocal microscope LSM710 at 40x magnification



Stem cells transplanted into mouse brains | Neurological disorders are devastating because adult brains are not able to regenerate on their own. Cell transplantation becomes an attractive therapeutic treatment possibility. Picture here shows that transplanted stem cells are able to survive and become neurons. This allows us to study how these transplanted cells develop and if they can functionally integrate into the existing brain circuitry.
Red – transplanted cells
White – supporting cells in the host brain



Ocean of Star Cells | Image taken with Zeiss LSM 710 confocal microscope showing 100% astrocytes differentiated from mouse neural progenitor cells (NPC). These astrocytes were identified by their expression of Glial fibrillary acidic protein (GFAP), shown in green. All cells in the images are marked by nucleus staining for 4',6-diamidino-2-phenylindole (DAPI – shown in pink), a fluorescent stain that binds strongly to A-T rich regions in DNA. We are testing the differentiation capabilities of various progenitor cells, including mouse and human NPC and human induced pluripotent stem cells (iPSCs) by manipulating growth conditions/factors in vitro.



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Red – transplanted cells
Green – supporting cells in the host brain

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VITAL SCIENCE

MAY 2013

Building Research Skills for the Future

Duke-NUS' unique third-year program arms its students with the skills to make more informed analyses and incubate the passion for research.

With Singapore striving to be the biomedical research hub, a critical mass of researchers and clinician-scientists will prove essential in elevating the pace and level of medical discoveries and advancements.

Cultivating the interest and appreciation of sound medical research among Duke-NUS' students is the school's unique curriculum, in which all students undergo a full academic year engaged in research during their third year. According to Associate Professor, Sandy Cook, Senior Associate Dean, Curriculum, the third year is aimed at facilitating competence and interest in research. While the goal is not to train full-fledged researchers, she said, "The program aims to inspire them and get them involved in research work so they understand the complexities of what it takes. It also helps them put the basic science and clinical education together, to really understand our vision to improve the practice of medicine."

Assoc. Prof. Sandy Cook, Senior Associate Dean, Curriculum

In their research year, students receive holistic support from various mentors in the areas of critical, qualitative, quantitative analysis. The aim, said Associate Professor Deidre De Silva, Clinical Sciences, a clinical mentor, is not only to produce potential researchers, but also inculcate an appreciation of medical literature. "In a fast-moving medical field where there is a wealth of new information coming in all the time, having a good grasp of research can translate to better interpretation of the literature. This is also useful even for students who do not take up research because they are familiar with the methodologies, the process of producing research, understand results and apply them."

Assistant Professor John Allen, Centre for Quantitative Medicine, highlighted the importance of imparting the skills to think critically about statistical data for a more robust and objective interpretation, "Students are taught to be more discerning about results and identify what is the real

substance of an article, but also the clinical significance in the light of the statistical outcomes." Mentors like Dr. De Silva and Asst. Prof. Allen also make every effort to help students publish their work even beyond the third year. Practically, this means students get the valuable experience of actually publishing a paper. The value of this experience was explored in a paper published in a special edition of the *Medical Science Educator*, Volume 23 (1S) 2013, which found that 49 per cent of students rated their third-year research experience as "excellent" and 40 per cent as "good".

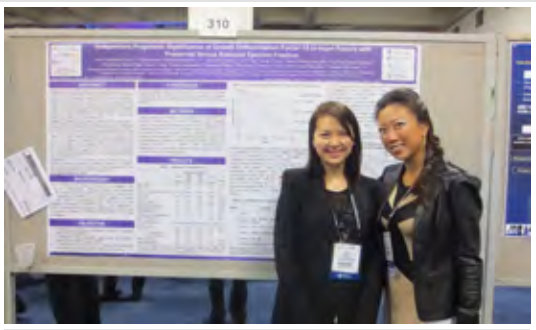
In another 2011 paper published in the *Medical Science Educator* that compared the percentage of papers published at Duke University and Duke-NUS, it was found that the latter's students did so at a comparable rate to the more established university. The paper noted that in 2010, 38 per cent and 28 per cent published papers in their third year at Duke-NUS and Duke University respectively, while 5 per cent and 11 per cent were first authors respectively. Said Assoc. Prof. Cook, "The fact that students are publishing is a testimony to the mentors and the model and bodes well for the future."

The chance to publish

Third-year Duke-NUS medical student Ms. Michelle Chan, will be one student from the Class of 2014 to see her name in print this year. She is the first author of a study looking at how a biomarker called Growth Differentiation Factor 15 (GDF15) predicts death and rehospitalization in heart failure patients from Singapore. The study is the first to look at the prognostic significance of GDF15 in an Asian population, and its findings show a potential role of GDF15 in the future diagnosis, monitoring and therapeutic success of heart failure patients. "We found that the prognostic value of GDF15 adds information on top of what we can get from usual traditional clinical factors such as age and gender," said Michelle. "Since GDF15 levels can be easily obtained and measured from blood samples, it holds great promise as a biomarker in the future management of heart failure patients."

Michelle is part of the on-going Singapore Heart Failure Outcomes and Phenotypes (SHOP) study that looks at heart failure in Singapore. It is led by Associate Professor Carolyn Lam, a Principal Investigator with NUHS.

Reflecting on the value of having a whole year dedicated to research, Michelle said, "It was a great opportunity to further my research interests in a specialty area of my choosing. Although I had previously done basic science research work surrounding clinical trials while pursuing my undergraduate degree in Pharmacy, this is the first instance I could integrate what I have learned in the first (basic science) and second (clinical) year of medical school." Her own decision to focus on Cardiology was because she was drawn to the rapid turnover of scientific breakthroughs in the field, she added. Her experience and achievements have been an "unbelievable" journey thus far. Not only did she present her research overseas at the American College of Cardiology 62nd Annual Scientific Meeting (one of the three biggest cardiology conferences in the world) for which she won an award for the highest ranking abstract from Singapore, she has also presented it at the Singapore Cardiac Society and won one of the awards for best oral presentation, and published a review paper on heart failure deaths.



Michelle and her research mentor, Assoc. Prof. Carolyn Lam

"I am especially thankful to my mentor, Assoc. Prof. Carolyn Lam for providing every opportunity to groom me to the best of my potential," said Michelle. "She gave me sufficient freedom to explore my own ideas yet challenged me at the same time whenever she thought I needed it. " For her, it is not only the communication skills, ability to critique medical literature, learning to refine her scientific writing and explaining her results to different audiences that have made the year fruitful. "Most importantly, is learning how to be a professional clinical researcher," she reflected. "Honest, responsible and meticulous with some creativity and just a little sprinkle of skepticism … the very things that will undeniably shape the rest of my clinical research career."

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VITAL SCIENCE
MAY 2013

An Eco-system of Support for Post-Docs

In the often arduous journey that is the post-doctoral fellowship, strong mentorship, robust intellectual support and the development of lifelong professional relationships make for a sound, meaningful and successful formula. However, Professor Shirish Shenolikar, Senior Associate Dean of Research, points out that the post-doctoral community is often the most "in jeopardy" in a medical school or university. While the graduate students and the faculty are seen as the direct responsibility of the school, post-doctoral fellows are not, because they are primarily under the purview of their Principal Investigator (PI) whose research grants pay these individuals. "This means, traditionally, that the post-doctoral fellows can be 'neglected' in terms of receiving formalized career training as they generally rely on their PIs for this advice. But we want to avoid this somewhat old-fashioned approach."

Forming a support system

Sensitive to this challenge and potential gap in the support of postdocs, Prof. Shenolikar noted that Duke-NUS in 2009, launched the Duke-NUS Early Career Scientists Association (DUNES) to better support these early career researchers by providing them some financial resources to direct and develop the professional skills, and foster connections between them and potential employers in the biomedical community in Singapore. “DUNES helps to capture the needs of the fellows and gives them a voice and opportunity to tap on a bigger ecosystem of support,” added Prof. Shenolikar.

In fact, DUNES has been well received not only by Duke-NUS post-doctoral fellows, but also by fellows at other institutions such as A*Star research institutes and NUS to share resources and experiences. A highly visible annual symposium has proven to be a good platform to explore ideas and develop ways to become more knowledgeable about different career pathways. Going forward, Prof. Shenolikar said that Duke-NUS is exploring more partnerships with Duke University to expand the level of support and recruit more ideas on how to further enhance the post-doctoral fellows program. In addition, Duke-NUS is striving to introduce an internal competition for post-doctoral fellowships which provide increased opportunities for Duke-NUS postdocs to gain the much needed “practice” in competing for research funding. “We hope to introduce more than one postdoctoral fellowship. Those who don’t get the actual funding will still get mentoring from our faculty to improve their research proposals. This will be become an important a platform to train our junior scientists.”

The importance of mentorship

Prof. Shirish Shenolikar (in blue) with Melissa Fullwood (left, then a postdoc) and his research team

These improvements to the post-doctoral development are important, said Prof. Shenolikar; after all, in science as in other parts of life, success begets success. “The success of our post-doctoral fellows is beneficial in the long-term for both our school and our faculty. For a mentor, the success of their trainees is the legacy that they leave behind and is vitally important for their scientific reputation and career. For the school, it is worth investing in our post-doctorate fellows because they could be the earliest demonstration of our success, compared with our medical or graduate students who will take many more years to show their impact. When our fellows attain prominent positions at other schools or research institutes, they become one of the best indicators of the school’s success as a training environment.”

This commitment to mentorship and ‘paying it forward’ is shared by other renowned scientists such as Professor Paul Nurse, a Nobel laureate who, with two other researchers, discovered the elements that control the life cycle of a cell. Prof. Nurse, who will run The Francis Crick Institute, Europe's largest biomedical innovation hub when it opens in 2015, will only recruit scientists who are passionate about mentoring others. In an interview with *The Straits Times*, he said, “Science is a communal activity, a strange combination of individualism and commonality … We rely on our colleagues completely to help us with our experiments, yet at the same time, we act as individuals." In addition mentoring helps younger scientists cope with failure – an event inherent in science. “You have to have a very strong psyche to deal with failure at such a high level," he shared, "and having someone more experienced in your community supporting you helps."

Dr. Melissa Fullwood, Assistant Professor (Yale-NUS), Special Fellow (Cancer Science Institute) & Lee Kuan Yew Postdoctoral Fellow

Support and success

Dr. Melissa Jane Fullwood – whose research specialty is in studying the epigenomics (chromatin changes, leading to gene expression) of gastric cancer using sequencing technologies – herself found the mentorship experience with Prof. Shenolikar from 2009 to 2012 to be valuable. During her time at Duke-NUS, Dr. Fullwood was the first author on a paper on sequencing apoptotic breakpoints with Prof. Shenolikar.

She also received the Lee Kuan Yew Post-Doctoral Fellowship, for which Prof. Shenolikar nominated her.

She recounted that she was drawn to Prof. Shenolikar's industry experience as well as his lab projects. "In addition, I was attracted to the fact that Duke-NUS is a medical school, and thought that I could learn from interactions with clinicians and medical students," she said. "My time at Duke-NUS provided me with a good learning opportunity. I also appreciated being exposed to grant-writing in Prof. Shirish's lab, both through the Lee Kuan Yew Post-Doctoral Fellowship as well as Prof. Shirish's grants, which ultimately came in handy when applying for the NRF fellowship." She added, "In addition to performing research in Prof. Shenolikar's lab, I was also a co-coordinator in the Freshman Seminars initiative at Duke-NUS. The combination of research and teaching made me more competitive for the position of an Assistant Professor at Yale-NUS and attaining the 2013 National Research Foundation (NRF) Fellowship."

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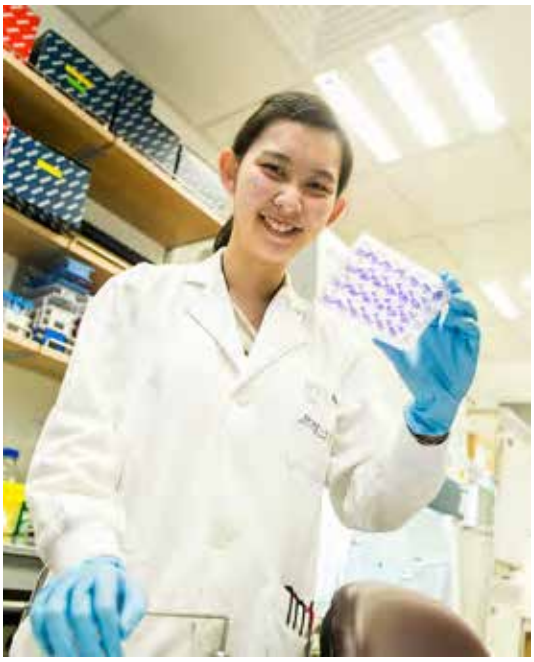
Reflections of an Unexpected PhD Student

First-year PhD candidate Esther Gan did not even like scientific research at the start, but discovered otherwise by accident. The former research assistant in Dr. Veronika von Messling's lab now works on innate immunity and dengue in the Emerging Infectious Diseases Program under the mentorship of Dr. Ooi Eng Eong. She shares how a 'mistake' led her to discover her love for research, and the valuable experiences in her challenging PhD journey thus far.

For the first two years of college at the University of British Columbia, I was convinced that I did not have the personality nor the patience for scientific research. It was during the third year of college, at an exchange program with Melbourne University that I mistakenly enrolled in a medical school pathology class. It was there that I was introduced to pathology and virology. A section on viral pathogenesis and its effect on human health particularly tweaked my curiosity. When I returned to Vancouver, I joined a laboratory at the James Hogg Heart and Lung Institute and worked on the pathogenesis of Influenza A virus in cardiomyocytes. It was there that I truly appreciated the complexities and challenges that came with research and realized, contrary to what I previously believed, I thoroughly enjoyed the work! In a brief moment of insanity, I toyed with the idea of entering the PhD program. Looking back, that was probably one of the best decisions I could have made for myself.



First-year PhD candidate, Esther Gan

The decision to join Duke-NUS was another stroke of luck. One of my Immunology professors in Vancouver, Dr. Abraham, raised an interesting option for me if I wanted to return to Singapore as he knew a virologist who had just moved to Duke-NUS. Eventually, my professor put me in touch with Dr. Veronika von Messling who at that time had just set up her lab at Duke-NUS working with respiratory diseases. I entered as a research assistant working on influenza. I thoroughly enjoyed my experience and it solidified my intent on doing my graduate studies.

What really convinced me to apply to Duke-NUS to take on my PhD was the collective nature of the department and how willing everyone was to share and teach. One postdoctoral fellow in Dr. von Messling's lab was by far one of the most intelligent mentors I could have asked for. I also got to

work with an adjunct faculty member who was a collaborator on my project and who very patiently taught me from scratch how to do mice work and how to logically design and execute an experimental plan. This open door policy with every professor, not only your own Principal Investigator, is a trait distinct to Duke-NUS. I was already considering Duke-NUS as an option, but after working here for a year, Duke-NUS became my first choice as an institute to gain a solid scientific foundation.

My PhD journey has been fantastic so far! After my rotations, I decided to join Dr. Ooi Eng Eong's laboratory to work with Dengue pathogenesis. More often than not, there are the days when results, or the lack thereof, make you want to tear your hair out. While Murphy's Law is our constant companion, these make me cherish the successful moments more. It's also heartening to share the highs and the multitudes of lows with students and staff who understand. At the end of a tough day, it is always comforting to have people to vent to who know what you are going through and will be there to laugh with you.

My mentor Dr. Ooi is a source of inspiration; his ever-creative ideas that somehow pop into his head and his passion for science is infectious! He has the remarkable ability to turn a simple and mundane idea into a complex and exciting hypothesis. He has certainly made my journey so far interesting and challenging in the best ways possible. Though I do not have much of a life (unless you count working for my PhD), I believe it's all worth it. I really enjoy learning and discovering the unknown with a great team. If anything, this process has taught me to learn how to laugh at my frustrations, mistakes and most importantly - myself.

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Duke-NUS' Inaugural Annual Giving Campaign

Launched with the aim of fostering a culture of giving within Duke-NUS, the inaugural Annual Giving Campaign was launched in January 2013. Individuals and teams were encouraged to do something for a Duke-NUS cause they were passionate about. After two months of campaigning and raising funds for their respective causes, the 14 groups of champions celebrated their fund-raising achievements on March 8, 2013.

Staff, faculty and students united to take on various challenges including stretching their physical limits to achieve their targets. On the day itself, staff and students enthusiastically took part in the Campus Walk-a-jog and Vertical Marathon to set timed records. Adding to the hive of activities, the Office of Corporate Services completed 8,888 rope skips while 10 students took on a grueling challenge of running 100km under 10 hours. The festive air was further enhanced by other champions who set up stalls offering food like hotdogs and cotton candy, games, as well as hand massages.

All the teams were recognized for their efforts and were presented with tokens of appreciation by new Board Chairman, Mr. Kai Nargolwala, who was heartened and enthused by the display of passion and unity.

To learn more about our Annual Giving Campaign, please visit: www.duke-nus.edu.sg/annualgiving

View gallery:

The Office of Corporate Services ready to take on their skipping tchallenge

Building a spirit of community as Owen enjoys a hand massage in support of the Education team's cause

Shao-min Hung, who came in first for the Campus Walk-a-jog


Joining in the fun, colleagues take part in the skipping challenge as well

Immense joy felt by Perfect 10 after completing their 100km run in 10 hours

The Class of 2016 receiving their token of appreciation from Mr. Kai Nargolwala

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Appreciating & Celebrating Our Leaders

A celebration and appreciation lunch was held on January 31, 2013 to thank Mr. Tony Chew for his contributions to Duke-NUS as its Governing Board Chairman. Over the past seven years, Mr. Chew has helped Duke-NUS to grow from strength to strength, to the success it enjoys today. As a token of appreciation for his invaluable leadership and guidance, the School presented a Duke Stone to Mr. Chew. The Duke Stone - first discovered by Duke University's founder, Mr. James B. Duke - is mined from a Hillsborough quarry in North Carolina and is a key feature in all of Duke's buildings. At the same time, the Governing Board also presented an elegant Chinese crystal art ware, to thank Mr. Chew for his extraordinary dedication and legendary vision. Adding to the occasion, Mr. Kai Nargolwala was also introduced and welcomed as the new Governing Board Chairman. Promising to build on the strong foundation laid by Mr. Chew, Kai, as he likes to be known, thanked everyone for the warm welcome. His vast experience in the financial world will help bring added dimension and new perspectives to the growth of the School.

Dean Ranga Krishnan presents the Duke Stone to Mr. Tony Chew as a token of appreciation

Mr. Tony Chew shares his memories of leading the school to its many successes

Kai speaks of his enthusiasm to take the school to greater heights

One for the memories: Szymon and Esther from the Student Council with Mr. Chew

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VITAL SCIENCE

MAY 2013

Professor Patrick Tan Wins Chen New Investigator Award

Professor Patrick Tan, from the Cancer and Stem Cell Biology Program, has been presented the coveted 2013 Chen New Investigator Award. This Award from the international Human Genome Organization (HUGO), is given to scientists who have made significant contributions to their respective fields of human genetic and genomic research during their early career years.

The Award Review Committee, made up of internationally acclaimed scientists from Canada, India, Japan, Switzerland and the USA, commended Dr. Tan on several fronts: his outstanding education background and excellent publication record, his significant research contributions on the genomic profiles of Asian cancers, as well as his long-standing body of work in cancer genomics, with a particular focus on gastric cancer.

Prof. Patrick Tan

Prof. Patrick Tan has attributed his honor to the tireless support of his research team and their many collaborators throughout Singapore.

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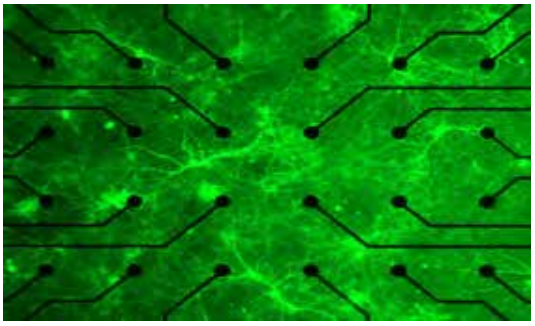
Cultured Neurons Provide New Platform for Understanding Memory Processes

Duke-NUS Associate Professor Antonius Van Dongen (senior author) and lead author Mark Dranias have found that cultured neuronal networks have short-term memory processes similar to those found in intact brains.

Their study, published in the *Journal of Neuroscience* in January 2013, consisted of growing embryonic rat brains in culture on top of a multi-electrode array (MEA), where they form functional neuronal networks. The scientists then genetically engineered the neurons so that they could use light pulses to activate them, while recording the network responses using the MEA.



A primary culture of embryonic rat neurons is shown above. The neurons grow on top of electrodes (black circles with lines) allowing their electrical responses to be recorded. A subset of the cultured neurons express a green fluorescent protein linked to a light-sensitive protein known as ChannelRhodopsin. When exposed to blue light, it excites that neuron, forcing it to fire an electrical pulse. When enough neurons fire, a long-lasting network response is elicited, storing information.

Significantly, the study showed that it was possible to investigate the mechanisms of information processing and short-term memory in cultured neuronal networks. By allowing precise pharmacological and genetic control, this new platform is ideally suited to study the processes underlying memory and to develop therapeutics for neurological disorders in which this facility deteriorates.

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Faculty Honors

Professor Mariano Garcia-Blanco has been elected to Fellowship in the American Academy of Microbiology. The Academy, the honorific leadership group within the American Society for Microbiology, recognizes excellence, originality, and creativity in the microbiological sciences, and his election to this group is a mark of distinction.

Associate Professor Annelies Wilder-Smith has been elected President-elect of the International Society of Travel Medicine. She has served for over a decade in various roles and capacities and was previously the counselor on the Executive Board.

Both Prof. Mariano and Assoc. Prof. Wilder-Smith are from the Duke-NUS Emerging Infectious Diseases Signature Research Program.

Prof. Mariano Garcia-Blanco

Assoc. Prof. Annelies Wilder-Smith

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DUKE NUS
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Details of projects awarded to Duke-NUS researchers from Jan-Mar 2013

No.	PI	Dept	Project Title (Please click titles for details)	Grant Call	Duration (Months)
1.	Eric Finkelstein	HSSR	Use of Conjoint Analysis to Estimate Cost-Effective Strategies for Increasing Screening Rates for Breast and Cervical Cancer Screening Programs	MOH HSR Nov 2011	18
2.	Paul Yen	CVMD	Molecular, cellular, and metabolic regulation of thyroid hormone-mediated hepatic lipophagy	NMRC May 2012	36
3.	Chetna Malhotra	Lien Centre	A Qualitative Study of Heart Failure Patients and Their Caregivers	Lien Centre Intramural Research Award	12
4.	Chetna Malhotra	Lien Centre	National Survey of Physicians Regarding Palliative Care Provision	Lien Centre Intramural Research Award	12

Total Amount of Funding Received: $10,572,924.60

Synopsis

1. Use of Conjoint Analysis to Estimate Cost-Effective Strategies for Increasing Screening Rates for Breast and Cervical Cancer Screening Programs

Eric Finkelstein, Health Services & Systems Research

Although cancer screening programs have been shown to be both effective and cost-effective, many Singaporeans do not undertake screenings consistent with recommended guidelines. The reasons for this relatively low uptake, and strategies for increasing it, remain mostly unexplained. The aim of this study is to improve our understanding of key factors that guide the decision of whether or not to use cancer screening services (separately for breast and cervical cancer) and

determine how to cost-effectively increase the reach of the programs, both overall and among low income and less educated women.

We propose conducting focus groups in order to identify the key factors that drive the decision to attend a screening exam. Conjoint analysis methods will then be used to estimate the relative importance of each of these factors and the extent to which modest incentives, targeted information and other strategies identified via the focus groups are expected to increase screening uptake. In addition to assessing Singaporean women's preferences for breast and cervical cancer screening, we will also give a special attention to the identification of potential knowledge gaps and misconceptions about cancer screening. Understanding the state of public knowledge about cancer risks and cancer screening programs will aid in targeting ongoing public information campaigns and make these more effective.

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2. Molecular, cellular, and metabolic regulation of thyroid hormone-mediated hepatic lipophagy

Paul Yen, Cardiovascular & Metabolic Disorders

Non-alcoholic fatty liver disease (NAFLD) is a progressive disorder that begins with fatty liver, progresses to fibrosis, and can lead to cirrhosis. It is commonly associated with obesity and diabetes, and it has become a worldwide epidemic . Currently, there is no effective drug therapy for NAFLD. Recently, we found that thyroidhormone (TH) surprisingly stimulates autophagy, a process that engulfs cellular components and breaks them down for metabolism in liver cells. The autophagy by TH can involve incorporation of lipids stored in fat droplets into autophagosomes that fuse with lysosomes. This generates fatty acids that undergo breakdown and metabolism within mitochondria and produce energy in cells. Thus, TH stimulation of autophagy in liver is linked with fatty acid metabolism. Our findings showed that autophagy by TH plays an important role in normal lipid metabolism and defects in autophagy in the liver may be a cause for the fat accumulation observed in NAFLD. We plan to characterize the cellular mechanisms and physiological roles of autophagy by TH within the liver. Our studies may lead to better treatments for NAFLD, diabetes, and obesity.

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3. A Qualitative Study of Heart Failure Patients and Their Caregivers

Chetna Malhotra, Lien Centre for Palliative Care

This study aims to understand the preferences for care at the end-of-life among patients with heart failure and their primary caregivers. Understanding such preferences is important for planning and improving services that provide care at the end-of-life.

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4. National Survey of Physicians Regarding Palliative Care Provision

Chetna Malhotra, Lien Centre for Palliative Care

The number of patients with life limiting illnesses requiring palliative care in Singapore is likely to increase. It is imperative to understand the attitude, confidence and current practices regarding palliative care provision among physicians managing patients with life limiting illnesses. Moreover, physicians' practices may be affected their own preferences for end-of-life care, though this has never been formally evaluated. Thus, we aim to conduct a national survey of physicians managing patients with life limiting illnesses in Singapore to assess the following:

- Attitudes towards palliative care provision and perception of confidence in initiating general/ basic palliative care
- Current practice of palliative care provision
- Magnitude of own end-of-life care preferences

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