Sex differences in hamstrings (H) to quadriceps (Q) maximum voluntary force ratio have been proposed as a factor for increased ACL injury risk in females. It has been suggested that the lower ratio in females may in part be due to a smaller H muscle size relative to Q muscle size. However, this has not been thoroughly investigated.

**PURPOSE:** To investigate sex differences in H/Q muscle volume ratio.

**METHODS:** Following ethics approval, muscle volume of the H and Q muscles were determined from the dominant leg of 66 untrained participants (32 males mean ± SD: age, 20.6 ± 2.5 y; height, 178.8 ± 7.0 cm; mass, 71.8 ± 7.2 kg; and 34 females: age, 20.9 ± 1.7 y; height, 168.3 ± 0.1 cm; mass, 62.9 ± 7.2 kg). T1 weighted axial plane images were acquired from the anterior superior iliac spine to the knee joint space using a 1.5 T Magnetic Resonance Imaging scanner (Signa HDxt, GE, CT, USA) and processed with Osirix software (version 4.0, Pixmeo, Geneva, Switzerland). The ratio of H/Q muscle volume was determined. Sex differences were measured using independent samples t-tests.

**RESULTS:** Males had 53% greater H muscle volume (940.5 ± 125.6 cm³ vs 616.6 ± 127.7 cm³, P < 0.001) and 43% greater Q muscle volume (1940.9 ± 263.7 cm³ vs 1354.8 ± 254.2 cm³, P < 0.001), compared to females. H/Q values for males and females were 0.49 ± 0.05 and 0.46 ± 0.07 respectively, showing a significantly higher ratio in males compared to females (P < 0.05, Cohen’s D = 0.57).

**CONCLUSION:** In agreement with our hypothesis the H/Q ratio displayed a significantly higher value in males with a moderate effect size. Sex differences in H/Q muscle volume may contribute to the increased ACL injury risk in females. Further investigations of neuromuscular factors including muscle morphology further explaining this increased ACL risk in females are warranted.

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**Sex-specific Molecular And Cellular Functional Adaptations To Resistance Training In Inactive Older Adults**

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Resistance training improves whole muscle performance in inactive older adults. However, the intrinsic muscle functional adaptations underlying these improvements are not well-understood, nor is it clear that men and women derive the same functional benefits.

**PURPOSE:** We measured the skeletal muscle functional response at the whole body, tissue, cellular and molecular levels in inactive older men (M: n=7, 69±2 yrs) and women (W: n=10, 70±2 yrs) to a 14 week moderate-intensity resistance training program.

**METHODS:** Whole muscle performance (one repetition maximum, isometric and isokinetic knee extensor torque) and size (computed tomography), cellular contractile properties (force-velocity curves) and myosin-actin cross bridge mechanics and kinetics (sinusoidal analysis) were measured pre- and post-training.

**RESULTS:** Resistance training increased whole muscle size (6-7%, p<0.05), one repetition maximum (48-71%, p<0.001) and isometric torque (8-15%, p<0.01) similarly in men and women, while isokinetic function was unchanged. In myosin heavy chain (MHC) I fibers, isometric tension (force per cross-sectional area) was increased in men and decreased in women with training (M: 7%, W: -9%, p=0.05), causing power output to be greater in men and lower in women at higher tensions (M: 12-44%, W: -28% to -61%). The differences in cellular function were explained at the molecular level by alterations in the number of strongly bound myosin heads (M: 21%, W: -9%, p<0.05) which, in turn, were due to sex differences in changes in myosin attachment time (M: 13%, W: -2%, p=0.06). In contrast to MHC I fibers, isometric tension was decreased in men and increased in women with training (M: -11%, F: 6%, p=0.06) in MHC IIA fibers and these differences were explained by increases in myofilament force transmissibility in women compared to men (M: -12%, W: 6%, p<0.05).

**CONCLUSION:** Resistance training improves whole muscle function in inactive older men and women, but there are sex differences in their fiber type response and the fundamental molecular adaptations that bring about the cellular phenotypes. These results indicate that exercise prescriptions may need to be sex-specific to maximize cellular and molecular performance, leading to optimal whole muscle function.

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**Sex Differences In Relative Contribution Of Lean Mass And Fat Mass On Bone Mineral Density**

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There is inconsistent evidence regarding the association between lean body mass, fat mass, and bone mineral density (BMD) between sexes and across various populations. This inconsistency in scientific evidence on these variables presents challenges when applying current evidence on lean body mass, and BMD in clinical scenarios.

**PURPOSE:** The purpose of this study was to further determine the impact of fat mass, lean mass on BMD in both men and women.

**METHODS:** Sixty participants (males: n=24, age: 30.5±14.8; females: n=36, age: 26.3±14.8) participated in the study. Investigators examined BMD and body composition measurements using dual-energy X-ray absorptiometry (DXA).