asmr Australian Society for Medical Research newsletter

October 2014

Giving Birth to New Ideas

Knowledge in life sciences has exploded in the last decade, primarily due to the introduction and development of new technologies, e.g. sequencing technology, induced stem cells and genome editing, allowing researchers to address essential question of life and death with entirely new eyes. The advent of these technologies has also made research endeavor much more transdisciplinary. This is great news because novelty and innovation in many cases happens at the intersection of different ideas and different research arenas.

But how does one set up a structure where such interdisciplinarity can happen? How does one break-down the silos of research arenas? There are certainly various ways to do this. One way we have been walking in this direction is to develop common infrastructures run by experts that allow researchers to access and utilize technologies they would otherwise never be able to use. In essence, hire the best brains, set-up a playground, and let them play! Great places of research are the ones that can attract the best talent at all levels and create an environment where these best talents can live their visions, and – with some luck – not only live their vision, must indeed come up with entirely novel ideas.

I myself am very interested in figuring out mechanisms for disease pathogenesis. Over the last years we for instance found that the RANKL/RANK system is a master regulatory path for bone breakdown, which affects hundreds of millions of people. We also found that this system is essential in how sex hormones control expansion of mammary gland epithelial cells and thus link sex hormones to breast cancer. Based on these principles, there is even a medicine approved already benefiting thousands of patients. However, we wanted to describe basic physiology and disease at more global, systems level. We therefore ventured into Drosophila screening – because we had this system available in our "playground" – and came up with the first systems genetics for intestinal bacterial infections, a global map of heart function, tissue specific metabolism (fat triglyceride storage as a measure for obesity), and we even developed a new behavioral

Professor Josef Penniger,
Senior Scientist and Scientific Director, IMBA

paradigm to model pain perception (avoidance of something dangerous). This has allowed us, and of course everybody else in the world, to indeed find novel pathways for disease. We also developed the first haploid stem cells in the world, which can now be used to perform "yeast" genetics in a mouse stem cell; in essence it should be possible to unlock the function of the entire genome for a particular pathway "in an afternoon".

Juergen Knoblich at IMBA studied neurobiology in Drosophila, in particular development of the fly brain. Then he and his postdoc Madeline Lancaster started to "play" with human stem cells and by doing so opened "pandora's box for human brain research", they grew the first human brain organoids in bioreactors out of a stem cell. Now it might be possible to model neurodegeneration, autism, brain cancer, etc in an organ culture model or maybe come up with new ideas of self-organisation that could in the future be used to develop ultrafast brain-network based microchips for computers!

These are truly exciting times in biology and biomedical research. And if one has the technologies and also the courage to look outside of our engrained point of vision, one can indeed come up with something truly novel. And true novelty gives birth to new ideas.

In this issue:

The Australian Society for Medical Research

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Fundamental thinking errors that reduce performance

Dr Luke Hesson
ASMR Board

As part of the Australian Health and Medical Research Congress (AH&MRC) this year ASMR has organized two outstanding Professional Development sessions. These sessions will be facilitated by Dr Maria Gardiner, a behavioural psychologist with over 15 years' experience who has worked with many leading scientists to maximise their potential and productivity. These workshops, titled *Cognitive Behavioural Coaching for High Performers* and *The Strategic Researcher* will focus on high-end professional coaching to provide researchers with the skills to reach their full potential. Furthermore, these workshops, as well as other professional development events, are complimentary with registration to this year's AH&MRC.

For this newsletter, our *Perspectives Articles* are invited commentaries by Dr Maria Gardiner and Hugh Kearns published in the journal *Nature*. The first article, "*Turbocharge your writing today*" (*Nature* 2011, 475;129) describes the psychology behind high quality, high quantity writing. The second article, "*Waiting for the motivation fairy*" (*Nature* 2011, 472;127) describes some of the fundamental thinking errors that affect motivation and productivity.

It's the thought that counts: The psychology of high performing researchers

Dr Maria Gardener
Thinkwell

I have spent many years working with high performing researchers and research groups. Despite these groups being productive and performing well, I realised there were still a lot of things being left to chance. The groups succeeded and did well, largely as a result of the talent and hard work of the researchers involved. Often there wasn't much time, (because there wasn't much available!), put into being strategic. So my work with researchers has largely been about getting them to think and act strategically about their research and about themselves.

Being strategic about your research might mean thinking about what you are choosing to work on, what your specific plans are in terms of future funding and setting targets for publications. Also who are or could you be working with? As a colleague of mine from Flinders University, Professor Mike Bull says of co-authoring "two people means half the work and you still get the same credit – it is a strange currency." With a bit of thought, guidance and planning, it is possible for researchers to improve their successes by being more strategic.

So that is being strategic about the work, but what about in relation to ourselves? In my experience many high performers I have worked with, who are usually busy and juggling multiple competing demands, just do the next thing in front of them. People make the decision of what to do next based on how they feel rather than rational judgement. How often have you sat down at your desk with a huge list of things to do (including a paper that you have been wanting to finish for the last month) and just opened your emails and started working on them? In no universe will that help you finish that paper! Sadly, an ability to manage yourself well is not very closely related to how intelligent you are. High performers are just (and often more!) prone to things like perfectionism, procrastination and career-limiting overcommitting as anyone else. By understanding how to improve the accuracy of thinking, high performers can reduce these type of behaviours and move closer to peak performance.

Two workshops will be offered at the upcoming congress that are designed for high performers: The Strategic Researcher (for experienced researchers) and Cognitive Behavioural Coaching for high performers (for all researchers and RHD students).

The other thing that we think is essential to know to boost your strategic prowess is the psychology of high quality, high quantity writing. In this workshop we discuss the impact of beliefs on writing.

President's Report

Dr Roger Yazbek,
ASMR President

With my time as the ASMR President coming to an end, I want to reflect on what has been a dynamic, exciting and sometimes turbulent year for the ASMR and for the broader medical research community.

The Medical research future fund (MRFF) has perhaps been the biggest announcement to directly impact medical research since the establishment of the Medical Research Endowment Account. The promise of a perpetual fund that returns $1 billion per year for investment into medical research endeavours has excited many in the medical research community. What seems to have been lost in the general debate is the reasons why we should lift the investment into medical research.

I did not become a medical researcher because I wanted to make lots of money, or because I wanted a high-flying lifestyle, surrounded by supermodels and expensive yachts. I became a medical researcher because I wanted to contribute to global knowledge, and make a difference to the health and wellbeing of people around the world. I am sure that this rings true with most researchers reading this article.

Lifting the investment in medical research is not about providing a stable career path for up and coming researchers, it is not about improving our statistics so that we compare favourably with other OECD countries. It is, first and foremost, about improving the health and well-being of the Nation's citizens, and ultimately, the Nation's prosperity.

For nearly 55 years, the ASMR has been at the forefront of advocacy for health and medical research. During my time as President, I have seen first-hand just how much respect the ASMR commands in the halls of Canberra. This reputation has only come about because the ASMR operates bipartially, with integrity, diligence, and transparency.

With legislation for the MRFF likely to have been tabled by the time this article goes to print, it is critical that that the final MRFF policy is structured in a way that underpins continuous benefits for all health. The ASMR has already started asking critical questions of the powerbrokers in Canberra to ensure that the final form of the MRFF will protect the health and welfare of all Australians. To support this, the ASMR has commissioned independent data that will model the future health and economic impact of the MRFF. This important data will be crucial to shaping the best way forward for the MRFF.

The ASMR regularly surveys the medical research workforce, and in October, we will be launching the 2014 ASMR Workforce Survey, which will gain a snapshot of the current workforce, and the impact of the current funding environment. I encourage you all to participate in the survey and to disseminate it amongst your colleagues, to ensure accuracy and relevance. As we move forward into a new funding environment, we need to ensure we have a workforce that is capable of dealing with the future health challenges.

I have been privileged to represent such an outstanding society whose primary aim is to support research excellence. I am so proud of all those involved with the ASMR, and the outstanding work they have undertaken to make this year such a success. I am only young, but I don't think I've seen a year where medical research has made the news on an almost daily basis!

I look forward to the culmination of my Presidency at the Australian Health and Medical Research Congress (AHMRC). The convenors have put together an outstanding program focussed on the central theme of transdisciplinary research. I am not exaggerating when I say that transdisciplinary research has featured in every conversation I have had this year, whether it be with a Minster or Institute director. The AHMRC will give researchers the competitive edge as we move towards a new future of cross collaborative research, bringing with it new vision and better health.

Sports Medicine Research Application to a High Performance Setting

Dr Darren Burgess
High Performance Manager,
Port Adelaide Football Club

Applying the latest evidence to practice in elite sport should be simple. Research tells us, for example, that Nordic hamstring curls prevents hamstring injuries in soccer players. Easy, just make your players perform Nordic curls 3 times a week and you'll never get a hammy! Unfortunately it's not that simple in the elite sporting environment. As most of you know, many top European and South American soccer teams play 3 games a week throughout the majority of a season. Try fitting Nordics into that schedule without increasing injury risk!

The above example highlights one of the many challenges Sports Science and Sports Medicine practitioners (SSM) working 'at the coalface' of elite sport face almost daily. Evidence-based practice is the goal of all astute SSM yet achieving this goal within this environment requires careful filtering of the research as well as the ability to convince players and coaches to apply it when necessary!

Despite these limitations health and medical research plays an integral role in influencing peak sports performance practice. Areas such as nutrition, player

monitoring, strength training, and injury prevention in particular have all benefited enormously from some outstanding lab and field based studies.

Contemporary sports performance nutrition owes much to the many researchers in this field. This area lends itself to direct application of more clinical research and the results of these studies have therefore found their way into elite sports performance. Extensive research on caffeine, creatine, and protein, for example, has led to widespread use of these legal substances within elite sport.

An effective hydration strategy is a rather controversial area of research in contemporary sports medicine. Up until the early 2000's the majority of research suggested remaining less than 2% (body weight) dehydrated should be the goal of all athletes competing in sports of greater than 60mins duration. However Professor Tim Noakes and his colleagues from South Africa have more recently suggested, with several appropriately designed research studies, that not only is drinking to thirst an effective hydration strategy for the majority of endurance athletes but that the emphasis placed on carbohydrate/electrolyte based beverages may be misdirected. This ongoing debate further highlights some of the issues facing the high performance community wishing to translate evidence into practice. They are clearly opposing opinions so which 'camp' is producing the best evidence? For your team/sport?

One of the more contemporary trends in SSM research is the extensive monitoring of athletes that is currently occurring in most elite sport settings. There is currently a plethora of studies using Global Positioning Satellite (GPS) technology, heart rate, heart rate variability, neuromuscular fatigue analysis, blood profiling, and saliva analysis all to establish athlete 'readiness to play'. Following successful validation with the literature, these practices have all been implemented to varying degrees in high performance environments. Interestingly, the majority of the research in this area concludes that if you want to establish an athlete's readiness to train or play, simply ask them! Perhaps one aspect of this monitoring research that has been lacking is the long-term effect of operating in a high performance environment on a players' physical and mental well-being. The area of concussion has deservedly received significant media and academic attention recently as attempts are being made to establish the short, medium and long term effects of repeated head trauma. However there is currently a dearth of research assessing the effects of injuries, pressure, and repeated exposure to physical exhaustion on a players' long-term health.

It would be foolish to say that all applied SSM professionals rely on research to dictate their practices. There are some outstanding practitioners who have survived and thrived in elite sport through more 'art' than 'science'. However it would be equally irrational to dismiss well-designed and executed studies using appropriate populations simply because they aren't all performed 'in the field'. Time spent filtering through the research and applying relevant information to your practice is indeed time spent wisely.

Excitement breeds learning

Cress Byrne
Quantum Victoria

Have you ever spent time on the Cerebellum Couch in the science classroom? Come on, be honest … you so have! I know I have and I am a born and bred scientist and mathematician and there have literally been days, not hours my friends, but days spent on the said couch drooling with disengagement in science. Now considering that Science should be the class that students sprint to each day, that's a crime!

Why then did this occur? Unfortunately the crime occurred because several of my teachers lacked the skills to provide a fully engaging, curious and inspirational science classroom. Whether this was a question of pedagogy, a lack of knowledge in the curriculum area or were they wanting in the passion required to inspire the required intrinsic love and feel for science is neither here nor there but the lessons I have taken away as an science educator have been lasting.

Youngsters need to be engaged and inspired in the science classroom from a tender age. Although some children learn well through board work at a young age, this model is really not designed to inspire a true understanding of the often somewhat ethereal concepts involved in science. For this to occur, youngsters literally need to be immersed through doing. This can seem a challenging task and it does require an adoption of a culture of reverse engineering learning activities and experiences that allow the accomplishment of curriculum goals. A natural extension of this is the development of acceptable evidence that shows that students have attained the relevant goal and a culture of actively participating in science lends itself well to this.

This may seem a daunting task but I can share a few things that I have used that have seen otherwise apathetic students leap up from the 'couch' and engage with fervour. First and foremost is that you must let your students see and feel your passion for science. This can be accomplished through discussion or better yet through showing them. So put your hair up in a pony, tuck you tail into your shirt, pull on your gumboots and get dirty with the science.

- Fire some ping pong balls across the room into a bucket and talk about projectile motion
- Filter some pond water and talk about size differentials, river beds, marine environments and littering
- Plonk a potato in some food dye, and talk about osmosis and diffusion
- Add some hydrochloric acid to some sugar, watch the tower of carbon grow and talk about chemical reactions
- Design and 3D print a car, race it using punctured CO2 canisters as the energy source and talk about physics
- Program some Lego robots to complete some challenges relating to natural disasters and talk about any and everything related to nature's fury, mathematics, computer programming, mechanical engineering and …
- Make some alfalfa people and watch their hair grow and talk about biology, photosynthesis, cellular respiration and just how awesome science is.

So really what I'm saying is get the kids excited about science through;

Filtering – Firing – Designing – Plonking (highly technical Science term) – Designing – Racing – Alfalfa-ing – Programming – Engineering

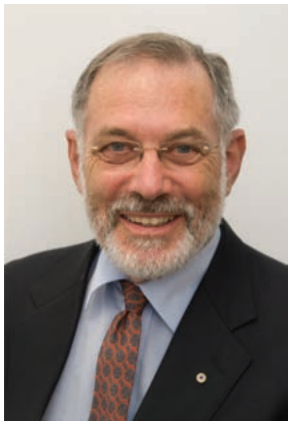
… any *'ing'* you can possibly imagine really.

Choose something you're interested in, dream up a method that can help you investigate its properties, actions or attributes. Give your method a shot and evaluate how effective your investigation was. Adjust your methodology for the next time … or, in other words, 'Give it a Go'!

The worst thing that will happen is it won't work. The students learn a heck of a lot more from trying and failing and then adjusting their methodology in order to succeed than from not trying at all! The students see your resilience as an adult and teacher and that is the very best role modelling they can get. It models problem solving and it models high expectations and the scientific method at its very best.

Excitement breeds engagement. Engagement breeds learning. Science, by its very nature, should be both. Make it so.

ASMR PEOPLE – Professor Ray Lowenthal



Professor Ray Lowenthal
Research Practitioner, Medicine and Paramedicine, UTAS

In this new column, we will profile ASMR supporters. Our inaugural 'ASMR person' is Professor Ray Lowenthal – recipient of the ASMR Distinguished Service Award (Tasmania branch) in 2014.

Professor Lowenthal's research interests are primarily in leukaemia, lymphoma, bone marrow transplantation and clinical trials of new cancer treatments, and he has been an author or co-author of over 130 peer-reviewed scientific papers. He was the first chairman of the Australian Leukaemia Study Group (1982-84), an organisation that has grown into a major international clinical trials organisation, now known as the Australasian Leukaemia/Lymphoma Group (ALLG).

He has been President of the Tasmanian Branch of the Australian Medical Association (1996-98), a member of the Medical Council of Tasmania (1996-2004) and the inaugural chairman of The Cancer Council of Tasmania (1996-2001). From 2001 to 2004 he served as President of The Cancer Council of Australia. In 2005 he was the recipient of the Medical Oncology Group of Australia's Cancer Achievement Award and for 2005-06 he was the Bob Pitney Travelling Fellow for the Haematology Society of Australia & New Zealand. The HSANZ made him a life member in 2008. In the Australian Queen's Birthday honours list for 2006 he was made an Officer of the Order of Australia (AO) "for service to medicine in the fields of oncology and palliative care and as a clinician, educator, researcher and contributor to professional organisations at state and national levels".

In this article, Professor Lowenthal tells us his Personal Philosophy as a Research Practitioner:

I have always thought that participation in research and making contributions to the research literature should be part of every medical practitioner's day-to-day practice. Indeed, I believe this is an obligation we owe both to those who have preceded us and those who will follow. To those earlier practitioners who have carried out and published prior research we say 'thank you' for allowing us as doctors and patients today to answer the questions 'how do we know what we know?' and 'how do we know what to do?' Then again the best thank you to past pioneers is that we should gift future patients further improvements. While medical treatments are immeasurably better now than, say, 50 years ago, there are clearly going to be many more improvements in the coming 50 years – the practice lifetime of today's graduates. We should imagine the future and help ensure that the future we want comes about.

In practical terms the standards I set myself over the years, to have and to continue to have research credibility, involved publishing 3-4 papers a year and, when attending a conference, never just to be a 'bum on a seat'.

To be successful though involves support from family and cooperation with colleagues from near and far. In medical research one should always be prepared and indeed keen to work with others, both nationally and internationally. One should attend meetings and participate in committees to help shape the future of one's speciality.

So get in there. Be determined. Make a commitment and see it through. Participation in medical research is immensely rewarding and satisfying. Yet virtually anyone with the right frame of mind can make it a success.

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Health psychology – what is it and what is its relevance to health care?

According to the definition used by the Australian Psychological Society's College of Health Psychologists since it was founded in 1996, "Health psychology is the **application of psychological science** and practice to the promotion and maintenance of health-related behaviour and healthy outcomes; the prevention and treatment of illness; the identification of causes and diagnostic correlates of health, illness and related dysfunction; the analysis and improvement of the health care system; and the dissemination of knowledge **to promote human health**". Thus notably, it differs from clinical psychology in having an additional focus on health promotion, illness prevention, and interventions aimed at the public and community groups rather than solely at individuals. A recent special issue of the *Australian Psychologist* (April 2014, vol. 49 no.2) reports many examples.

Health psychologists apply to health, everything that psychologists know about how behaviours (actions, thoughts, feelings) can be changed. The role of behavior change is clear in tackling the risk factors for the major sources of disease burden in our time: behaviours such as smoking, alcohol abuse, poor diet and lack of exercise, inadequate parenting, unsafe sex, and family violence. In this brief snapshot of psychology and health I'll give a few examples of the contributions of psychological knowledge to health care.

Psychologists – where do they come from? Before going on however, I am aware that psychology is a less well-understood profession than those of Medicine or Nursing, so can seem a bit mysterious to the public. Hence a quick update: Psychologists come under the jurisdiction of the Australian Health Practitioner Regulation Agency (AHPRA) and meet national standards for registration, continuing professional development, and the accreditation of their training programs. Most have completed a 5th and 6th year Master of Psychology program, usually in one of the nine areas of specialty endorsement including clinical, health, and occupational psychology. These higher degree programs include coursework, supervised fieldwork, and research, all strictly regulated by AHPRA, and entry to them is very competitive. The other main pathway to registration as a Psychologist is through a 2 year program of learning and supervised practice, also tightly regulated by AHPRA, after a 4-year undergraduate degree with Honours in Psychology. To learn more visit the Psychology Board website (www.psychologyboard.gov.au) or the Australian Psychological Society (www.psychology.org.au). Research training via the PhD is common for Honours Psychology graduates, and many researchers are not registered as psychologist practitioners.

Chronic condition management: Doctors are very familiar with the headaches and other pains, sleeping problems, concentration difficulties and appetite disturbances which can be chronic, very resistant to diagnosis and treatment, and like anxiety and depression, responsible for many days of lost productivity. Adding the more clearly diagnosable chronic illnesses such as diabetes, cardiovascular disease and respiratory conditions, **and** considering the role of human behavior as both risk factor (diet, exercise, smoking, alcohol etc) and as determining the success of treatment (e.g. adherence to recommendations), the case for behavior change to reduce the burden of illness is clear.

Apart from their unique interest in health promotion and illness prevention, health psychologists are well-placed to assist with the management and self-management of chronic conditions. There is now a large evidence base for the effectiveness of interventions which proceed from a patient-centred perspective: problem identification, goal setting, identification of barriers to change, preparation for relapses & temptations, feedback on progress then review of goals. Hence the importance of provider-patient communication. Motivational interviewing, often combined with awareness of "stages" in change motivations, requires a nondirective, partner-like relationship which helps people to get past the resistance to change which can be an upfront obstacle even when they "know" that they should become actively involved in looking after their health.

Teamwork: Psychologists' work in health care settings overlaps with lots of other health professionals such as psychiatrists, GPs, other medical specialists, nurses, dietitians, and epidemiologists. Therefore learning how to understand, and collaborate effectively with

Professor Helen Winefield, School of Psychology, University of Adelaide

these is a major responsibility. Inter-professional communication (IPE) can be taught and learned; unfortunately an HWA audit in 2013 found "marginal, minimally resourced, fragmented and unsustainable" IPE curricula for health professional students. The report recommended making IPE mandatory in post-registration CPD, and the development of a national approach to building knowledge, research and information-sharing on this emerging topic. Psychologists have been relatively late to recognise the need for IPE and get involved in its delivery, but in principle they have the skills to make a major contribution.

Research collaborations: The undergraduate curriculum in psychology once emphasised "rats and stats" but in fact there are virtually no animal labs in psychology departments and schools anymore – they've all moved over to psychiatry and neuroscience. Psychologists continue to be well-trained in research design and methodology, including the newer qualitative and mixed-method approaches to data collection and analysis. As well they maintain their expertise in reliable and valid measurement of human cognitive, motivational and affective states. The scientific literature in health psychology often reflects collaborative efforts between psychologists and other health professionals as well as between academics and practitioners.

Universities are a good place to start looking for research collaborators, and every Australian university teaches psychology, commonly including health psychology to at least some extent. The College of Health Psychologists provides a forum for both academics and practitioners, and the Australian Psychological Society's website offers a "Find a Psychologist" button. I hope this brief outline has been useful, and please contact me if you'd like more details about any of the above.

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