

國立臺中教育大學 111 學年度研究所碩士班招生考試

運動科學概論試題

(含運動生物力學及運動生理學)

適用系所：體育學系碩士班 (運動科學組)

一、運動技術分析為運動生物力學重要子課題，請說明拋體運動可分為哪三種類型(12%)？並詳述影響拋體運動表現的力學參數有哪些？(13%)

二、詳讀下文，回答問題 (共 25%)

The Influence of X-Factor (Trunk Rotation) and Experience on the Quality of the Badminton Forehand Smash

No existing studies of badminton technique have used full-body biomechanical modeling based on threedimensional (3D) motion capture to quantify the kinematics of the sport. The purposes of the current study were to: 1) quantitatively describe kinematic characteristics of the forehand smash using a 15-segment, full-body biomechanical model, 2) examine and compare kinematic differences between novice and skilled players with a focus on trunk rotation (the X-factor), and 3) through this comparison, identify principal parameters that contributed to the quality of the skill. Together, these findings have the potential to assist coaches and players in the teaching and learning of the forehand smash. Twenty-four participants were divided into two groups (novice, $n = 10$ and skilled, $n = 14$). A 10-camera VICON MX40 motion capture system (200 frames/s) was used to quantify full-body kinematics, racket movement and the flight of the shuttlecock. Results confirmed that skilled players utilized more trunk rotation than novices. In two ways, trunk rotation (the X-factor) was shown to be vital for maximizing the release speed of the shuttlecock – an important measure of the quality of the forehand smash. First, more trunk rotation invoked greater lengthening in the pectoralis major (PM) during the preparation phase of the stroke which helped generate an explosive muscle contraction. Second, larger range of motion (ROM) induced by trunk rotation facilitated a whip-like (proximal to distal) control sequence among the body segments responsible for increasing racket speed. These results suggest that training intended to increase the efficacy of this skill needs to focus on how the X-factor is incorporated into the kinematic chain of the arm and the racket.

(背面尚有試題)

Keywords: 3D motion capture, full-body modeling, kinematics, whip-like movement.

1. 寫出上述期刊論文中文題目？(4%)
2. 寫出期刊論文的研究目的？(9%)
3. 詳述期刊論文研究結果？(12%)

三、閱讀後回答下列各問題（共 50%）

Effect of Capsinoids Supplementation on Fat Oxidation and Muscle Glycogen Restoration During Post-exercise Recovery in Humans.

Current Pharmaceutical Design 27(7):981-988

Abstract

Capsinoids (CSN), the novel non-pungent capsaicin analogs have been reported to promote metabolic health and exercise tolerance. However, the effect of CSN on fat oxidation and changes in skeletal muscle glycogen levels during post-exercise recovery has not been investigated in humans. We examined the effect of CSN supplementation on energy reliance, muscle glycogen resynthesis, and molecular proteins in the skeletal muscle of young adults during post-exercise recovery. In this crossover-designed study, nine healthy adult male volunteers (aged 21.4 ± 0.2 years, BMI 21.9 ± 1.3 kg/m²) completed a 60-min cycling exercise at 70% VO_{2max} . Participants consumed either CSN (12 mg, single dosage) or placebo capsules with a high-carbohydrate meal (2 g carb/kg body weight) immediately after exercise. Biopsied muscle samples (vastus lateralis), blood and gaseous samples were obtained during the 3h post-exercise recovery period. We found that oral CSN supplementation right after exercise significantly altered the energy reliance on fat oxidation during recovery. This was evidenced by a lower respiratory exchange ratio (RER) and higher fat oxidation rate in the CSN trial. Despite this, acute CSN dosage does not contribute to enhancing the glycogen replenishment in skeletal muscle during 3h recovery. We identified no significant differences in postprandial glucose and insulin area under the curve in both trials. Western blot data showed increased muscle GLUT4 expression, but no significant response of p-Akt/Akt ratio with CSN during post-exercise recovery. Our findings conclude that acute CSN intake could change energy reliance on fat oxidation, but is unable to enhance muscle glycogen resynthesis during post-exercise recovery. Thus, ergogenic properties of CSN in relevance to muscle glycogen restoration following exercise needs to be further investigated in young adults.

1. 這篇研究論文的研究目的？(5%)
2. 研究方法中提到的增補劑為何(5%)？以何種形式補充(5%)？補充劑量(5%)？何時補充幾天？(5%)

3. 受試者接受運動挑戰描述，何種運動挑戰(5%)？運動強度(5%)？運動多久？(5%)
4. 請描述 VO_{2max} 的測量方法？(5%)
5. 這篇研究論文的結論？(5%)

國立臺中教育大學 111 學年度研究所碩士班招生考試

體育概論試題

(含體育學原理及體育行政管理)

適用系所：體育學系碩士班（運動人文社會組）

- 一、請說明臺灣國民運動中心之主要功能及其核心運動設施應包含哪些內容，並舉任一國民運動中心為實例闡述其營運模式。(25%)
- 二、P. LEAGUE+聯盟是中華職籃之後，臺灣第二個開打的職業籃球聯盟，試從SWOT的觀點，分析P. LEAGUE+目前的市場定位與其因應策略。(25%)
- 三、請以運動全球化的主要面向論述臺灣棒球運動之流動圖景。(25%)
- 四、政府對於全民運動的推展，除了制定政策及相關場所設施之外，猶須哪些關鍵因素互相配合，方能順遂？請依序論述之。(25%)