Reasoning of dissertation topic and competency of potential supervisor for admission onto joint LSU and TU doctoral studies in 2022

Area of research (title and code)	**Biomedicine, Life sciences**
Field of research (title and code)	**Biology**
Topic of research	**Gut microbiota in athletes**
Institution	**Lithuanian Sports University**

Potential supervisor

Pedagogical and scientific degree	**Name, surname**
prof. dr.	Tomas Venckūnas

Short reasoning of proposed dissertation topic

Title
Athletes' gut microbiota in relation to training and nutrition
Short research description (including aims and objectives) (maximum 1500 characters). The human gut microbiome is linked to many states of human health and disease. The metabolic products of the gut microbiota is abundant, but the implications of these microorganism pathways on well-being including exercise capacity are poorly understood. With the proposed PhD topic we **aim** to identify the composition of whole-scale microbiota and its functionality depending on the exercise training loads, modes and diets of the athletes. The outcomes of the study are expected to unveil biological factors of exercise capacity outside the body *per se*; more generally, the study is aimed to shed light on the common factors which make the symbiosis between the exercising humans and their microbiota efficient.
Relevance of the problem, its novelty at national and international level (maximum 1500 characters). It has been recently shown in the stool of marathon runners postmarathon and the elite rowers an increased relative abundance of genus Veillonella (Scheiman et al. Nature Medicine 2019), anaerobic bacteria well known for their lactate fermenting abilities as their only carbon source. It has also been shown that blood lactate crosses the epithelial barrier into the lumen of the gut to feed microbiota with the by-product propionate produced. The latter is ergogenics as also shown in an elegent experiments on mouse model where intrarectal instillation of propionate increased treadmill run performance to a comparable extent observed after Veillonella atypica gavage (Scheiman et al. 2019).
Research methods and possibilities for conducting these studies (maximum 1500 characters). A large cohort (total n>1000) of competitive athletes from distinct sports (classified by anaerobic lactic energy contribution and training volumes) will be recruited for the study to donate faecal samples, genomic DNA and to fill the questionnaried on diet and sports-accociated aspects. Healthy age-matched untrained individuals (n=1000) will serve as a control group. Multi-omics approach will be applied to comprehensively analyse the stool samples for the gut genome composition of the microbiota as well as its functionality (activity) via transcriptomic (gene expression) and metabolomic analyses. Generated data will be linked via bioinformatic tools to quantify any emerging associations, including those with the dietary and training factors.

Please indicate the links between the proposed topic for the doctoral thesis and biomechanics / physical therapy / sports study programs. None.
Is the proposed topic for the doctoral thesis related to currently funded research projects? Please indicate the links between the proposed topic for the doctoral thesis and funded research projects. (Funded by grant donated to Lithuanian Health Sciences University).
Is the proposed topic for the doctoral thesis related to joint research with a foreign institution? Please indicate the links between the proposed topic for the doctoral thesis and research with a foreign institution No.

Currently I am supervisor of 2 doctoral students.

Supervisor _____ (signature) TOMAS VENCKŪNAS (Name, surname)

Date 2022-05-09