Reasoning of dissertation topic and competency of potential supervisor for admission onto joint LSU and TU doctoral studies in 2019

Area of research (title and code)	**Muscle Physiology**
Field of research (title and code)	**Ageing**
Topic of research	**Ageing muscle**
Institution	**Institute of Sport Science and Innovations**

Potential supervisor

Pedagogical and scientific degree	**Name, surname**	**Academic position**
MSc, PhD	Hans Degens	Professor

Short reasoning of proposed dissertation topic

Title

The influence of genotype, diet and physical activity on the age-related muscle wasting in mice due to motor neuron loss

Summary

Muscle weakness in old age is largely attributable to loss of muscle mass, due to both atrophy and loss of muscle fibres. The loss of muscle fibres is a consequence of neurodegeneration, where motor neuron death causes muscle fibres to become denervated. While many fibres are reinnervated by sprouting from neighbouring motor neurons, not all fibres will be reinnervated and disappear.

People seem to age differently where some people still show incredible athletic feats in old age and others of the same age are frail. Differences in motor unit number at birth, determined by genotype, may cause some of the variation in muscle ageing. **We therefore hypothesise** that the %-loss of muscle mass in a given time is inversely related to the number of muscle fibres in a motor unit.

Diet undoubtedly contributes to different rates of ageing, where for instance methionine restriction reduces low-grade systemic inflammation. We **hypothesise that methionine restriction enhances motor neuron survival and thereby decreases the rate of ageing-related muscle wasting**.

The aim of the study is to assess 1) the contributions of genotype and methionine content in the diet on the age-related neurodegeneration and associated loss of skeletal muscle mass, and 2) how a hypertrophic stimulus may reverse or attenuate the loss of muscle mass in old age.

The objectives of the study are to assess:
1) the role of genotype in neurodegeneration and skeletal muscle wasting and weakness in aging.
2) the efficacy of a hypertrophic stimulus to attenuate or reverse the age-related muscle wasting and dysfunction in old age.
3) whether methionine restriction **a**) attenuates neurodegeneration and muscle wasting in old age and **b**) enhances gains in muscle mass and function in response to functional overload.

We have the unique opportunity to determine **a**) for the first time ever motor unit numbers in the same animals every 3-6 months and **b**) the interaction of genotype, diet and functional overload on age-related neuronal degeneration and muscle wasting, as we have mouse strains that vary more than 10-fold in muscle mass. This will give important information that will ultimately inform guidelines to combat muscle wasting and dysfunction in old age.

Currently I am supervisor of ___3___ doctoral students.

Supervisor _____ (signature) Hans Degens (Name, surname)

Date 8 March 2019