
Innovative Diagnostics and the Use of AI Allow Individualised Approaches in Performance Medicine



High calibre speakers at the MEDICA MEDICINE + SPORTS CONFERENCE illuminate new methods and their practical uses

Top athletes are constantly being measured and analysed, and this includes the use of innovative technologies and methods in diagnostics. The evaluation of the resulting data increasingly uses Artificial Intelligence (AI) which delivers many new insights for individualised training, prevention of injuries, regeneration or rehabilitation. The [11th MEDICA MEDICINE + SPORTS CONFERENCE](#) will address these issues on Wednesday and Thursday, 15 and 16 November 2023, during the world's leading medical trade fair [MEDICA](#) (duration: 13 – 16 November).

The conference in the Congress Center Düsseldorf (CCD South) brings together internationally renowned specialists from sports medicine, sports sciences, physiotherapy as well as technical specialists for an interdisciplinary dialogue concerning innovative approaches in prevention, regeneration and rehabilitation for both peak athletic and health sports.

A professional football player with an implanted defibrillator

Top athletes with chronic diseases face very special challenges. How can people with a chronic disease be professional athletes? One answer is given by Daniel Engelbrecht. On Wednesday, 15 November 2023, starting at 13:15 h he will share his experience as a professional football player with chronic heart disease and an implanted defibrillator – the device actually saved his life twice. How can the need for the defibrillator to activate in this way be prevented? Based on his own experience, Engelbrecht, who has been playing for e.g. VfL Bochum, Alemania Aachen and the Stuttgarter Kickers, can share tips that can be valuable for active professional and amateur athletes and their coaches.

2022 Olympic discus champion Lars Riedel invited to train at the MEDICA SPORTS HUB (© Constanze Tillmann).

World hockey champion talks about professional sports and diabetes

Professional sports also carry a risk of coronary arteriosclerosis, a sign of an increased risk for e.g. stroke. Prof. Benjamin Levine presents a cardiologist's view of the latest scientific findings. The founder and director of the Institute for Exercise and Environmental Medicine at the Texas Health Presbyterian Hospital in Dallas focuses his research especially on how circulation responds to stimuli such as training or space flight. That diabetes type 1 is no hindrance to success, is proven by Timur Oruz. He won third place at the Olympics with the German national hockey team in 2016, and in 2023 even became world champion. During the conference he will share how he manages daily training and competition with diabetes and what advice he has for other people who are affected. However there are also limits for people wanting to become professional athletes – for example for people with neuromuscular diseases. How important sports nevertheless are for multiple sclerosis, will be explained by Prof. Philipp Zimmer of the department for research into circulation and sports medicine at the TU Dortmund University. In the case of many chronic diseases, sports are an option to significantly improve symptoms and progression.

Paediatric sports medicine

The World Health Organisation WHO recommends at least 60 minutes of moderate to strenuous physical activity every day for girls and boys from 3 to 17 years of age. 80 percent of all children in Germany fail to meet this target. The lack of physical activity in children is alarming. "First of all more sports – but do we really need sports medicine for children?" This is the question with which Dr. Nicole Müller, senior physician at the paediatric clinic of the University Hospital Bonn, will open the conference session 2 on Wednesday, 15 November 2023. Children recover more quickly than adults from the same muscular effort, and therefore reaching their physical limits is literally "child's play". This is especially true for short periods of exertion, for example during interval training. However, there are risks involved especially for highly talented young athletes attempting to reach absolute peak performance in too little time – see "hyper-motivation". "Sports training for children and adolescents – talent as a possible risk factor" is the matching title of a lecture by Prof. Ralph Beneke from the Institute of Sport and Motology at the University of Marburg.

Dr. Ruth Löllgen, Astrid-Lindgren Paediatric Hospital in Stockholm, will speak in Düsseldorf about emergencies during sports, and how these can be prevented especially concerning children. However, Dr. Löllgen insists, that possible risks should not keep children from participating in sports. Lack of physical exercise would be much worse.

Lack of physical exercise has increased during the pandemic

Prof. Yolanda Demetriou, University of Innsbruck, sees an urgent need to act. She compares the activity behaviour of children in Germany with that of other European nations. Already before the pandemic, the situation was bad, and now as a result of the pandemic, it is even worse. Among other things, what the sports scientist recommends as a countermeasure, is a change in how children get to school, for example by not driving children there by car. Children should instead be encouraged to cycle to school.

How individualised training could ideally look in practice is demonstrated during a guided tour for the participants of the conference through the [MEDICA SPORTS HUB](#). On 150 square meters in the trade fair Hall 4, innovative sports and health equipment is waiting to be put to the test – for example that made by 'Skillcourt'. The company's training concept aims to not only address strength and mobility, but also to offer focused stimulation for the brain. Sports participants can currently access 40 tests and exercises of various levels, to focus their training on perception, reaction, quick action, acceleration, deceleration and change of direction.

Score a goal with artificial intelligence

Using "Big Data" to analyse performance during football is the topic of the first lecture at the conference on Thursday, 16 November 2023. One thing is clear: In professional football, during scouting and while analysing the game, more and more data need to be processed and interpreted in less and less time. AI methods have therefore become indispensable and will only continue to gain in importance. Based on video, event and position data, scientists have developed and validated several tools with which data from games can be extracted and evaluated extremely quickly and reliably, and with full automation. Prof. Daniel Memmert, managing director of the Institute of Exercise Training and Sport Informatics at the German Sport University Cologne, will provide a brief summary of what is already possible and is being used. Memmert and his team have themselves been busy for years with the analysis and simulation of complex position data and are processing very large amounts of data, therefore "Big Data". They have developed and evaluated corresponding theoretical models. In Düsseldorf, Memmert will demonstrate how AI can be used to prevent injuries.

AI can also contribute to improving physical activity behaviour. How, is the topic for a lecture at the conference by PD Dr. Daniel Link. He is an advisor for the German football league (Deutsche Fußball Liga DFL) in the field of sports data. Knowledge like this is already used to predict potential injuries of professional athletes – to prevent injury, but also to realise where the future limits of their capability of performance lie. Dr. Max Müller will explain which conclusions can be drawn from objective movement tests for young athletes. He is the CEO of the company Moticon, which produces sensor insoles for highly precise measurements of pressure distribution and strength.

The 3D human musculoskeletal computer model "Myonardo" by contrast is supposed to deliver exact measurements of the strain on bones, joints, tendons and muscles during human movement. This allows movements to be predicted and to precisely determine which forces act inside the body. Movement analysis then quickly reveals any weak points in athletes. This serves to for example prevent injuries during training. Prof. William. H. M. Castro, Ccentre for Orthopaedic Research in Münster and co-founder of Predimo, will offer a presentation thereof.

Psychology and AI as building blocks for higher performance

"What we can learn from individual diagnostics and interventions in elite athletes" is the title of the lecture by Prof. Markus Raab. The head of the Section Performance Psychology at the department of psychology at the German Sport University Cologne will present the first results of the project "in:prove" in Düsseldorf. This project combines interdisciplinary data from physiology, exercise and training sciences, from social sciences and psychology, through utilisation of AI. Seven top Olympic associations, among them the German Ice Hockey Federation and the German association of gymnasts (Deutscher Turner Bund), participate. Raab himself takes a look at the differences in psychological conditions for behaviour, in order to better predict performance development and high responses to training.

Prof. Wilhelm Bloch, department of "Molecular and Cellular Sports Medicine" at the German Sport University Cologne, and Prof. Sebastian Gehlert, institute for sports sciences at the University of Hildesheim, take a special look at the effect of training on muscles. There is unanimous consent that the right resisted exercise training improves muscular strength and tension and protects joints from injury. But Gehlert takes a much closer look, at the metabolic enzymes of human skeletal muscles, at the metabolome. Even at this molecular level, the effect of training can be measured – and this effect can be proven in trained as well as untrained people.

Individualisation is also something of importance for the team doctor of the German national league football club RB Leipzig. Dr. Robert Percy Marshall will outline his concept of care, which aims to provide the professional players at RB with optimal support thanks to a holistic approach.

Innovations for sports medicine in the "Sharktank"

From an inner-ear-sensor to measure the consumption of energy (by 'cosinuss') to the evaluation of the loss of liquids and electrolytes (through an analysis by 'flowbio') to printed sensors for muscle activity (by 'Noxon'): The "Sharktank" is the conference session 6 on Thursday afternoon on 16 November 2023, and will again present numerous technical innovations for sports and health. Among them are, for example, "internet of things" solutions by 'eesy-innovation'. These can help simulate the conditions of a competition realistically even in remote places on Earth. And because in spite of the best preparations, something can always happen in sports, there is a need for suitable therapy options. 'Summus' will

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therefore present laser therapy applications (for example to reduce pain) in the "Sharktank".

All information about the programme and how to participate at the MEDICA MEDICINE + SPORTS CONFERENCE are available online at: <https://www.medica-tradefair.com/mmsc2>.

Partners of this international conference within the framework of MEDICA are the largest associations of sports medicine and sports sciences in the world, among them DGSP, dvs, FIMS, EFSMA, EiM (ASCM), EiME, FESI, epsi, Sport Speaker and WT Wearable Technologies.

The conference is accredited as a category A continuous training event by the North Rhine Medical Association.

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