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## <Purposes>

The present study aimed to investigate the effects of dynamic leg press training on the physiological cross-sectional areas (PCSAs) of human lower limb muscles during 20 days of 6° head-down tilt bed rest.

Five healthy men comprised the resistance training group (BR-Tr) and 10 healthy men as control group (non-training group, BR-Cont) participated in this study. The BR-Tr performed two sessions (morning and afternoon session) of dynamic leg press action including knee extension and plantar flexion daily for the bed rest period: 1) three sets of 10 repetitions at 90% of maximum load, 2) 40% of maximum load to exhaustion. Muscle volume, muscle length, and fiber length of the right thigh and leg muscles were determined using serial axial magnetic resonance The PCSAs of the knee extensor (KE), images. knee flexor (KF), plantarflexor (PF), and dorsiflexor muscle groups were estimated as muscle volume times the cosine of the angle of fiber pennation divided by the fiber length.

<Results and Discussion>

After the bed rest period, BR-Tr showed no significant changes in the PCSA of the KE and KF. However, the PCSA of these muscle groups in BR-Cont significantly decreased by 7.0% and 8.8% (both p<0.001), respectively. Moreover, both BR-Tr and BR-Cont showed significant decreases in the PCSA of PF with similar magnitude of 11.6% (p<0.001) and 11.9% (p<0.001), respectively. These results suggest that dynamic leg press training during bed rest prevents the thigh muscles from deteriorating, but does not for the calf muscles.

<Key words>bed rest, muscle size, human, atrophy, MR imaging

## セ226 MUSCLE ARCHITECTURE AND ISOKINETIC FORCE PRODUCTION IN ATHLETES.

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Twenty-one male varsity athletes, 7 swimmers and 14 skiers (Alpen; 8, Cross-country; 6), were served as subjects. We measured muscle thickness and angle of pennation for the lateral site in the middle thigh by means of B-mode ultrasonic scanning method. And we observed pennation angle of fascicle in vastus lateralis muscle in relaxed and maximal isometric contracted conditions on standing position. Ratio for pennation angle and maximal contraction of the vastus lateralis was calculated by ultrasonic view. We measured maximal isokinetic knee extension force at velocity of 60, 120 and 240 degrees per second using isokinetic dynamometer.

We observed a significant correlation between pennation angle ratio and contraction ratio for vastus lateralis muscle for all subjects. Pennation angle ratio in alpen skiers showed significantly larger values than that in other athletes. Isokinetic peak torque per body weight for knee extension at all the velocities was significantly higher in alpen skiers. The pennation angle ratio was significantly closed to knee extension peak torque at all the velocities in all subjects. A higher correlation coefficient was observed at the lower velocity of 60 degrees per second. A similar tendency was observed between isokinetic force production relative to body weight and contraction ratio in all athletes. We considered that muscle architectures and isokinetic force production are affected by Specificity of athletic training.

Key words: muscle architecture, isokinetic force, athletes.