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## **WHICH MUSCLES ARE RESPONSIBLE FOR AGE-RELATED LOCOMOTOR DECLINE?**

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### **Objectives**

Despite numerous work has emphasized locomotor declines in older age, it is not known which lower limb muscles are mainly responsible for this deterioration and how impaired muscle function ultimately limits locomotor performance with age. The aim of this study was to investigate changes in muscular output across different modes and intensity of locomotion due to ageing.

### **Methods**

Lower limb muscle moments and powers during walking (self-selected), running (4 m/s) and sprinting (maximal speed) were determined and compared among three age-groups (young 26±6 yr., middle-aged 61±5 yr., and old 78±4 yr.) with thirteen participants with each.

### **Results**

The age-groups showed similar walking (1.6 m/s) and running (4 m/s) speed but different maximal sprinting speed (young 9.3 m/s, middle-aged 7.9 m/s, and old 6.6 m/s). Age-related deficit in ankle plantarflexor moment and power generation became more severe as humans switched from walking to running to sprinting. As a compensatory action for reduced ankle propulsion, old group produced more muscle power at the knee joint during walking and at the hip joint during running. During maximal sprinting, young group generated greater muscle moments and powers from the ankle and hip joints, but surprisingly, not from the knee joint when compared with the older counterparts

### **Conclusions**

These findings indicate that propulsive deficit of ankle plantarflexors contributes most to the declines in locomotion. Furthermore, muscular deficit of the hip rather than knee muscles limits the performance among elderly. These novel findings improve understanding of the mechanisms behind human locomotor declines with age and provide insights for preventing performance impairments in older populations.