



# isem

Institute of Sport and Exercise Medicine

 UNIVERSITEIT STELLENBOSCH UNIVERSITY

110°

torsion stress

drag

$$F_D = C_d \frac{\rho V^2}{2} A$$

$$a = \frac{(v-v_0)}{t}$$

acceleration

# Institute of Sport and Exercise Medicine

 **S100**  
1918 · 2018





# Born to flex and extend

The Institute of Sport and Exercise Medicine (ISEM) leapt out of the starting blocks in 2015. Led by a highly skilled multidisciplinary team based in the Faculty of Health and Medical Sciences, ISEM quickly established an international reputation for research excellence and practitioner training while offering world-class preventative care and rehabilitation services to South African and international athletes.

Nestled among fynbos-covered mountains just an hour from Cape Town, Stellenbosch University is deservedly proud of its many contributions to developing athletic talent in South Africa. To this, ISEM adds a high-level research and teaching component, propelling the discipline of sports and exercise medicine onto a new platform from which it can expand both within and beyond the campus.

ISEM's mandate at the University is to co-ordinate and set direction for research, teaching and service provision in sport and exercise medicine. As it does so, three factors have come to distinguish ISEM from similar institutes.

First, exercise and sport are not optional extras at the University, but integral to the learning and life skills available to all students and staff. For ISEM, this means that adopting a multidisciplinary approach to the medicine, science, technology, art and psychology of sport and exercise is effortless and innate. For clients, it means that specialists, treatment and training facilities are all accessible in one place.

Second, ISEM acknowledges that, to have a significant social impact, research institutions have to actively serve the wider community. Accordingly, ISEM has worked with other Stellenbosch University departments and units to establish South Africa's first publicly funded multidisciplinary Sports Injury Clinic. The Clinic serves recreational and competitive athletes who could not otherwise afford treatment. ISEM also has several innovative research programmes using physical activity to prevent and treat the rapid rise of chronic lifestyle-related diseases in low-resource environments.

Third, ISEM is a world leader in Paralympic sports medicine. The range and depth of ISEM's theoretical knowledge and practical experience of the role of physical activity in the rehabilitation and training of people with impairment is not easily replicable in other academic institutions or private clinics.



© DARIEN SCHUMANN

***ISEM's potential impact is considerable as it has the scope to support all people participating in any exercise-related activity. ISEM's research not only helps top athletes to perform at their best but also lends insight to the medical challenges facing the non-sporting population and aims to enhance their quality of life. ISEM is playing a crucial role in helping the Medical Faculty to realise its vision of advancing health and equality in South Africa and beyond.***

– Prof Jimmy Volmink,  
Dean of the Faculty of  
Medicine and Health Sciences,  
Stellenbosch University



*To support top athletes performing at levels where every micro-movement counts, and in a field where technology is progressing rapidly, ISEM partners with the Central Analytic Facilities and their Neuromechanics Laboratory. The Laboratory includes an instrumented treadmill (floor-embedded, incline-adjustable), a force-plate system (three floor-embedded plates), two motion-capture systems (10 cameras each), high-end electromyographic and electroencephalographic systems, and a cardiopulmonary exercise testing cart, as well as pressure platforms and pressure mats.*



# Drawing on tradition, imagining the future

At Stellenbosch University, sport is integral to the life of more students and staff than on any other campus in South Africa. The institution has done much to enable South Africans to achieve a higher standing in many international sporting codes than might be expected of a small nation located so far from the world's northern hubs.

This is no coincidence. The entity responsible for sport on campus – Maties Sport – has three main aims: to develop world-class sportspeople, to ensure that emerging sports stars achieve academic success, and to encourage more students and staff to take part in recreational sport and exercise.

By working closely with Maties Sport, ISEM's focus is on enhancing performance by improving athletes' health, adding a high-level research component and drawing in other expertise to establish sophisticated monitoring systems and specialised units.

For example, the Advanced Concussion Programme, run jointly by ISEM and Campus Health, sees between 300 and 350 concussion cases per year and is using the research data that this provides to better understand and manage this condition. Similarly, ISEM is working with the University's Department of Sport Science to develop an app that detects concussion by tracking abnormal eye movement, and with the Physiotherapy Department, to develop balance retraining for people who suffer concussion.



*We are confident that ISEM's clinical services, the dissemination of evidence-based research and its educational endeavours will help reduce injury and illness at various levels of the game. We are excited that ISEM is working with us to expand our academic footprint and we look forward to being a teaching and learning partner in ISEM's FIFA Centre of Excellence.*

– Ilhaam Groenewald, Chief Director, Maties Sport

## Contributing to a multidisciplinary field

The notion of 'exercise as medicine' is gaining traction worldwide as doctors become proficient in prescribing exercise as treatment and referring patients to exercise professionals for training. ISEM offers students a collaborative and multidisciplinary environment in which a range of health and other professionals bring their insights and skills to bear in order to maximise their impact.

ISEM's research focus areas include:

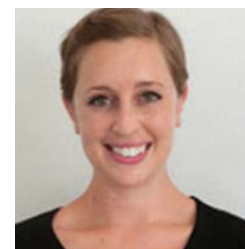
- The prevention, diagnosis, treatment and rehabilitation of para-sport athletes
- The prevention and rehabilitation of chronic non-communicable disease using exercise and other lifestyle interventions as therapeutic tools
- The prevention, diagnosis, treatment and rehabilitation of sports injuries
- The prevention, diagnosis and treatment of medical conditions related to participation in sport
- Performance optimisation including load monitoring and the prevention of overtraining.

For more information see [www.i seamsun.com](http://www.i seamsun.com)



*The key to optimal performance and well-being is the balance between training load and recovery; ISEM is helping athletes to achieve this.*

– Rob Lamberts, Head of Research and Academic Planning at ISEM



*It is a privilege to work at ISEM, a world leader in impairment and para-athlete health research. The projects we run are empirically and socially impactful. I find the change we bring to people's lives very meaningful.*

– Phoebe Runciman, post-doctoral research fellow at ISEM



# A living laboratory: where research informs practice and practice informs research

Improving health and well-being at every level is central to ISEM's vision, and community engagement is essential to achieving this.



*ISEM's Sports Injury Clinic is a unique and profound initiative, targeting the sporting community who are often neglected by public health services. The Clinic's holistic and multidisciplinary approach ensures comprehensive assessment and clear evidence-based management plans that aim to get sporting individuals back to what they enjoy most – sport!*

*– Cobus Breytenbach, Head Physiotherapist, Sports Injury Clinic*

## **Injury and illness prevention in community sport**

For talented athletes with minimal means, chronic injuries can be decisive in determining whether they continue or abandon their sporting career. To begin to address this, ISEM, in collaboration with the University's Orthopaedics Department and staff from Campus Health and Maties Sport, helped establish the Tygerberg Sports Injury Clinic.

Tygerberg Hospital is one of southern Africa's largest public health facilities, and caters mainly for people who cannot afford private medical care. Most South Africans earn very little, so the Hospital's workload is heavy and its limited resources are mainly directed towards patients with acute problems.

The Sports Injury Clinic is disrupting this trend and the results have been inspiring. All patients see a sports physician and a physiotherapist; an orthopaedic specialist is also available if required. This means each patient receives immediate care, and the need for further intervention and even surgery is often avoided.

The Clinic is also already reducing strain on the Orthopaedics Division, while also offering an effective teaching platform for students of sports medicine and orthopaedic registrars.

## Chronic disease, exercise and lifestyle

ISEM has several community-focused projects to promote healthier lifestyles and mitigate chronic illnesses in low-resource settings.

For example, ISEM's innovative Charge Project encourages patients to use redundant spinning bikes as interactive phone chargers in clinic waiting rooms. The project promotes the fun side of physical activity by challenging community members to check their fitness level and health awareness by offering them a health literacy quiz while they recharge their phones.

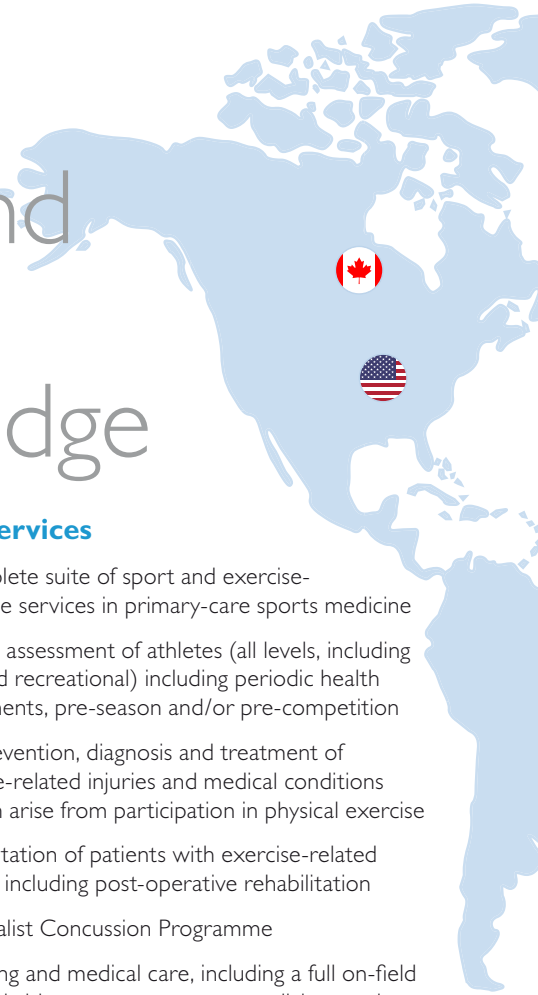
In addition, to explore the feasibility and effectiveness of exercise-based rehabilitation programmes for patients with one or more non-communicable diseases in low-resource settings, ISEM is running several ground-breaking research programmes that are uniquely minimalist and patient-centred in their focus. This includes contributing to research on cerebral palsy being done by the University of Cape Town's Neurosurgery Division.



*As yet, no comprehensive evidence-based guidelines exist for the rehabilitation of patients suffering from non-communicable diseases in low-resource settings. But we can't just copy what we know is effective in highly resourced communities and think this will work, or can even be studied, in the same way in more resource-constrained settings.*

*– Martin Heine, post-doctoral research fellow at ISEM*

# Collaborating locally and worldwide to develop and share new knowledge



keeping US healthy 

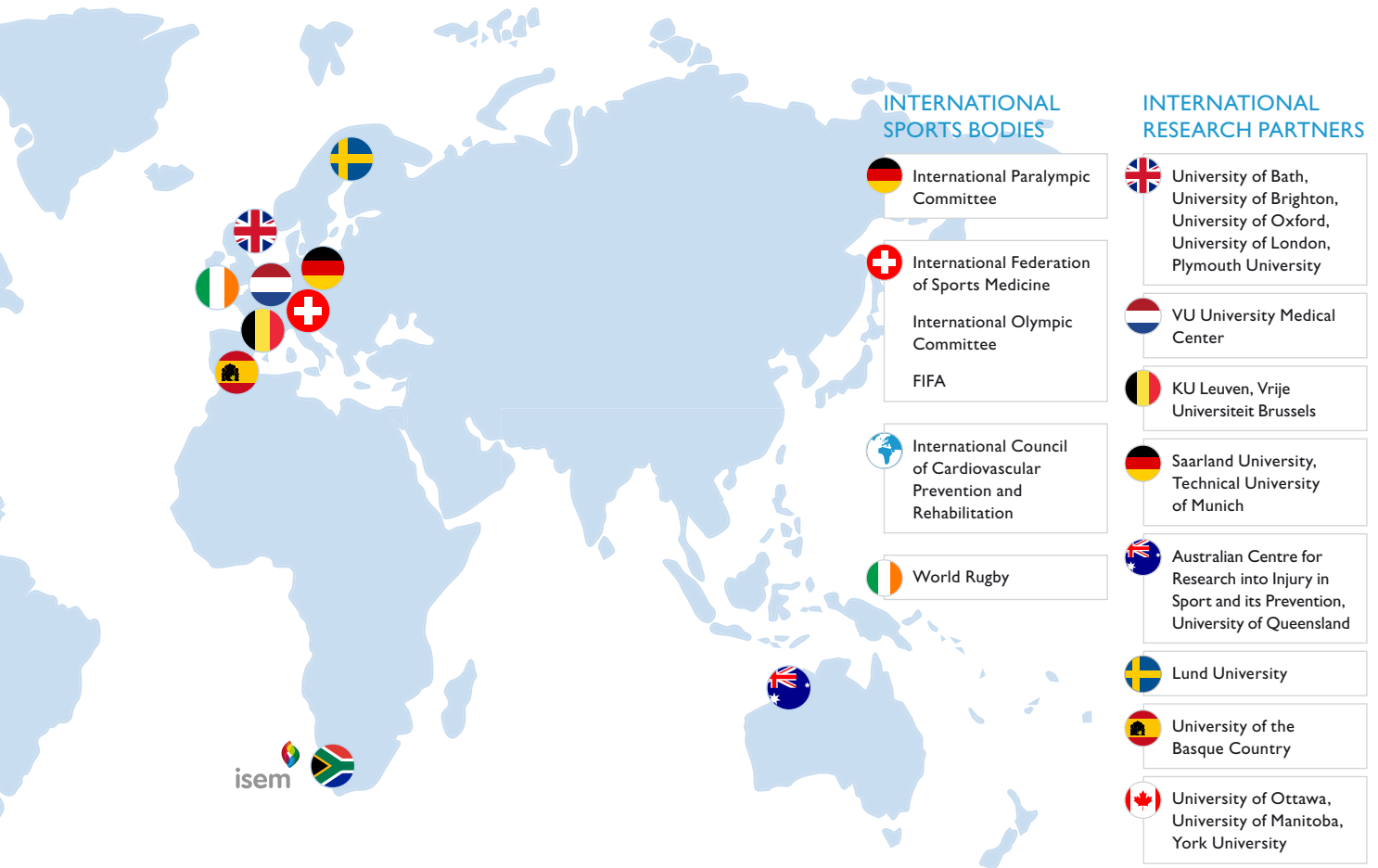
## Fast facts about ISEM

- Modules offered by ISEM form part of Stellenbosch University's undergraduate medical curriculum
- Postgraduate degrees offered: an MSc in Sport and Exercise Medicine by coursework and research; an MSc in Exercise Medicine by research; and a PhD in Exercise Medicine
- Accredited short courses for general practitioners and other health professionals: the science of sport and exercise medicine; the medical aspects of sport and exercise medicine; and exercise-related injuries and illness
- Peer-reviewed publications (2016–2018): over 48
- Non-communicable diseases impacted on by ISEM's work: cardiovascular disease, chronic respiratory disease, obesity, osteopenia/osteoporosis, sarcopenia and frailty, neurodegenerative disease, diabetes, hypertension, metabolic syndrome, degenerative disc disease, cognitive impairment, rheumatoid arthritis, cancer, dyslipidemia, arthritis, depression and cerebrovascular disease.

## ISEM services

- A complete suite of sport and exercise-medicine services in primary-care sports medicine
- Medical assessment of athletes (all levels, including elite and recreational) including periodic health assessments, pre-season and/or pre-competition
- The prevention, diagnosis and treatment of exercise-related injuries and medical conditions that can arise from participation in physical exercise
- Rehabilitation of patients with exercise-related injuries, including post-operative rehabilitation
- A specialist Concussion Programme
- Screening and medical care, including a full on-field and field-side emergency sports medicine service
- Medical care for athletes participating in local, regional, national and international sports events and preparation camps. These services are provided in partnership with the organising committees of these events.
- An integrated medical, scientific and psychological approach to optimising the performance of top athletes, including pre-participation screening and periodic physical assessments of progress being made
- Physiotherapy, including strengthening, conditioning and rehabilitation.






## ISEM facilities

- On-site radiology equipment, including MRI, high-resolution ultrasound, CT and X-ray, and interventional radiological services
- Orthopaedic services, provided and conducted through a network of orthopaedic surgeons
- Sport technology that comprehensively monitors and manages fatigue in high-performance athletes (including GPS and digital performance analysis)
- A Biomechanics Laboratory and stipulated clinical facilities throughout the campus
- Athlete accommodation in Stellenbosch and nearby, complete with nutritional, psychological and vision-training services.




## INTERNATIONAL SPORTS BODIES

 International Paralympic Committee

 International Federation of Sports Medicine

International Olympic Committee

FIFA

 International Council of Cardiovascular Prevention and Rehabilitation

 World Rugby


## INTERNATIONAL RESEARCH PARTNERS

 University of Bath, University of Brighton, University of Oxford, University of London, Plymouth University

 VU University Medical Center


 KU Leuven, Vrije Universiteit Brussels

 Saarland University, Technical University of Munich

 Australian Centre for Research into Injury in Sport and its Prevention, University of Queensland


 Lund University

 University of the Basque Country

 University of Ottawa, University of Manitoba, York University


 Harvard Medical School, University of Minnesota, Yale University

## SOUTH AFRICAN RESEARCH PARTNERS

 In the Faculty of Medicine and Health Sciences at Stellenbosch University, ISEM is part of the Division of Orthopaedic Surgery, and works closely with the Departments of Physiotherapy, Radiology, Psychiatry, Emergency Medicine, Anaesthetics and Internal Medicine.

Across faculties, ISEM has ongoing projects with the Faculties of Education, Science, Arts and Engineering.

In South Africa, ISEM collaborates with the University of Pretoria's Sport, Exercise Medicine and Lifestyle Institute, the University of Cape Town's Exercise Science and Sports Medicine Unit and its Division of Neurosurgery, Cape Peninsula University of Technology's Faculty of Health and Wellness Sciences and the University of the Western Cape.



*ISEM has provided phenomenal assistance and support to the BMT Academy, pushing us to ensure that our riders are regularly screened for any health issues and preventing injuries by ensuring that we learn how to balance effort and recovery.*

*– Christopher Norton, co-ordinator, BMT Academy*

# Nurturing emerging talent

Most South Africans live and breathe sport. Stellenbosch University's contribution to developing the talents of some of South Africa's most iconic and influential sporting champions is well known. Building on this, ISEM is working with organisations in the local community, as well as nationally and internationally, to better understand the illnesses and injuries that arise for athletes and to find ways of preventing these.

## The BMT Academy: cycling into self-confidence

ISEM provides annual health screening, as well as ongoing injury-prevention advice and performance monitoring for emerging cycling talent. Established by a local social entrepreneur in 2015, with the aim of sharing the joy of cycling with riders from less privileged backgrounds, the BMT Academy has tapped into a wellspring of hitherto hidden talent. With backing from ISEM and several sponsors, Academy riders have qualified for and achieved outstanding results in local mountain-bike races, including the internationally accredited Cape Epic.

## Endurocad: developing skills for the long run

The South African Endurance Academy (Endurocad) is a not-for-profit organisation founded in 2013 by Olympian long-distance runner Elana Meyer and business strategist, Janet Welham. The first of its kind in Africa, Endurocad has been set up to identify and train talented young middle-distance, marathon and cross-country runners, helping them achieve their full potential, not only as athletes but also academically and career-wise. Nolene Conrad is an inspiring example.

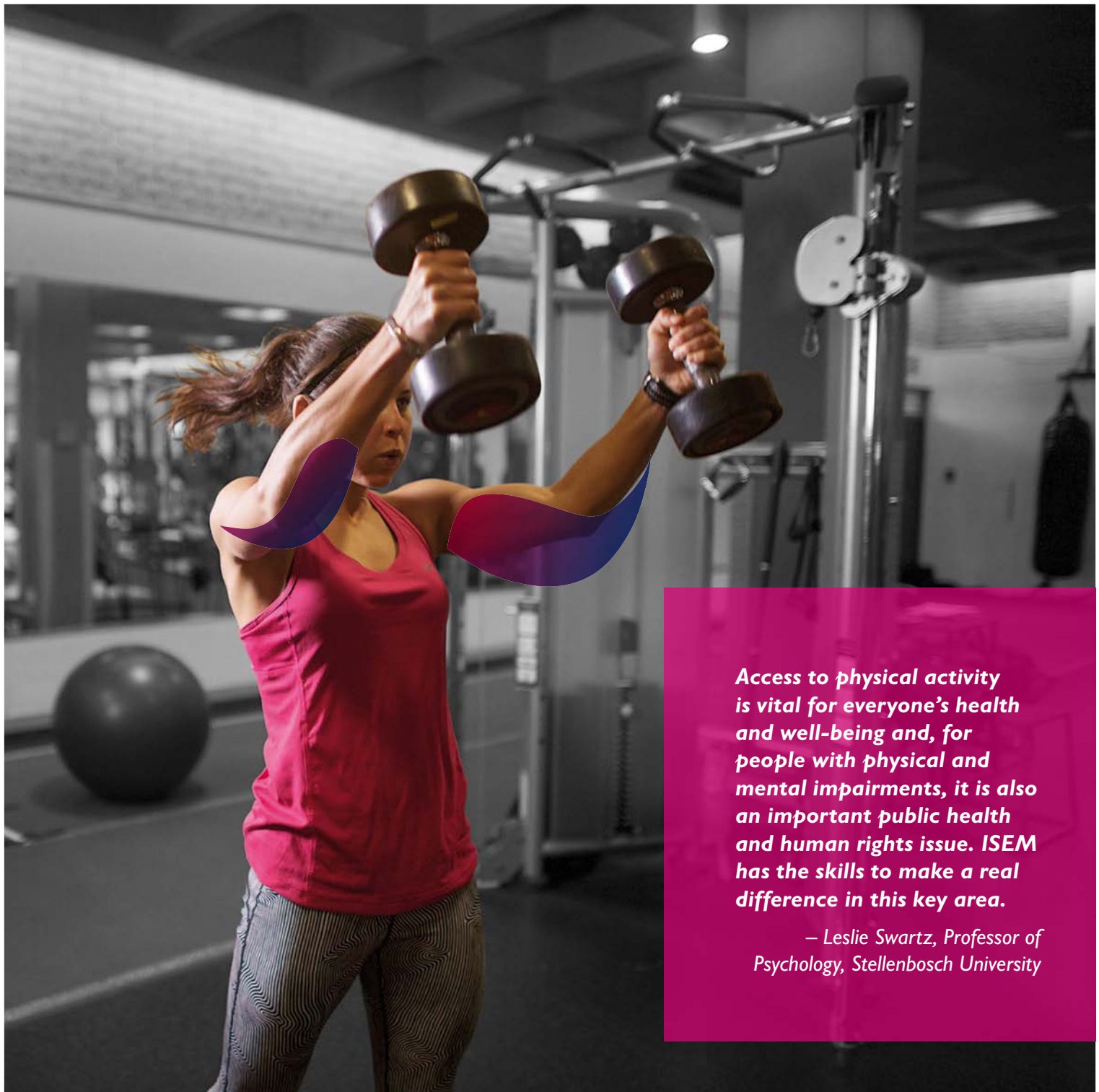


© ROGER SEDRES

*I was born in Bishop Lavis in 1985 and grew up in Blue Downs outside Cape Town. When I was thirteen years old I was diagnosed with asthma. For three years I was in and out of hospitals. After a near-death experience, my doctor advised me to take up running saying it might help me to outgrow the illness. A few weeks later, I took part in a school cross-country race, running right at the back. Then I started to train seriously and the next year I was right in front. Training and racing was a challenge. I had to run with my asthma pump tucked into my crop top, but I persevered. Applying to join Endurocad was one of the best things I have done. The Academy has supported me not only by giving me a job in my field of study, they have also played a vital role in my athletics career and supported me so that I can perform at the highest level. It has contributed tremendously to my achievements not just as a sportswoman but as an individual.*

– Nolene Conrad, professional athlete and athlete manager for Endurocad





***Access to physical activity is vital for everyone's health and well-being and, for people with physical and mental impairments, it is also an important public health and human rights issue. ISEM has the skills to make a real difference in this key area.***

*– Leslie Swartz, Professor of Psychology, Stellenbosch University*

# Venturing to the extremes of human physiology

ISEM is acknowledged as a world leader in Paralympic sport medicine and is streets ahead in understanding the role of physical activity in the rehabilitation of individuals with impairment.

*I have a dream that Paralympians and Olympians will receive equal status and that the public will respect and honour disabled athletes for the heroes and the stars that they are.*

– Dyan Buis, Paralympic sprinter and long jumper



Whether individuals suffer sudden injury or congenital illness, ISEM has the expertise to take them from an ambulance or hospital bed, through carefully designed and monitored rehabilitation programmes, and into participation in sport at the highest level they can aspire to.

Through ISEM and the Division of Orthopaedic Surgery, individuals can access super-specialist experience from limb reconstruction, spinal surgery, orthopaedic oncology, hand and foot surgery to physiotherapeutic and biokinetic rehabilitation, as well as psychological support and encouragement.



*The Adapt2Move programme in the Department of Sport Science at Stellenbosch University aims to optimize movement for the differently able. This involves addressing various barriers experienced by the differently abled with regard to physical activity, rehabilitation, health and well-being, and participating in sport. Working with ISEM and persons who are differently able, our vision is to accompany people from the point of injury or diagnosis through rehabilitation and reintegration into a healthy social and sporting life.*

– Suzanne Ferreira, Department of Sports Science, Stellenbosch University



# Leading by example

No one could be better equipped to lead ISEM than its founder and director, Professor Wayne Derman.

Derman has had a distinguished and dynamic academic career training sports physicians, exercise scientists and biokineticists. He is also co-director of the International Olympic Committee (IOC) Research Centre of South Africa and serves on the International Paralympic Committee's Medical Commission.

For years, Derman has played a key role in providing clinical support to South Africa's international athletes. He was chief medical officer for Team South Africa at the Olympic Games in Sydney in 2000 and Athens in 2004, and has been team physician to the South African Paralympian team since 2008. In 2010, he also served as the medical officer for Cape Town during the FIFA World Cup.

His own research focuses on the prevention of chronic lifestyle diseases and on injury and illness prevention in athletes, especially those with disabilities. Reflecting his significant contribution to the discipline, Derman's publication record (over 211 at last count) includes articles in peer-reviewed journals, book chapters and policy documents.

## Stepping into the future

ISEM has ambitious plans for the future. With its research findings widely published and its recommendations being adopted or incorporated by local and international sporting codes, health and fitness organisations, as well as by commercial entities and lifestyle advocates, the organisation is ready to expand.





## Seeking new partnerships

ISEM is seeking partners and benefactors who wish to associate themselves with the further development of this world-class sports-medicine platform.

A named rehabilitation centre that focuses on optimising the recovery and training of athletes with injuries and impairment is planned. Here, therapy, education and advice will help clients adjust to acute trauma or illness, and move on into the world of para-sport.

ISEM also plans to build South Africa's first live-in rehabilitation centre for people suffering from chronic diseases of lifestyle. Focusing on exercise and nutrition, the centre will help clients adopt healthy habits and routines, and manage their conditions so as to minimise their need for ongoing medical intervention.

In collaboration with existing organisations, ISEM will soon expand the hospitality and accommodation it offers to international athletes and sports teams wishing to train in world-class facilities with access to high-tech assessment, as well as biomedical and clinical support.

Named research chairs are also available for sponsors who would like to align themselves with the health benefits and cutting-edge research that ISEM delivers.

For further information, see [www.isemsun.com](http://www.isemsun.com)

*What attracted me to medicine was the ability to play a meaningful role in people's journey to health. I was drawn to sports medicine because it operates at the extremes of physiology. We study humans at maximal speed, at the tops of the tallest mountains and at the depths of the oceans. What the Paralympians add on top of all that is an extra layer of complexity – the layer of impairment or disability – the ultimate clinical challenge.*

– Wayne Derman, ISEM director



# Growing a hub of innovation and excellence

© WILL PUNT



**To invest in or collaborate with ISEM, please contact:**

**Prof Wayne Derman**

Director of the Institute of Sport and Exercise Medicine, Co-Director of the IOC Research Centre in South Africa, and Director of the FIFA Medical Centre of Excellence

Clinical Building, Faculty of Medicine and Health Sciences, Stellenbosch University, South Africa  
Tel: +27 (0)21- 938 9801

Email: ewderman@sun.ac.za

**To extend your skills in sports and exercise medicine by enrolling for a professional diploma or postgraduate degree, please contact:**

**Ms Lindi Deck**

Administrative Assistant, Institute of Sport and Exercise Medicine

Clinical Building, Faculty of Medicine and Health Sciences, Stellenbosch University, South Africa  
Tel: +27 (0)21- 938 9801

Email: lmdeck@sun.ac.za

[www.isemsun.com](http://www.isemsun.com)

 @ISEM\_SU



**isem**

**Institute of Sport  
and Exercise Medicine**



**UNIVERSITEIT  
STELLENBOSCH  
UNIVERSITY**



**IS 100**  
1918 · 2018