Internship offer
M2 Musculo-Skeletal system, Locomotion, Exercise (MuSkLE)

Title of the Internship: Influence of footwear cushioning on propagation of vibrations to the visceral region during simulated running

Laboratory (name, n°, website): LIBM,UR 7424, Université Claude Bernard LYON 1. https://ufr-staps.univ-lyon1.fr/recherche/libm

Research team (name, website): SPORT PERFORMANCE AND INJURY PREVENTION (SPIP), https://libm.univ-st-etienne.fr/fr/equipes/spip.html

Supervisor to contact (name, email address): Christophe HAUTIER, christophe.hautier@univ-lyon1.FR

Project description including a short introduction, aim/objectives and methods/approach to be used

Running is a physical activity with numerous health benefits. However, 30% to 65% of long-distance runners have experienced GI symptoms [1]. In fact, There appears to be a dosage effect: the longer the distance, the more likely runners are to experience gastrointestinal symptoms [2]. There are two types of gastrointestinal symptoms: those related to the upper gastrointestinal tract (including nausea) and those related to the lower GI tract [3]. Running and other activities share common characteristics that may explain these GI symptoms: the redistribution of blood flow to working muscle, reducing total splanchnic perfusion; and the increase in the activation of the sympathetic nervous system that reduces gastrointestinal function. Eating during physical activity may contribute to increase GI symptoms and high ambient temperature (≥30°C) lead to a higher incidence and more severe GI symptoms. Women have a higher risk of experiencing GI symptoms as well as Individuals who have experienced recurrent exercise-induced GI symptoms in the past.

These issues are more common in running than in other sports, such as cycling [4]. One possible explanation for these differences is that running generates acceleration that are about twice as great as those of cycling for a similar workload [5]. Consequently, studying accelerations in the abdominal region appears to be an important objective for better understanding the extent to which visceral vibrations contribute to the etiology of gastrointestinal disorders. The objective of this work is to characterize the propagation of vibrations during simulated running to the visceral region as a function of impact intensity and footwear cushioning.

1. Gil SM, Yazaki E, Evans DF. Aetiology of running-related gastrointestinal dysfunction. How far is the finishing line? Sports Med. Auckland, N.Z.; 1998;26:365–78.
2. Glace B, Murphy C, McHugh M. Food and fluid intake and disturbances in gastrointestinal and mental function during an ultramarathon. Int J Sport Nutr Exerc Metab. 2002;12:414–27.
3. Costa RJS, Snipe RMJ, Kitic CM, Gibson PR. Systematic review: exercise-induced gastrointestinal syndrome-implications for health and intestinal disease. Aliment Pharmacol Ther. 2017;46:246–65.
4. Rehrer NJ, Meijer GA. Biomechanical vibration of the abdominal region during running and bicycling. J Sports Med Phys Fitness. 1991;31:231–4.
5. Mlinaric J, Mohorko N. Nutritional strategies for minimizing gastrointestinal symptoms during endurance exercise: systematic review of the literature. J Int Soc Sports Nutr. 2025;22:2529910.

Skills required: Training in sports science and biomechanics of movement - Experience in movement analysis, accelerometry and programming; Spoken and written English