

座位姿勢における動的バランス能力と  
体幹筋横断面積の関係の解明  
—チェアスキー競技におけるパフォーマンス向上を目指して—

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**Clarification of The Relationship Between Dynamic Balance Ability in  
The Sitting Position and Muscle Cross-Sectional Area of Trunk Muscles  
—Aiming to Improve Performance in Sit-Ski—**

by

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ABSTRACT

The current study investigated the relationships between muscle cross-sectional areas of trunk muscles and dynamic balance ability in the sitting position for 14 healthy young men in order to obtain knowledge about improvement of performance in sit-ski. The cross-sectional images of the erector spinae muscle, the abdominal rectus muscle and the abdominal internal-external oblique muscles were obtained by extended field-of-view ultrasound imaging. Their cross-sectional areas were determined using ImageJ.

To evaluate the dynamic balance ability in the sitting position, a floor reaction force meter was fixed on a six-axis motion base used as a disturbance applier, and a chair ski seat was placed on it. Participants sat on the seat, and the following disturbances were applied: 1) disturbances to move the basal plane laterally, 2) disturbances to tilt the basal plane, and 3) disturbances to add both simultaneously. Because the dominant arm of all participants was the right arm, the laterality was first confirmed for all parameters. As a result, there was no laterality in each parameter. When investigating the relationships between the muscle cross-sectional areas of each muscle and the dynamic balance ability in the sitting position, therefore, the left and right mean values were used. There was a significant correlation between the muscle cross-sectional area of the abdominal rectus muscle and the dynamic balance ability. On the other hand, the muscle cross-sectional area of the abdominal rectus muscle was smaller than the others. Consequently, it could not be asserted that the amount of the muscle cross-sectional area of the trunk muscle affects the dynamic balance ability in the sitting position positively.

## 要 旨

本研究では、チェアスキー競技におけるパフォーマンス向上に関する知見を獲得するために、健全な若年男性14名を対象に、体幹筋横断面積と座位姿勢における動的バランス能力との関係を検討した。超音波診断装置のパノラマ撮像モードを用いて、脊柱起立筋、腹直筋及び内腹斜筋-外腹斜筋の3筋の横断画像を取得し、筋横断面積を測定した。座位姿勢における動的バランス能力を測定する際には、外乱印加装置として使用する六軸モーションベース上に床反力計を固定し、さらにその上にチェアスキーのシートを乗せた。参加者にはその上に座るよう指示し、以下の3つの外乱を印加した際の動的バランス能力を評価した：1) 基底面を側方に動かす外乱、2) 基底面に傾斜をつける外乱、3) その両者を同時に付加する外乱。腹直筋の筋横断面積と傾斜外乱時の動的バランス能力に一部有意な相関関係がみられた。しかしながら、腹直筋よりも大きな横断面積

を有する他の2筋と動的バランス能力との間に有意な相関がみられなかったことを加味すると、今回の結果を以て、体幹筋の筋横断面積の多寡が座位姿勢時の動的バランス能力に影響を及ぼすと断言するには至らなかった。