

PSSA News

May 2010– June 2010

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Editorial Greeting

Can you feel it?? Can you feel it?? We are more or less a month away from the Football World Cup. I am sure that everyone is getting themselves in gear for this event. Take note our academic work will not stand still. A few magazines and newspapers recently brought interesting articles to the front which actually originated from **Physiology**. For example I saw that the average distance covered by a football player is roughly 12 km. And the fitness regime that they put in to maintain a healthy sport body??? It is really great to know that most of the top teams have one or even two **Physiologists** in the squad. So if you are not a sport fan, watch the game for the advancement of **Physiology**. The editorial team hope that every South African Physiologist will enjoy the next few weeks till 11th of July. Keep it up PSSA. Oh before I forget.. We want to congratulate our President, Prof Kathy Myburgh on her birthday (2 May) , and our secretary, Dr Anna-Mart Engelbrecht on her promotion to Associate Professor. Many great Physiology Blessings from all of us.

Dr James Meiring

From the President's Corner

Dear fellow-members of the PSSA

Just an observation and a request:

The path of research went its own way.

In this newsletter there are 2 items which indicate that some of the most satisfying moments occur unexpectedly and long after the line of research was first initiated. Let's start at the beginning: When you are a young researcher you may sometimes wonder if it is 'all worth it'. When your research results are truly interesting and important, you know there should be excitement generated by the publication. But sometimes it is written off as 'just herbal mumbo-jumbo' or it is considered too far-fetched for the attention of anyone except the researchers who spent their time and energy to prove the point. Don't despair.

Moving ahead a decade or two: A new technical breakthrough can suddenly put all your work in the spotlight; or the time might just be right for the research world to understand why you did that original experiment in the first place!

And so, the path of research, although heading forward, leads back to your original contribution. And this can be as satisfying as your first gel that finally worked!

Perhaps that satisfaction would have been lost in the day-to-day academic juggling of tasks. I can recommend sabbatical and I'm sure Cephas can recommend semi-retirement.

Please will you take some time to submit academic or research snippets and insights. You never know who might find it interesting.

Best wishes,

Kathy

Prof KH Myburgh

Stellenbosch University

Scientists discover new method to transport insulin across the skin into the bloodstream

Scientists at the University of KwaZulu-Natal have discovered a new method to administer insulin into the bloodstream via a skin patch. The research, presented at the Society for Endocrinology BES meeting in Manchester UK, suggests that this technique could have potential future applications in the management of diabetes. The research team, led by Prof Cephas Musabayane at the University of KwaZulu-Natal, South Africa, have developed a patch made out of pectin hydrogel, which is placed on the skin to deliver insulin into the bloodstream. To examine whether this patch works, they tested it on diabetic male rats (n=40). The rats were divided into four groups and given patches containing different amounts of insulin (6, 15, 30 and 60 µg), followed by an oral glucose tolerance test. Their blood insulin levels were examined at 30 minutes, 1, 2, 3 and 4 hours after glucose administration. At each time point during the glucose tolerance test, blood glucose levels were significantly lower in the high insulin dose group compared to the groups that received lower insulin doses ($P<0.05$). After 4 hours, blood insulin levels were highest in the group that had the most concentrated patch (112.7 pmol/l for 60 µg group; 35.7 pmol/l for 30 µg group; 26.9 pmol/l for 15 µg group; 18.7 pmol/l for 6 µg group). These data indicate that insulin was transported from the skin patch into the blood in a dose-dependent manner, with patches containing more insulin leading to a higher insulin concentration in the blood. The research shows that this pectin hydrogel insulin patch has the potential to deliver insulin across the skin and into the blood stream. However, it is important to emphasise that trials of this patch for use on humans or to treat diabetes are still a long way off. More work is now needed to establish exactly how the insulin is transported through the skin and how this process can be optimised to provide longer term benefit in lowering blood glucose levels. Researcher Prof Cephas Musabayane said: *"Our findings are very exciting because they show a possible new mechanism for delivering insulin into the bloodstream. We found that our insulin patches were able to successfully deliver insulin across the skin and into the bloodstream in a dose-dependent fashion. However, we need to be realistic in our expectations and this study is just the first step in a long line of development. We now know that, using this patch, we can transport insulin across the skin and into the blood. The next step in our research is to find out more information about the mechanisms underpinning this phenomenon. This will help us to understand how we can control the dose of insulin that is delivered to the blood more precisely and examine how this technique can be improved to control blood glucose levels over a longer time period."*

There are currently over 2.6 million people in the UK with diabetes, and an estimated 171 million sufferers worldwide. Since insulin therapy was introduced, the most common method of administration has been injection. However, there are consistent reports of patients failing to take their injections, leading to a mismanagement of their disease and potentially dangerous medical complications. This has led to a search for alternative methods of insulin delivery, including oral delivery and delivery across the skin.

This research was presented as a poster at the Society for Endocrinology BES 2010 conference in Brittan (15-18 March 2010)



Foto: Dr Mark Tufts & Prof Cephas Musabayane

University of KwaZulu-Natal, Discipline of Human Physiology, Durban, South Africa.

Our President Prof Myburgh- Invited Speaker

Prof Kathy Myburgh - was recently the only foreign invited speaker at a prestigious Seminar Series in celebration of Prof Cooke's "Life in Motors". Prof Cooke is retiring from University of California San Francisco Department of Biochemistry, Macromolecular Structure Group. He devoted most of his scientific life to understanding all aspects of myosin structure and function: he played a large role in interpreting the functionally important aspects that came from the details of the first crystal structure of the myosin head. It took over 10 years to crystallise myosin and a lifetime to understand its detailed functions - the ATPase site, to the head action, the role of the light chains, the binding sites and changes in the shape of the head and neck through the cross-bridge cycle. He was the first to apply the principles of negative feedback of enzymatics to understand muscle fatigue. He was also the first to identify a 'super-relaxed' state - a hypothesis that he started to test for the first time when Prof Myburgh held a Cardiovascular Research Institute (CVRI) post-doctoral fellowship in his laboratory. It has taken 15 years to gain sufficient evidence to convince the 'muscle myosin world' to publish a follow-up paper by the most recent post-doc in PNAS (Jan 2010)¹. Perhaps a once obscure paper², will now be read more frequently!

1. Stewart MA, [Franks-Skiba K](#), Chen S, [Cooke R](#). Myosin ATP turnover rate is a mechanism involved in thermogenesis in resting skeletal muscle fibers. *Proc Natl Acad Sci U S A*. 2010; 107(1): 430-435.

2. [Myburgh KH](#), [Franks-Skiba K](#), [Cooke R](#). Nucleotide turnover rate measured in fully relaxed rabbit skeletal muscle myofibrils. *J Gen Physiol*. 1995; 106(5):957-73.

We are on the web:
http://
www.physiolsoc.org.za
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UWC - DEPARTMENT OF MEDICAL BIOSCIENCES

Research in Action

Prof Gerhard van der Horst has recently undertaken a two week trip to "sample" semen from 17 African elephant at Phinda (near Sodwana) and 15 white rhinoceros from Musina and Mzini (near Brits). He was accompanied by his MSc/PhD student Ilse Luther, who works at the National Zoological Gardens (NZG) in Pretoria. This research trip was part of a major collaboration that started in September 2009 and involves research/Zoo teams from IZW in Berlin, Zooparc de Beauval (France), Pittsburgh Zoo and the NZG.

This specific project is named "Frozen Dumbo II" and involved about 20 scientists from many disciplines, with the main purpose to cryopreserve the sperm and have this valuable genome and top class new genetic diversity available for Zoo's around the world. Elephants and rhinos were darted from helicopter and given a calming sedative that lasted for about an hour. After semen and blood collection, an antidote was given which caused the animals to recover and walk away within 30 seconds! The UWC angle was to establish the validity and applicability of Computer Aided Semen Analysis (CASA) to wildlife, by determining the quality of a semen sample and its use in sperm functional testing. Prof van der Horst reports that the research trip was a huge success and that the preliminary results indicates that CASA is indeed an accurate, objective and very rapid method compared to manual methods. Apart from this, it was possible to use about 15 different types of protocols in sperm assessment, including the isolation of sperm RNA from both rhinoceros and elephants.

This collaboration forms part of a larger project dealing with CASA of various other wildlife species, including bottlenose dolphin, lion, leopard and several antelope species. In future this research will contribute to the development of a model system for wildlife species semen evaluation.



**Professor Gerhard
van der Horst**

INVITED CO-GUEST EDITOR



Prof Ralf Henkel has been invited to act as Co-Guest Editor for a Special Edition of the Asian Journal of Andrology, together with Prof RJ Aitken of Australia. This edition, titled "Cell Biology and Genetics of Sperm", will be published in early 2011 and will contain contributions of a number of world-class spermatologists and cell biologists. Prof Henkel, who originally hails from Germany, is currently the Deputy Chair of the Department of Medical Biosciences at UWC. One of his research focus areas is investigating the physiological mechanisms whereby selected plant extracts improve male reproductive functions. In addition, Prof Henkel is conducting projects on alternative male contraceptive methods as well as the effects of genital tract infections on sperm functions, including sperm DNA damage and apoptosis. Prof Henkel is also a member of the Editorial Board of the scientific journals 'Andrologia' and the 'Asian Journal of Andrology'.

International Visitor

The Hypertension in Africa Research Team (HART) from the North-West University (Potchefstroom) was visited early February 2010 by Prof. John Reid from Glasgow, Scotland. He presented a Workshop as part of the planned setup of a Hypertension Research and Training Clinic on Campus. Prof. Reid has extensive experience regarding hypertension and blood pressure clinics and gave a valuable workshop full of advice to HART and all other interested persons from various health disciplines. Scientists from HART hope to establish the clinic during the course of the next two years.



Photo (from left to right): Dr. Matthew Glyn; Dr. Rudolph Schutte; Prof. Hugo Huisman; Prof. Mariette Lowes (Vice-Rector); Prof. Nico Malan; Prof. Leone Malan; Prof. John Reid (Visitor from Glasgow); Prof. Amanda Lourens (Vice-Rector); Prof. Johannes van Rooyen; Mrs. Carla Fourie; Prof. Alta Schutte; Mrs. Tina Scholtz.

Tygerberg Medical Physiology (Stellenbosch University)



Achievement

Prof Amanda Lochner was honored with the Gold Medal for Science from the SA Academy. This very prestigious national decoration was awarded to her on the basis of her life long contribution to science at national and international level.

Amanda Lochner

Promotions



Stefan du Plessis



Hans Strijdom



Erna Marais

Prof Stefan du Plessis (Head of the Division) and **Prof Hans Strijdom** were recently promoted to associate-professors in the Division while **Dr Erna Marais** was promoted to the position of Lecturer.



Shantal Windvogel



Derick van Vuuren

New appointments

Dr Chantal Windvogel joined the Division as a Lecturer, while **Mr Derick van Vuuren** was appointed as Junior Lecturer.

Medical Physiology (SU) Dress Red to Save Young Hearts

On the 14th of February 2010 students and staff from the Division of Medical Physiology at Tygerberg dressed in red and pledged some money towards the SA Heart and Stroke Foundation. The money was in aid of the award-winning children's program that provides free health education to crèche and primary school aged children in previously disadvantaged areas.



PhD Student, Bali Sishi: Study trip to Bergen Norway



Travelling to Norway was the highlight of this year for me. Having never left the borders of South Africa before, I had no expectations except for what I was told and what I had read about the country. Trip formed part of a research collaboration with Prof Anne K. Jonassen (heart physiologist) of the department of Biomedicine at the University of Bergen. Together with our DSG group, headed by Anna-Mart Engelbrecht, we research cell death mechanisms which include apoptosis, autophagy and necrosis in the heart as well as the signalling mechanisms that guide these processes. My purpose for going to Norway however was to learn how to perform heart perfusions and did I perfuse! I perfused so much that I had three words forming part of my vocabulary every second sentence - rats, rig, buffer. I'm not perfect at it yet, but I'm getting there. Not only did I work hard, I also played hard. I got to discover a new sport - skiing. It was so much fun. Besides the skiing, I also had the opportunity to explore Bergen itself. It's a beautiful city with a rich heritage and friendly, hospitable people. All in all the trip felt more like a holiday than work. It was a huge success, thoroughly enjoyable and worthwhile.

PARENTS' EVENING

The Department of Human Anatomy and Physiology hosted its 7th annual Parents' Evening on Thursday 4 March 2010. The spouses and parents of 2nd year Chiropractic, Homoeopathy, Podiatry and 1st year Emergency Medical Care students were invited to view the department's facilities and meet the staff including Prof Andre Swart (Dean: Faculty of Health Sciences), and Mrs Jenny Motto (Vice-Dean: Faculty of Health Sciences). The Parents' Evening was initiated as a means to expose students' families to what the study of Anatomy and Physiology entails and, specifically, the stress related to dissecting human cadavers. It was hoped that this endeavour would enable the families to better support the students, foster pride amongst the students regarding a subject that is traditionally considered to be very challenging and also bridge the divide between parent and university lecturer. The evening commenced with sundowners followed by a welcome by Mrs Elaine Swanepoel (HOD: Department of Human Anatomy and Physiology) and an opening address by Prof Andre Swart (Dean: Faculty of Health Sciences). The students then escorted their family members to the Anatomy Museum, the Anatomy Dissection Hall, the Physiology and Histology laboratories respectively. The students showcased the facilities and demonstrated their knowledge to their families while staff was available in each venue to field any questions and engage with the parents. The evening was concluded with a finger supper for the approximately 200 students, guests and staff. Once again, this endeavour proved to be a roaring success as indicated by the delight expressed by the guests at being able to catch a glimpse of what their children experience in the department of Human Anatomy and Physiology.



Other news from the Department of Human Anatomy and Physiology is that we have gone through a period of staff changes: Matome Mpholwane moved on to Medunsa after spending a year at UJ and Arisha Prahaladh (Segadavan) is leaving us to move to Port Elizabeth to be a full time mother for her two year old son. This means we currently have two vacancies in the department.

The cardiovascular Pathophysiology and Genomics Research Unit (CPGRU) at WITS



The Cardiovascular Pathophysiology and Genomics Research Unit (CPGRU) in the School of Physiology, Faculty of Health Sciences, University of the Witwatersrand, has six full-time academic staff members and the Unit publishes on average eight papers per year, mostly in high impact international cardiovascular journals. The CPGRU members supervise approximately 20 MSc or PhD students at any one time and graduate three higher degree students on average per year. In 2008 and 2009 four papers published by CPGRU members in prestigious cardiovascular journals generated editorial commentaries and the laboratory recently published an invited review in recognition of their contributions to the field of genetics of hypertension. The CPGRU is nevertheless proud of a number of recent achievements of the younger members of the laboratory as will be highlighted.

In 2008 and 2009, eight postgraduate degrees were awarded to students from the CPGRU. Importantly, in 2009 Dr Olebogeng Majane (see photograph) was awarded a prestigious Postgraduate Degree Award for the best PhD thesis in the Faculty of Health Sciences at WITS entitled: *Impact of excess adiposity on blood pressure and cardiovascular target organ damage*. For his PhD Olebogeng distinguished himself by publishing three papers in the leading hypertension journals, *Hypertension*, *J Hypertens* and *Am J Hypertens*, an accomplishment that is going to be hard to beat.



In 2009, the research Unit's students and younger staff contributed to 21 presentations at international and local conferences and won two conference awards. Muzi Maseko (see photograph of Muzi at Disney World after the American Heart Association Scientific Sessions), Dr Harold Majane, Dr Siyanda Makaula and other members of the laboratory presented work in Orlando (USA) Milan (Italy) and Kyoto (Japan).



Muzi Maseko



Dr Siyanda Makaula



Vernice Peterson



**Zinhle Gasa and
Jeff Sibiya**

The CPGRU scooped the awards at the 16th Congress of the Southern African Hypertension Society held in February 2010. Ms Michelle Redelinghuys won the YK Seedat Award for the best clinical presentation for her oral presentation entitled: *Heritability and familial aggregation of indices of large artery function in a community sample with a high prevalence of excess adiposity*. In addition, Ms Marietha Nel, won the Lionel Opie Award for the best basic science presentation entitled: *Effect of antihypertensive drugs on cellular arginine transport*.

A number of young members and students of the CPGRU have also been recognized through elections to positions and through receipt of grants and scholarships. In this regard, Dr Siyanda Makaula (see photograph) has recently been elected to serve on the executive committee of the South African Society for Cardiovascular Research (SASCAR), Olebogeng Majane and Muzi Maseko have recently received Carnegie large grants for their research, Jeff Sibiya (supervised by Olebogeng Majane) and Zinhle Gasa (supervised by Siyanda Makaula and Kennedy Erlwanger) received TATA Scholarships for their higher degrees (see photograph) after having competed with 1988 applicants and Ms Vernice Peterson (see photograph) received the South African Society for Cardiovascular Research (SASCAR) Travel Award to attend a flow cytometry workshop which was held at the University of Stellenbosch in March 2010. We are certain that all members of the PSSA will join with the members of the CPGRU in congratulating these young achievers. You have provided the evidence that cardiovascular research is alive and well in the heart of Gauteng.

More news from WITS:

- Dr Kennedy Erlwanger was promoted to Associate Professor in the School of Physiology.
- At the Faculty of Health Sciences prize giving ceremony earlier this year, Kennedy Erlwanger was awarded the Phillip V Tobias Medal and Convocation Distinguished Teacher's award for Basic Sciences.
- Mr Trevor Nyakudya and Mr Fabian Maunganidze have been appointed as Associate lecturers in the School of Physiology.

AND.....!

Don't forget our **annual PSSA Conference** later this year in East London, hosted by Walter Sisulu University from the 27-29th September 2010. For more information please consult the website <http://www.wsu.ac.za/physiology/>

INVITATION:

You are all invited to register for the Annual meeting of the Scandinavian Physiological Society from 12-14 August 2011 in BERGEN, NORWAY. For information and registration details: <http://tinyurl.com/sps2011>

COMPETITION:

The editorial board of the PSSA is looking for the best picture taken with a top class International football player during the FIFA 2010 World Cup here in South Africa. The best original photo win a **Box of Pinotage**. Rules: Only registered PSSA members may participate. Send your pictures to Dr James Meiring (meiringj@sun.ac.za) for the next issue of the PSSA newsletter. Good luck!

ON A LAST NOTE:

Please remember that the President and the Secretary positions will become vacant for the next term. In the mean time think about new candidates which can be nominated at the PSSA annual conference to fill these positions.

Editorial Reminder:

Please forward staff promotions, ground breaking research, exciting scientific news that made headlines in local papers, student achievements, awards, or exciting news relating to Physiology to Dr James Meiring (meiringj@sun.ac.za).