PhD position, Laboratory of Human Motricity, Expertise, Sport and Health (LAMHESS), University of Toulon

A full funded PhD position (3 years) is available within the University of Toulon, at the Human Motricity, Expertise, Sport and Health laboratory (LAMHESS) under the supervision of **Dr. Vercruyssen Fabrice** and **Dr. Gruet Mathieu (LAMHESS)**

Deadline for application: **18th June 2018** / Beginning: September-October 2018 /Degree: Master's degree at least with distinction
Contact: Dr. Vercruyssen Fabrice (vercruyssen@univ-tln.fr)

Project title: Effect of running garments on soft-tissue vibrations, muscle fatigue and metabolic efficiency in trained male and female athletes

Project Summary:
In Trail running races and/or isolated downhill studies, substantial alterations in neuromuscular function have been reported with significant decrements in both central and peripheral fatigue-related variables for knee extensors and plantar flexors muscles which are greatly involved in running events. Neuromuscular fatigue may be strongly dictated by exercise-induced muscle damage (EIMD) over repeated and prolonged eccentric muscle actions through downhill sections. Furthermore, it has been reported that muscle fatigue may induce acute and delayed alterations in running economy following trail running events or laboratory-based downhill sessions. Several strategies including the use of compression garments (CGs) have been investigated in the search for an optimal strategy that may attenuate the effects of acute and delayed EIMD. Among these modalities, the use of lower limb CGs in many runners during exercise and over the recovery phase may constitute a potential mean to reduce EIMD. The reduction in soft-tissue vibrations constitutes the most attractive hypothesis to explain the beneficial effects of CGs on acute physiological responses and muscle fatigue. Although this hypothesis is often suggested in the literature, few studies have specifically focused on the quantification of soft-tissue vibrations using complex and mathematical modeling and its relationship with muscle fatigue and metabolic efficiency. Based on numerous scientific reports, it is worth noting that the measure of pulmonary oxygen uptake, which is a global index of metabolic efficiency, seems not to be sensitive enough to the wearing of CGs during exercise, suggesting the need to use other methodological tools to quantify metabolic efficiency such as mathematical modeling (e.g. oxygen uptake kinetics and muscle oxygenation pattern). To date, different running apparels or garments (e.g. with compression and more recently, ceramic disks) may be used by athletes during exercise but also, during the recovery phase to optimize running performance. An integrative approach appears to be useful and relevant in the understanding of a such energetical model of human locomotion. The objective of this PhD is to propose an integrative approach including a mechanistic standpoint for examining the effects of wearing innovative running garments on acute and delayed physiological responses and biomechanics, in laboratory and ecological settings, within populations of male and female runners.

The PhD thesis will be conducted at the Laboratory of Human Motricity Expertise Sport and Health (LAMHESS) of the University of Toulon (France) in strong collaboration with the Salomon Company. Physiological and biomechanical knowledges are expected by the expertise committee. Programming, mathematics (e.g. signal analysis) skills and tools for measuring muscle energetics will be advantageous for the candidate. **Applicant should sent** a detailed letter of intent, a curriculum vitae, and a copy of grades (especially the last grade) obtained in a single email to the following address: **vercruyssen@univ-tln.fr**