



PSSA Newsletter

Physiology Society
of Southern Africa

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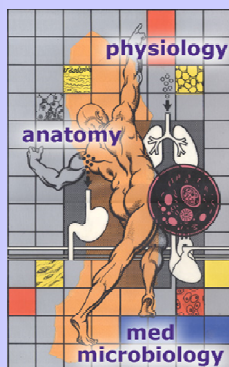
Editorial message

Thank you UWC

We wish to thank the organizing team from UWC for creating a framework for a fantastic annual conference of the Physiology Society. It was a great opportunity to showcase the research in the field of Physiology. We especially thank the supervisors who made a point sending their students to this conference, and in that way contributing to capacity building of the needed new generation of scientists in Physiology.

In this newsletter, we summarize some of the highlights of the conference, with the aim to encourage all students across South Africa, to prepare their research for the PSSA 2012. We also encourage all post-docs, senior researchers and academics to contribute for the conferences to come, so that we can continue raising the PSSA profile.

file. We should not underestimate the creative potential and diligence we have, which, even if equipment and capacities are limited, makes a significant impact.



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Thanking you: Front (from left to right): Prof Gerhard van der Horst, Dr Kareemah Gamielien, Prof Gert Martiz, Back (from left to right): Prof Burtram Fielding, Prof Edmund Pool, Prof Daneel Dietrich, Prof Maryna de Kock, Ms Linda Sissing, Absent: Dr Sahar Abdul-Rasool



A wonderful participation of the Physiology departments across the country.



Conference Report: Laureate Professor R. John Aitken FAA FRSE

It is a great pleasure to write a report on my recent visit to the University of the Western Cape to attend the 39th Conference of the Physiology Society of Southern Africa (PSSA) on Monday 29 – Wednesday 31 August 2011.

My overall impression of the proceedings is that they were world class and a great credit to the PSSA. The plenary speakers were excellent and had clearly been chosen with considerable care in order to represent as broad a range of scientific constituencies as possible. Too frequently we only attend meetings representing our own subspecialty whether it is reproductive biology, endocrinology, cancer or metabolism and diabetes. Because the PSSA represents the entire spectrum of physiological systems, it is possible to learn something new just by listening to how scientists in distant fields have addressed problems in their own specific area of physiology. For example, after listening to Professor Amanda Lochner's excellent talk I became interested in the idea that melatonin is a very effective, safe antioxidant that might be used to counteract oxidative stress in a variety of pathological situations. Since returning from the PSSA meeting I have assessed the ability of melatonin to protect oocytes from oxidative stress and found it to be extremely effective. Such an advance would not have been achieved if I had not attended the PSSA meeting and listened to a talk outside my immediate sphere of interest addressing the pathophysiology of pancreatic beta cells.

Apart from the Plenary Speakers, the other major highlight of the PSSA was having the privilege of serving as an adjudicator for the Wyndham prize. This gave me an opportunity to hear talks from the more junior members of the Society and judge the quality of the up-and-coming generation of scientists represented by the Society. From this experience I learned that the future of the PSSA is in excellent hands! I was particularly impressed not just by the content of the presentations, which was outstanding, but also by the quality of the presentations themselves. South Africa has a generation of young developing scientists who will not only make excellent researchers in the future but also gifted teachers. The winning presentation by Margot Flint was excellent and broke new ground in our understanding of the relationships between male genital tract infection, semen viscosity and fertility. In passing, it should also be pointed out that selecting a winner from this group of young PSSA scientists was extremely difficult because so many talks were of such a high standard.

I hope it is clear from the foregoing that attending the PSSA meeting in Cape Town was, for me personally, a great privilege. I was very impressed by the quality of the young scientists being trained in South African Universities and would happily take on any of these students as post-doctoral fellows in my own laboratory. I can offer no greater endorsement of the PSSA meeting, and the standing of the physiological sciences in South Africa in general, than to say that I hope my visit will encourage collaborations in the future that will further enhance our international ties in this area.

Laureate Professor R. John Aitken FAA FRSE
University of Newcastle



Congratulations to all students who presented their work at the PSSA congress. “Hear” for yourself, what the competition winners have to say:

Margot Flint, Stellenbosch University—winner of the Wyndham award

The project I took on for my Master’s in Reproductive Biology focused on infectious states in the male reproductive system and the effects elicited on the reproductive capacity of the men presenting with the condition leukocytospermia. With an increase in the number of patients suffering from the condition attending Tygerberg Hospital for fertility challenges, it has opened up an avenue of research that holds exciting prospects as I am planning collaboration with Professor John Aitken from the PSSA conference 2011. With the clinical infrastructure at Tygerberg Hospital and the protein chemistry facility at the University of Newcastle in Australia, I hope to further my research projects into studies examining leukocytospermia, oxidative stress and specifically the proteomic profile. In the next few years I will be undertaking my PhD with Professor Stefan du Plessis and aim to achieve research headway in conjunction with international collaborations into a field that is relatively novel in South Africa.



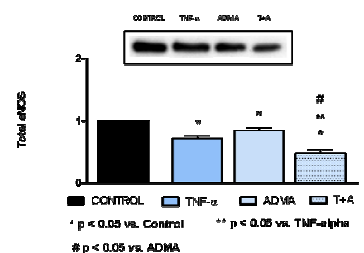
Margot Flint and Prof Kennedy Erlwanger, PSSA 2011

Amanda Genis, Stellenbosch University—winner of the Johnny van der Walt award

I am currently investigating endothelial activation and dysfunction (a reversible precursor of atherosclerosis) in the cardiac microvascular system. The main focus of this study is to see how a particular cell line (cardiac microvascular endothelial cells – CMECs) will respond to various insults, by simulating an environment where the endothelium would normally be exposed to harmful circulating stimuli in an *in vitro* setting. With this *in vitro* study, the cells were exposed to various such factors at different concentrations and incubation time periods. The cell viability, nitric oxide bio-availability and oxidative stress in these cells were assessed by means of various fluorescent probes with flow cytometry. Using tumor necrosis factor alpha (TNF- α) treatment at 5ng/ml and/or asymmetric dimethyl arginine (ADMA) (an endogenous NOS inhibitor) at 500 μ M for 24 hours as our main protocol, we have examined this scenario from various angles. This model is associated with an array of changes in the endothelium and these pro-atherogenic factors appear to induce adaptive (\downarrow PKB/Hsp90/eNOS; \uparrow iNOS; \downarrow nitro-oxidation) and anti-apoptotic changes in CMECs at 24h, some of which seem to be via mechanisms that exert additive effects. Noting these changes might be helpful in acting as an “early warning system”. We would like to further investigate our discoveries, by elucidating the mechanisms and the involvement of certain proteins.



Amanda Genis, PSSA 2011, with some of her data (below).



I started working at the Department of Medical Physiology (Tygerberg) in 2005, working on a project on Levosimendan cardioprotection with Prof. Joss du Toit. After completing my honours degree in Psychology at UNISA, I converted the above project to a masters degree at the US. The above mentioned study on activation and dysfunction in CMECs is my PhD project and hopefully will be completed by the end of next year. I would like to continue at the department and be an integral part of a well established cell culture research team, under supervision of Prof Hans Strijdom.



...and the runner ups are:

Balindiwe Sishi, Stellenbosch University

Balindiwe a.k.a. Bali is a fun loving person who enjoys studying, working with people and finding out new things. Never in my wildest dreams did I picture myself doing research for this long and actually still enjoying it. I've always seen myself in a white coat with the title "Dr" in front of my name and always thinking in terms of the medical field. Little did I know that that white coat represented my white lab coat and the title "Dr" meant completing my PhD studies. I would like to still be apart of the research world as I think I have the potential to truly make a difference in the current field.

My current research has focused on the topic of anthracycline-induced cardiotoxicity which poses a major risk to cancer survivors in developing heart failure later on in life. Although these drugs are very effective in killing cancer cells, they also attack normal cells such as cardiomyocytes. We have explored and manipulated a survival mechanism (autophagy) often used by cells in times of stress with the intention of decreasing cardiotoxicity in order potential delay or inhibit heart failure. We have assessed various signaling pathways specifically those involved in cell death as well as proteolysis. In addition, we have also investigated how mitochondria, the power house of energy production, are affected in the presence of these drugs. As difficult as it was sometimes, we have made a lot of progress with data collection and our results appear to be promising.

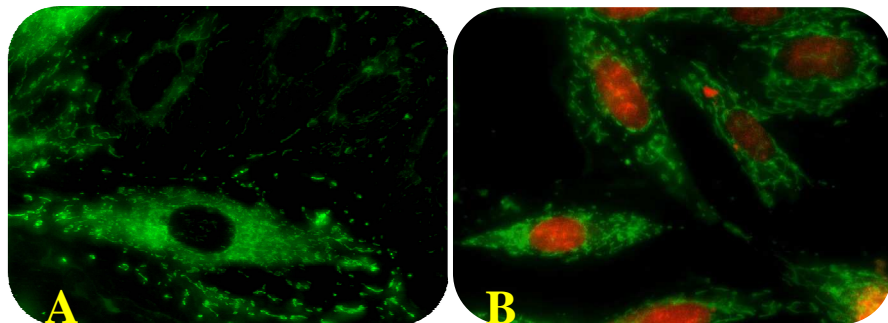


Figure: A: Normal healthy (elongated, tubular) mitochondria (green). B: Unhealthy (shorter, fragmented) mitochondria in the presence of the anthracycline doxorubicin (red).



Corli Westcott, Stellenbosch University

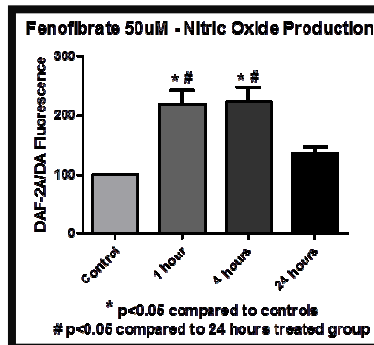
Born in the Free State I started my study career in Potchefstroom (North-West University) where I enrolled for the degree B.Sc Physiology and Human Movement Sciences. I finished my B.Sc Honours as well as M.Sc in Occupational Hygiene. I joined Stellenbosch University and started my PhD in January 2011 in the division Medical Physiology (Tygerberg campus) under the supervision of Prof. Hans Strijdom. The role of the endothelium in the development of atherosclerosis really interested me, especially the fact that hypercholesterolaemic drugs (aimed at improving cholesterol levels) can also have



Corli Westcott, Stellenbosch University cont.

beneficial effects on the endothelium. A group of drugs referred to as the statins provided a breakthrough in the treatment of hypercholesterolaemia and showed to be very effective in lowering low density lipoprotein cholesterol (LDL-C) but failed to raise high density lipoprotein cholesterol (HDL-C). Patients experiencing both of these conditions therefore require combination therapy which can address both of these problems. The use of statins (aimed at decreasing LDL-C) together with fenofibrate (aimed at increasing HDL-C) is now used clinically and showed to be very effective. But what does this combination do to the endothelium, more specifically the cardiac microvascular endothelial cells (CMECs)? That is the question that I am addressing in my PhD. Thus far we investigated the effect of administering only fenofibrate on normal CMECs and it showed to have a major effect on intracellular nitric oxide (potent vasodilator) production, increasing it up to two-fold compared to controls. We have not yet established the source of these large amounts of nitric oxide, and that is the next step in our investigations. We also plan on using a model of endothelial activation and dysfunction and perform pre- and post-treatments with these drugs individually and also in combination in order to establish potential protective effects on the endothelium.

Where do I see myself in five years? I plan on having finished my PhD degree and hopefully broadening my current study, investigating the endothelium and hypercholesterolaemic drugs in the presence of different types of cholesterol. HDL-C is now recognised as an independent predictor of cardiovascular disease and research is shifting to therapies aiming to increase these levels of cholesterol. I hope to contribute to this field of knowledge!



At the recent Academic Year-day 2011 of the Faculty of Health Sciences, Corli Westcott was also the Runner up in the category “best presentation in Basic Sciences”.

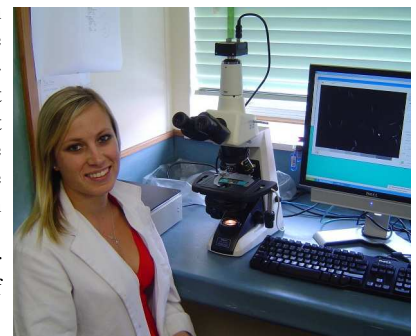


More news from the Stellenbosch Tygerberg Campus

Retha Erwee delivered the “best presentation by a Basic Scientist under the age of 35”.

This past year we have been working on a project to determine whether or not the different concentration levels of the reproductive hormones, during the menstrual cycle, cause differences in sperm function. The idea for this novel study was generated from the knowledge that sperm has both oestrogen and progesterone receptors on their cell surface and that the female reproductive hormones play a significant role in spermatogenesis. Our results showed that the hormones interplay and affect each other and therefore the individual hormones cannot be used to extrapolate on the effect the female milieu interior in sperm function. We also found that sperm motility is increased at ovulation, suggesting that the hormone concentrations at this phase are suitable to act as chemo-attractants to attract the sperm cells to the site of fertilization faster. Our results also indicated that the hormones protect the sperm cells from undergoing spontaneous acrosome reaction at ovulation. We therefore conclude that the combined hormones effect sperm function in such a manner as to synchronize and optimize male gamete function to coincide with the female’s fertility window in order to increase fertilization success.

I presented my project *Does the female milieu intérieur influence sperm function* at the academic year day of Stellenbosch University and was awarded the prize for the best new researcher in the area of Maternal and Women’s Health.



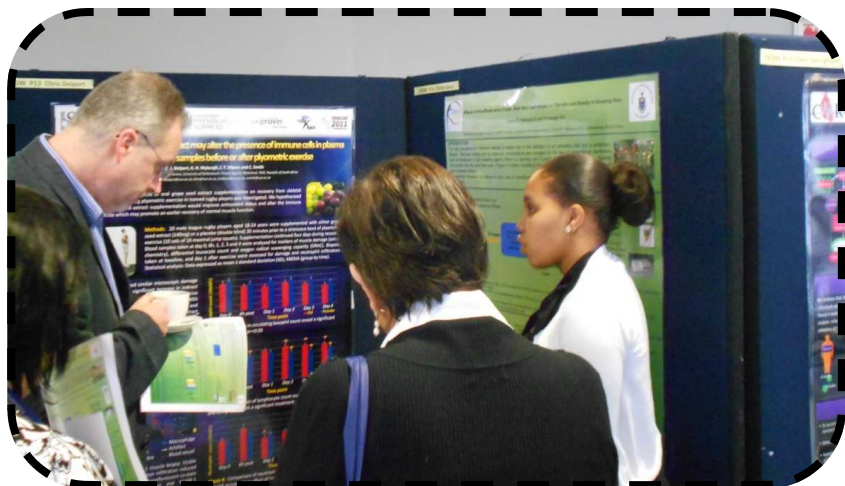


...and more runner ups: *Johnny van der Walt poster competition*

Ms Zinhle Pearl Gasa

In 2004, I matriculated from Glenhaven Secondary in Durban. I hold a BSc Degree from Walter Sisulu University. There I realized my passion and love for science. I have been inspired by some of the female leaders in the field of Medicine, who like myself, have been raised by single parents. While my mother was away to make sure she brings food to the table, my grandmother and uncles took good care of me. It is for these reasons that I strive for excellence to give back to my community.

I am currently enrolled in my second year of a Master of Science in Medicine degree in the School of Physiology, at the Faculty of Health Sciences, University of the Witwatersrand. I am investigating the effects of the *Aloe Vera* crude leaf extract on diet-induced obesity in growing rats. My aim is to answer some of the questions related to the mechanisms by which *Aloe vera* may act to attenuate diet-induced metabolic dysfunction. As an aspiring scientist, I have previously studied the effects of combination anti-diabetic treatment on gastrointestinal and accessory organs, work which I submitted late in 2009 as part of my honours' degree. I believe that education is an investment in oneself.



Miss Zinhle Gasa (right) presenting her poster to the Judges of the Johnny van der Walt poster competition.



Impressions and networking....Fabian Maunganidze and Lebogang Metsing.



... the Gala evening. A great opportunity for socializing AND paving out the next nature paper...



The international plenary speakers Prof Aitken and Prof St John together with Stellenbosch University delegate Prof Du Plessis.



Delegates from Wits University engaged in pre-prandial discussions.



Delegates from Walter Sisulu University at the congress dinner.



PSSA AWARD FOR EXCELLENCE IN PHYSIOLOGY RESEARCH

Ben: Question: What do you think are the most important milestones counting for this award?

Kathy: Since the award looks at things you've done over many years, it must have been a factor that there was no Human Biology research taking place in the Stellenbosch Physiology Dept and I really did a lot to get us from nowhere to where we are now. Imagine having none of the research facilities that we have now and having no international outputs. Now we dominate PSSA! When I first started there is no way we could have recruited the good researchers and postgrads we have now or the good international postdocs who are contributing to so much.

Question: What are your most important personal achievements?

Kathy: Obviously gaining my NRF B-rating is something I am very proud of. It means that my international profile is significant and my publications are of high quality and appreciated as excellent work by colleagues in my field.

Question: What gives you your international profile?

Kathy: I am one of the senior scientists in the American College of Sports Medicine. I am a Fellow of the College and on the Editorial Board. I was an Associate Editor for a cycle of 4 years. At the conferences I have made major contributions. I set up and chaired a Symposium that was called a Featured Symposium. This was around 2004 already. Since then I've also been invited by colleagues as a speaker in two other Symposia and was awarded the chance to give an individual Tutorial lecture. To maintain that kind of profile for along time, you have to keep up with the advancement of science. I also edited a whole issue of the journal, Comparative Biochemistry and Physiology. Recently I became a Section Editor for BMC Physiology. These things are not just marketing yourself, you have to be good and also not too narrow in order to make these kinds of big contributions.

Question: How important is the science for the award?

Kathy: Actually, this is the most exciting part of the whole process, how research evolves and how you find your special niche in the bigger scheme of things. Everything else either leads towards this, or is a result of the research efforts. I have made it my focus to bridge the gap between human subject research and single fibre, cellular and molecular research. There are not so many people in my field who can do that. I must say it is quite challenging. When you work with human subjects doing exercise and especially athletes who strain their bodies, you have to take into account that all the systems in the body are going to be affected. The link between muscle and endocrinology has been a focus since 1999. We started with the physical and psychological consequences of training and stress and how supplements could influence the processes. That was when Carine was my PhD student. This led naturally to the work on muscle damage which is my focus now. Carola played an important role as collaborator when I first started to have students studying satellite cells. She was interested in stem cells in the heart, and I was interested in satellite cells in skeletal muscle, so we could combine our expertise very easily. It is very important for me to study the processes in models from cell to rodent to human. There is no other way to answer the questions that we have. Also, there are very few people who are focusing in vivo on the links between the immune system and muscle regeneration. Most of the research is aimed at muscular dystrophy and not exercise models. While muscular dystrophy is not such a big problem in South Africa, infectious diseases cause a lot of muscle wasting and muscle damage, so the research we do in that area is not so much for international acclaim, but to help one of the big problems in South Africa. Really, skeletal muscle has always been fascinating to me.

Question: How important is it to you to facilitate opportunities for upcoming researchers and their field?

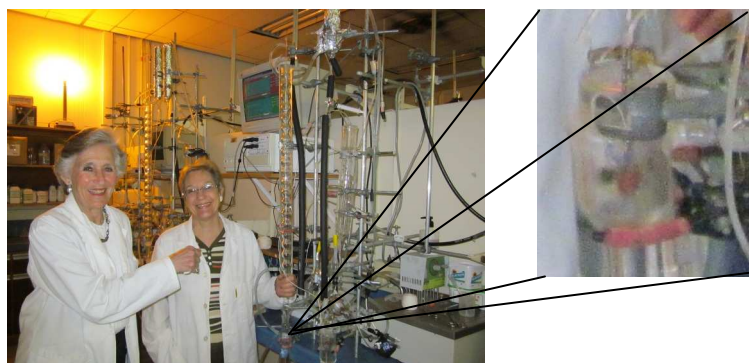
Kathy: I think it has been important that I gave more opportunities for the younger lecturers to highlight the modern science they are doing. At the Durban PSSA, I organized a series of Keynote Lectures on technological advances that various PSSA members were actually using. Also, a big change has been that there is a better balance between cardiovascular metabolism research and a lot of other fields that now have strong research coming out. So, more people can feel their research belongs at PSSA.

Question: Is there anything else you would like to say?

Kathy: I can't thank my own students and postdocs enough. They really keep me motivated to push on and have contributed so much to how we have evolved as a Group. They have learned that if you want to work at the boundaries of new knowledge, then you have to jump in at the deep end yourself. It is insecure but it pays off. If it comes to the students at the PSSA, I think they are nervous about the questions I might ask them during the Wyndham!

Plenary speaker Prof Lochner:

I am currently emeritus professor in the Department of Biomedical Sciences (Section: Medical Physiology), working in the same laboratory where I have spent most of career. My research thus far has focussed mainly on ischaemic heart disease and my aim was to gain more insight into the molecular and cellular events during myocardial ischaemia and reperfusion and to develop strategies to prevent or attenuate these harmful changes. In this regard, my co-workers and I have examined the role of kinases and phosphatases in ischaemia/reperfusion injury. Currently my group is also focussing on the heart in obesity and the development of type 2 diabetes and the effects of the pineal gland hormone, melatonin, on these conditions. An exciting new project is re-investigating the old controversy of the harmful and beneficial effects of catecholamines on the heart in ischaemia.



Prof A Lochner with her colleague S Genade at the perfusion apparatus, where a rodent heart is being perfused (left) and at the PSSA 2011 dinner receiving a bouquet of flowers as a token of appreciation for her plenary lecture (right).

International honour for Stellenbosch University professor

Prof Stefan du Plessis, Head of the Division of Medical Physiology, has received the “*Dr Sijo Parekattil Award for Excellence in Reproductive Research*” from the Center for Reproductive Medicine (CRM). It was awarded to him at their annual awards ceremony held in Cleveland, USA. The award honours internationally well-established researchers who have proven their research excellence over a period of time and who have made a contribution to the research endeavours of the CRM.

The CRM is a research programme of the **Glickman Urological & Kidney Institute** at the world famous Cleveland Clinic, located in Cleveland, Ohio. It is a not-for-profit multi-specialty academic medical centre, with more than 40 000 employees, that integrates clinical and hospital care with research and education. US News & World Report consistently names Cleveland Clinic as one of the nation’s best three hospitals in its annual “*America’s Best Hospitals*” survey, with their Urology programme currently being ranked as number two in the USA.

Contact details

PSSA :

President: Prof Kennedy Erlwanger:
Kennedy.Erlwanger@wits.ac.za

Secretary/Treasurer: Prof Hans
Strijdom: jgstr@sun.ac.za

Newsletter: Dr Ben Loos
bloos@sun.ac.za



We are still on the web !
www.physiolsoc.org.za/



International honour for Stellenbosch University professor cont.

During the past four years Prof Du Plessis has collaborated extensively with members of staff from the CRM on several research projects. This has already led to the publication of more than 20 peer-reviewed manuscripts and book-chapters. He is also regularly invited to participate as a member of the international faculty in their Summer Internship Programme. Prof Du Plessis and his postgraduate students study the basic mechanisms of sperm function and the effects of factors such as reactive oxygen species, obesity, cellphone radiation and infections. This is done to better understand how spermatozoa function, and how male infertility can possibly be treated.



Dr Rakesh Sharma (Coordinator of the Andrology Laboratory, CRM), Prof Ashok Agarwal (Director of the Center for Reproductive Medicine), Prof Stefan du Plessis (Medical Physiology, SU) and Dr Sajal Gupta (Assistant Coordinator of Research, CRM).

We would like to hear from you

If you would like to contribute to the newsletter, be it with news from your department, news regarding your research, issues centred around physiology and teaching, or anything you feel should be shared with the PSSA community, please contact the editorial team (bloos@sun.ac.za).