Reasoning of dissertation topic and competency of potential supervisor for admission onto joint LSU and TU doctoral studies in 2020

Area of research (title and code)	**Biomedical Sciences**
Field of research (title and code)	**Biology (01B)**
Topic of research	**Weight loss strategies, health, physical and mental efficiency**
Institution	**Lithuanian Sports University**

Potential supervisor

Pedagogical and scientific degree	Name, surname	Academic position
Lect., PhD	Rima Solianik	Lecturer, researcher
Prof., PhD	Marius Brazaitis	Professor, senior researcher

Short reasoning of proposed dissertation topic

Title

Effect of different weight loss strategies on health promotion, cognitive and motor functioning

Summary

Worldwide obesity has nearly tripled during last decades (WHO, 2018), thus a greater proportion of these individuals have a risk of chronic diseases (Eurostat statistics, 2019) and the incidence of the metabolic syndrome (Saklayen, 2018) and a wide range of psychological problems (Eurostat statistics, 2019)

There is strong evidence that regular exercise contributes to body weight and fat loss, maintenance of body weight and fat reduction in obesity (Petridou et al., 2019), and improves health (Pedersen, Saltin, 2015). However, because of various injuries and disabilities (severe obesity, sports injuries, osteoarthritis, spinal cord injury, etc.) and free time restrictions, some people cannot participate in regular exercise program for extended period (Iguchi et al., 2012).

Recently various calorie restriction (CR) technologies were popularized in order not only to decrease weight but also to improve health; specifically, intermittent fasting where individuals go extended time periods (e.g., 16-48h) with little or no energy intake, with intervening periods of normal food intake (Mattson et al., 2017; Longo & Mattson, 2014). However, it can be expected that combination of intervention may have greater effect on weight loss and improvement in metabolic syndrome indicators. It is established that a low resting energy expenditure is a risk of weight gain (Müller et al., 2016). Studies shows that not only acute CR (Zauner et al., 2000), but also and cold stimuli (Celi et al., 2010; Westerterp, 2018) increase resting energy expenditure. There is evidence that cold exposure stimulate brown adipose tissue, which is involved in energy expenditure and represents an attractive target to combat obesity (Peres Valgas da Silva et al., 2019). Thus the question remains if there is synergetic effect of cold stimuli and CR on weight loss and obesity related metabolic syndrome parameters. Furthermore, there is evidence that CR (Michalsen, 2010) and cold exposure (Sevchuk, 2008) can alleviate depressive symptoms. However, no studies including CR or combination of CR and cold stimuli so far have investigated the kynurenine pathway which plays a role in the pathophysiology of depression (Réus et al., 2015).

It is noteworthy that nevertheless, there is few conflicting studies of CR effects on cognitive performance (Doniger et al., 2006; Uher et al., 2006; Solianik et al., 2016b; Green et al., 1995; Lieberman et al., 2008; Solianik, Sujeta, 2018), however, there is no information regarding short-term CR or short-term CR with cold stimuli on brain neural network arousal, information processing, and cognitive performance efficiency during workday. Furthermore, limited information is available regarding the effects of fasting on motor behavior. There is evidence that maximal grip strength (Gutiérrez et al., 2001; Solianik, Sujeta, 2018) and movement accuracy (Solianik, Sujeta, 2018) remains unaffected during total CR. However, it remains unknown if any

adaptive responses occur at spinal, supraspinal or peripheral level which can help to keep proper functioning. Moreover, it remains unknown how CR or short-term CR with cold stimuli affects isometric and dynamic endurance, dynamic strength, explosive force production or tasks requiring speed-accuracy properties. Observed effects on cognitive and motor functioning will indicate if current weight loss strategies can interfere everyday life, and daily and sports activities.

Thus, the aim of current project is to identify the most effective acute strategy (cold stimuli and fasting vs fasting alone) for weight loss and health promotion, and to clarify different strategies effect on cognitive and motor functioning efficiency in different genders and weight-groups.

Please indicate the links between the proposed topic for the doctoral thesis and health promotion / physical therapy / sports study programs.

There is strong evidence that regular exercise contributes to body weight loss and improves health, however because of various injuries and disabilities and free time restrictions, some people cannot participate in regular exercise program for extended period. Therefore, other effective strategies (calorie restriction and cold stimuli) and their combination is important issue during implementation of therapeutic approaches for health promotion.

Is the proposed topic for the doctoral thesis related to currently funded research projects?

No

Is the proposed topic for the doctoral thesis related to joint research with a foreign institution?

Yes (Sopthie Erhard and Perikles Simon)

Currently R. Solianik is a supervisor of 1 doctoral student, and M. Brazaitis is a supervisor of 4 doctoral students.

Supervisor 1	_____ (signature)	Rima Solianik (Name, surname)
Supervisor 2	_____ (signature)	Marius Brazaitis (Name, surname)

Date 2020-03-04