令和 7・8 年度　大学院博士後期課程
一般 I 期・社会人 I 期・社会人（秋入学）
バイオテクノロジー専攻　試験問題（外国語）

問題 A　次の英文を日本語で全訳しなさい。問題文は 2 ページあります。

Football involves sprinting, changes in direction, jumping, and contact, with the trunk playing a key role in performance. Therefore, trunk muscle training is essential for improving trunk function, which encompasses endurance, strength, and control. Trunk stability, a critical aspect of trunk control, has been defined as the ability to control the position and motion of the trunk over the pelvis to allow optimum production, transfer, and control of force and motion to the terminal segment in integrated athletic activities (Kibler et al., 2006).

Trunk endurance and strength tests, such as the McGill tests, prone- or side-bridge tests, and the Sorensen test, are commonly used to assess trunk function (Nesser et al., 2008; Imai and Kaneoka, 2016). However, maintaining static trunk positions or applying constant force to the trunk is nearly impossible during football actions, such as sprinting, changes of direction, jumping, and physical contact. Football also involves many sudden changes in speed and direction, which require instantaneous control of trunk position and movement in response to unexpected stimuli. often occurring with both anticipated and unanticipated timing. Thus, it is necessary to control the trunk position and movement instantaneously during dynamic actions in response to sudden or unanticipated stimuli. Despite to this, no specific assessment tests for trunk control in dynamic actions are currently unavailable. Therefore, a trunk control test incorporating these elements is necessary.

Several studies have investigated the trunk control during change-of-direction tasks. Sasaki et al. (2011) found that control of forward trunk inclination at foot contact is associated with change-of-direction performance. Other researchers reported the importance of controlling lateral flexion and axial rotation of the trunk (Marshall et al., 2014; Sado et al., 2019, 2020). These studies have indicated the importance of minimizing trunk movements in the sagittal and frontal planes at the change of direction and actively moving the trunk toward the next direction after initial contact. Although motion capture system and high-speed camera are often used for the movement analysis, several studies have recently reported the use of inertial sensors (Bergamini et al., 2013; Chia et al., 2021;

Comomilla et al., 2018; Kim et al., 2020). These sensors, which measure acceleration, angular rate, and the magnetic field vector, are small, lightweight, and easy to transport for field use. They cause less interference with movement tasks and are less location-dependent than motion capture systems. Additionally, these sensors provide real-time feedback in sports and rehabilitation.

The present study focused on trunk control during unanticipated perturbations. Building on front- and back-bridge exercises, which are commonly used for trunk muscle training, we developed trunk-control tests that incorporated these factors and aimed to measure trunk movement using an inertial sensor. Previous studies have shown that trunk stability training and integrated neuromuscular training enhance athletic performance and balance, particularly in adolescent football players (Hammami et al., 2023; Imai et al., 2014). Strength improvements in pre-adolescence are primarily due to neuromuscular adaptations, whereas in adolescence, strength gains are mainly attributed to increases in muscle mass driven by hormonal influences (Myer et al., 2011; Viru et al., 1999). However, neuromuscular adaptations continue to refine in response to the rapid muscle mass gains during adolescence (Fort-Vanmeerhaeghe et al., 2016; Viru et al., 1999). Although increases in muscle mass and strength are related to better performance, neuromuscular control of postural and trunk stability is also associated with functional movement (Zemková and Zapletalová, 2022). Additionally, since proximal stability enables distal mobility, trunk stability plays a crucial role in efficient movement, force production, and transmission, which are essential for the proper execution of athletic activities (Kibler et al., 2006). Given the importance of trunk control and neuromuscular control during adolescence in athletic performance, the aim of this study was to clarify the relationship between trunk-control ability during unanticipated perturbations and athletic performance in adolescent football players. Based on previous studies indicating that trunk rotation control is critical for change-of-direction tasks (Marshall et al., 2014) and that the thickness of the transversus abdominis (TrA) is related to sprint (Fujita et al., 2019), we hypothesized that that trunk rotation control during the front- and back-bridge tests would correlate with sprint and change-of-direction performance

【出典】 Atsushi Imai (2025) Relationship between Trunk Control during Unanticipated Disturbances and Athletic Performance in Adolescent Football Players. International Journal of Sport and Health Science, 23, 1-8.

以上

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問題 B　　以下の英文を日本語に全訳しなさい。問題文は 2 ページあります。

※著作権の関係で掲載しておりません

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【出典】Brenda Walpole (2023) Biology for the IB Diploma Coursebook. Cambridge University Press, ISBN 978-1-00-903968-0, PP. 39 – 42.

以上

出題意図および評価のポイント

― 問題 A ―

スポーツ科学の学術英文を素材に、体幹機能や安定性の定義、既存テストの限界、慣性センサー活用、思春期の神経筋適応、研究目的・仮説へ至る論旨を正確に把握し、専門用語を自然な日本語に訳す力を測った。評価のポイントとしては、1）用語の精確さ、2）因果・対比・限定関係を保った忠実さ（脱落・誤訳なし）、3）読みやすい日本語（直訳調を避け句読点・文分け適切）等の観点から評価した。

― 問題 B ―

博士後期課程で研究を遂行するために必要な能力を総合的に評価するため、以下の点について評価した。

1）基本的な英語の読解能力があるか。

2）問題文は、タンパク質に関する基本的かつ専門的な用語および概念を含んでいる。単に個々の単語を訳するだけでなく、それらが生物学的な文脈でどのような意味をもつのか、正確に理解しているか。

3）文全体や段落全体の論理的なつながりを読み解き、筆者が伝えようとしているものを正確に把握できる能力があるか。