

Faculty of Education University of Ostrava



**HUMAN MOVEMENT AND HEALTH**

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# HUMAN MOVEMENT AND HEALTH

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Human movement and health are undoubtedly interrelated and, like other domains, deserve a scientific view. The right movement under the scientists' supervision, the influences of the age on various physiological changes, the psychological well-being, the quality of life itself, not only these are topics resonating within the range of the main scientific direction of the University of Ostrava.

[#HMDC](#) [#research](#) [#osu](#)  
[#HAIE](#) [#biomechanics](#) [#physiology](#)  
[#running](#) [#cycling](#) [#physicalactivity](#)

## HUMAN MOVEMENT AND HEALTH

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Movement is natural and integral part of human life, and the Department of Human Movement Studies at the University of Ostrava has been focusing on its research over a long period of time. The Department concentrates its scientific activities at the Human Movement Diagnostics Centre (HMDC) - the unique workplace that was established in 2008 and was inspired by the laboratories of Massachusetts University. The team led by doc. Mgr. Roman Farana intensively cooperates with many foreign universities (in the USA, Great Britain, Italy, Austria...) and repeatedly receives scientific awards at international conferences.

HMDC has two tens of experts, including PhD students, who are actively involved in a number of researches. The search of connections between the movement of the human and his health is their common denominator. According to the founder and expert guarantor of HMDC, doc. Mgr. Daniel Jandačka, Ph.D., movement is undoubtedly related to the cardiovascular diseases which cause death to the majority of population: *„Movement as part of a healthy lifestyle clearly contributes to higher life expectancy . And a quality life up to the high age with good social relations is conditioned just by the health.”*

As a part of HMDC, four modern equipped laboratories are included - the laboratory of the functional anthropology (1), the laboratory of the physiology of the body load (2), the laboratory of physical activity (3) and the laboratory of the biomechanics (4), that has its own magnetic resonance, which is absolutely unique within the Czech universities range. *„We are trying to find out the causes of pathological conditions related to the physical activity and sports, and, on the contrary, to identify the protective factors, i.e. the protection against pathology;“* doc. Mgr. Daniel Jandačka, Ph.D. adds and cites osteoarthritis as an example - the most common form of joint wear, being suffered by a huge number of people.

HMDC experts are conducting several research projects in parallel - for example, they examine: the relationship between the biomechanics and physical activity amongst pre-school children; the effect of gender and age on changes in bone parameters amongst runners; the knee joints asymmetry following anterior cruciate ligament injury (in the collaboration with Portsmouth University); or they investigate the effect of the low-carbohydrate diet on health and sport performance of the human.

The most extensive research, in which HMDC is involved, includes 1,500 active runners (men and women) in total from northern Moravia and southern Bohemia. The aim of the project (under the abbreviation HAIE) is to monitor whether and how exercising (movement) in the polluted air of the industrial region is affecting the health, psychical well-being and quality of life. *“This is the first research in the Czech Republic that is associated with the movement of the human and linked to his behaviour. The whole project is about a holistic approach, which includes also the psychosocial phenomena and uses modern technologies”*, says doc. Mgr. Daniel Jandačka, Ph.D., the founder of this research study. HMDC cooperates in this research study with the Faculty of Medicine of the University of Ostrava.

The future activity of the HMDC will be significantly influenced by the new building of the University Centre of the Sport and of the Behavioural Health, where the entire Department will be moved. The architecturally unique building with the running oval on the first floor will be built in the Ostrava centre by the year 2022 at the latest. The new headquarters of the HMDC will extend the possibilities of scientific research and education of the future kinanthropologists, as well as of the behavioural consultations for the public in the field of healthy lifestyle, including suitable physical activities.

## HUMAN MOVEMENT DIAGNOSTICS CENTRE

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The scientific activities of the Department of Human Movement Studies are concentrated mainly at the Human Movement Diagnostics Centre.

The main tasks of the Human Movement Diagnostics Centre (HMDC) are:

- to widen the knowledge boundaries in the field of kinanthropology (the science of the movement of the human);
- to transfer the research results into practical applications beneficial for the society;
- to provide high expert level of education to Bachelor, Master and Doctoral students;
- to mediate the understanding of the benefits arising from the physical activity;
- the commercial measurements for the top, performance and recreational sportsmen ( $VO_{2max}$ , Anaerobic threshold, Wingate test, Body composition, Biomechanics of movement and others).





## HUMAN MOVEMENT AND HEALTH - RESEARCH AREAS

### THE BIOMECHANICS OF HUMAN MOVEMENT AND IMAGING METHODS

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In the field of biomechanics, the research focuses on the investigation of the causes of muscle-skeletal injuries during sport and physical exercises and on creating consequent recommendations for their prevention in different age groups of the population. We deal with the coordination and the variability of the human movement during the ontogeny of the human motor activity during the individual phases of the motor learning process. The laboratory of imaging methods has its own magnetic resonance and sonograph, which opens the possibilities of a deeper examination of the musculoskeletal system of the human and its structures, including the brain. This provides more detailed answers to the questions of the origin and causes of injuries and opens considerable opportunities for multidisciplinary research.



## PHYSIOLOGY AND FUNCTIONAL ANTHROPOLOGY

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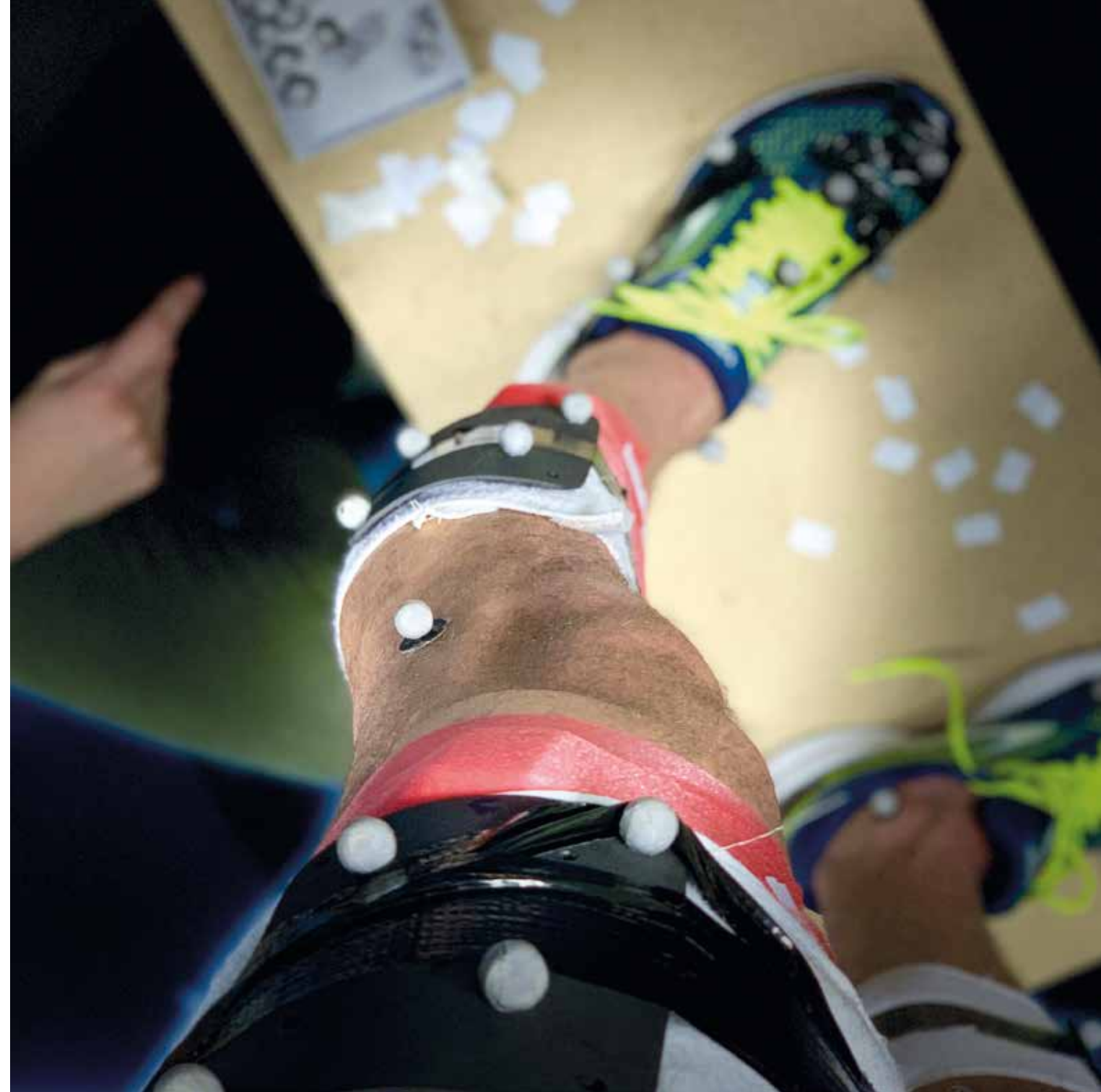
In the field of physiology and functional anthropology, the research focuses on the functional and somatic parameters to assess the level of physical activity as a significant parameter for maintaining the individual's health. The focus of the research is the search of the optimal physical activities with regards to the performance and age characteristics and specificities of the target group, namely in the context of the chronic civilization diseases prevention and of improving health fitness of the population.



## PSYCHOSOCIAL HEALTH DETERMINANTS

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In the field of behavioural research, we focus on the study of psychosocial aspects of physical activity. We are interested in how the physical activity affects the psychological processes, mental health and quality of life of the individuals of different age groups. We also investigate what factors are involved in formation of healthy life habits, including the physical activity, and how to use the best the psychological knowledge to build the motivation and effective interventions to increase the level of physical activity amongst different target groups.





## SIGNIFICANT PROJECTS

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- **The effects of lowering dietary carbohydrates on health, exercise performance and wellbeing-related outcomes** (GAČR 18-08358S)  
– the principal investigator doc. PhDr. Lukáš Cipryan - the research project focuses on the important and popular problematics of the effect of carbohydrate restriction intake in human diet on physical performance and health.
- **Healthy Aging in Industrial Environment (HAIE)** - The main intention of the study is to monitor whether physical activity in the polluted air and some other characteristics (psychosocial, biomechanical, physiological and somatometric) can affect the health, psychical well-being and quality of life.  
The study involves adult men and women of all age groups from the Moravian-Silesian and South Bohemian regions.  
More info: <https://www.4haie.cz>





## EXCURSION IN THE HUMAN MOVEMENT DIAGNOSTICS CENTRE

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Do you want to see how the top-equipped laboratories look? Are you interested in the measurement details of the world-class level researches? Do you know what your body consists of? If so, do not hesitate and come to see us, to measure and to understand your body and its movement from the perspective of science!

More info: <https://pdf.osu.cz/cdlp/23020/exkurze/>

## INTERNATIONAL COOPERATION

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- **Prof. Joseph Hamill, Ph.D. (University of Massachusetts Amherst)**  
Biomechanics basic locomotion (walking, running), coordination and variability of the human movement
- **Prof. Gareth Irwin, Ph.D. (Cardiff Metropolitan University)**  
Biomechanics of the sport and application into a sport training
- **Isaac Estevan, Ph.D. (University of Valencia)**  
Biomechanics of the human movement, motor development and movement learning
- **Prof. Paul Laursen, Ph.D. (Auckland University of Technology)**  
Physiology of the body load, high intensity interval training, nutrition in sport
- **Prof. Peter Hofmann, Ph.D. (University of Graz)**  
Physiology of the body load, high intensity interval training
- **Timothy Exell (University of Portsmouth)**  
Biomechanics and symmetry of the human movement
- **Julia Freedman-Silvernail (University of Nevada Las Vegas)**  
Coordination and variability of the human movement
- **Victor Casula, Ph.D. (University of Oulu)**  
Imaging methods, quantitative analysis of the cartilages and tissues quality

## CONTACT PERSONS

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- **Doc. Mgr. Roman Farana Ph.D.**  
Head of the Human Movement Diagnostics Centre,  
Vice-Dean for Science and Research  
e-mail: roman.farana@osu.cz
- **Doc. PhDr. Lukáš Cipryan Ph.D**  
Head Deputy of the Human Movement Diagnostics Centre  
e-mail: lukas.cipryan@osu.cz
- **Mgr. Adam Motyka**  
PR officer for the science and research, excursions, promotion  
e-mail: adam.motyka@osu.cz  
mobil: +420 777 799 645

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