**AME2P 3533 Laboratory of Metabolic Adaptations to Exercise in Physiological and Pathological conditions (V. Martin)**

**Thesis director:** Sébastien RATEL (Associate Professor, accredited to supervise research)

sebastien.ratel@uca.fr

**Effect of body mass on the energy cost of human locomotion: an anti-gravity treadmill study**

The energy cost of locomotion plays a major role on the functional capacities of individuals. It has often been expressed per unit of body mass to compare different populations. Yet, energy expenditure with changing body mass is not systematically proportional and this mode of expression is therefore inappropriate. Allometry has sometimes been used to better consider the effect of body mass but it is a method that is based on mathematical laws. Given the impossibility of directly comparing individuals of different body mass, an alternative would be to use an anti-gravity treadmill to modulate the level of unloading. The first objective of this project is therefore to compare more precisely the energy cost of locomotion between children and adults, women and men, normal-weight and obese individuals, by mobilizing the same body mass on an anti-gravity treadmill, and to compare the results to those of allometry. The applications of an anti-gravity treadmill also lie in the possibility of creating rehabilitation programs by decreasing body mass in obese individuals to improve body composition and the energy cost of locomotion while reducing the osteo-articular constraints. The second objective of this project is therefore to assess the effects of these programs in order to optimize the functional capacities, neuromuscular function, mobility and health of obese individuals and therefore meet the objectives of challenge 3 of the CAP20-25 project.

**Svedenhag J.** (1995). Maximal and submaximal oxygen uptake during running: how should body mass be accounted for? Scand J Med Sci Sports 5:175-80.