# 臺北市立大學

# 111 學年度碩士班考試入學筆試試題

**系　　所：運動健康科學系碩士班**

**組　　別：不分組**

**科　　目：運動健康議題（運動健身指導、運動傷害防護、運動健康科學研發相關議題）**

**考試時間：90 分鐘【10:30-12:00】**

**總　　分：100 分**

※ 不得於答案卷封（背）面上作答或註記符號及文字（包含於答案卷封面作答後塗改者），否則不予計分。

※ 作答時限用藍色或黑色鋼筆或原子筆，用其他顏色或鉛筆作答者，所考科目不予計分。

※ 不得使用計算機或任何儀具。

**問答題（每題 20 分，共計 100 分）**

一、肥胖所衍生的健康問題為現今大家所關注的健康議題，請就您所知說明何謂肥胖？並請說明透過運動方式防止肥胖發生的主要機轉為何？

二、速度依循訓練(velocity-based training, VBT)是近年來較為主流的訓練議題，受惠於運動科技的進步，讓相關產品可以讓教練、健身指導人員更加靈活地應用在實際場域，進一步的幫助運動員提升身體表現。請解釋何謂速度依循訓練及其常見方式為何？

三、 臺北市領先六都於 2022 年邁入超高齡社會，肌少症及失智症是超高齡社會最被關切的議題，請由肌少症或失智症兩項重要議題中選擇一個議題，深入說明在超高齡社會中該議題需要被重視的原因、評估方式、運動處方的設計原則、前述運動處方可以達到健康促進目的的依據為何？

四、 請仔細閱讀［文件 1］的摘要短文，以中文陳述此篇摘要的意涵。

五、 請仔細閱讀［文件 2］，以不超過 400 個字的篇幅說明您自這篇文章所獲取的知識。

[文件 1]

**Background:** Through scholastic sports programs, adolescent athletes compete to represent their communities. However, few studies investigate the changes in physiological and mental profiles during varied sport periodization among this population. Therefore, the purpose of this study was to compare the changes in sports performance and stress-related biomarkers between the competitive season (CS) and off-season (OS) in elite adolescent basketball players.

**Method:** Nine elite Division I male basketball players (age: 15–18 years. old) participated in this study. Basketball-specific performance, salivary dehydroepiandrosterone sulfate (DHEA-S)/cortisol levels, mood state, and sleep quality were all accessed during the CS and OS periods.

**Results:** The training load during OS was 26.0% lower than CS ($p = 0.001$). Muscle mass, aerobic capacity, 10 m sprint, and Abalakov jump (AJ) power during OS were greater than that during CS (+2.2–9.8%, $p < 0.05$), but planned agility was greater during CS ($p = 0.003$). The salivary DHEA-S/cortisol was greater during CS than during OS ($p = 0.039$). The overall mood state and sleep quality did not differ between periods, but the POMS-tension was higher during CS ($p = 0.005$).

**Conclusion:** The present study demonstrates that muscle mass, aerobic capacity, peak AJ power, and 10 m sprint performance, but not planned agility, were greater during OS compared to CS among elite adolescent basketball players. Furthermore, the stress-related responses reflected by the D/C ratio and mood tension were relatively lower during the OS in these athletes. Thus, this study suggests that coaches and sport science professionals should closely monitor athletes' training states across varied training/competition periods to better react to modifying training or recovery plans.

文獻來源: *Int J Environ Res Public Health, 18(24), 13259, 2021.*

[文件 2]

Unfamiliar eccentric exercise frequently results in muscle damage, the symptoms of which include strength loss, pain, muscle tenderness, and elevation in creatine kinase (CK) activity (Belnave and Thompson, 1993; Eston et al., 1996; Mc Hugh et al., 2000, 2001). Following recovery from this initial bout a repeated bout of the same exercise results in minimal signs and symptoms of muscle damage. This has been referred to as the "repeated bout effect."(Nosaka and Clarkson, 1995) This protective effect has been demonstrated in vivo and in vitro with various types of activities using different muscle groups (Sacco andJones, 1992; Nosaka and Clarkson, 1995). Many theories have been proposed to explain the repeated bout effect but a specific mechanism has not been identified. For a recent comprehensive review see Mc Hugh et al., (1998a). Three basic mechanisms have been proposed. They are neural (Moritani et al., 1988), cellular (Lieber and Friden, 1993) and the 'connective tissue' theory (Armstrong et al., 1991). For a comprehensive review on these proposed mechanisms see Connolly et al., (2002).

Several authors have discussed the possibility that there is a change in motor unit recruitment during the repeated bout which limits the extent of damage (Pierrynowski et al., 1987; Golden and Dudley, 1992; Mayr et al., 1995; Nosaka and Clarkson, 1995; McHugh et al., 1998b). Eccentric actions typically produce greater force but less motor unit recruitment. Specifically, Golden and Dudley (1992) suggested that the lower level of motor unit activation associated with eccentric contractions may provide the opportunity to "learn more efficient recruitment" for a repeated bout. In accordance with this Nosaka and Clarkson (1995) suggested that the neural adaptation would "better distribute the workload among fibers." Similarly, Pierrynowski and colleagues (1987) suggested that "increased synchrony of motor unit firing" may reduce myofibrillar stresses during a repeated bout. These adaptations seem plausible given the neural characteristics of eccentric muscle contractions. Indeed, recent work has demonstrated significant differences in motor unit activation and fiber type recruitment for eccentric compared to concentric exercise at the same intensity (McHugh et al., 1998b). Eccentric exercise is associated with selective recruitment of a small number of predominantly fast twitch motor units. At present, this neural control of motor unit recruitment is considered mediated by a central (nervous system) mechanism.

Eston et al.(1996) demonstrated that a prior bout of unilateral isokinetic eccentric exercise provided protection against damage following a downhill run. CK was elevated on average 580% in the group that did not have a prior bout of eccentric exercise. In contrast, CK was elevated by only 150% on average in the group that did have a prior bout of eccentric exercise. Despite the fact that only the quadriceps muscle of the dominant limb was exposed to the prior bout of eccentric exercise, whole body CK elevations were significantly blunted. It was not clear whether this effect was due to reduced damage in the dominant quadriceps or whether protection was provided to other muscle groups involved in the downhill running. This data suggests the possibility of a crossover of protection to muscles not preconditioned by eccentric exercise and thus, the possibility of a protective effect on the contralateral side. Such an adaptation would have to be mediated centrally.

The possibility that the muscle damage initiated in one limb could provide protection against damage following a repeated bout in the contralateral limb has not been examined previously. Our intention was to initiate muscle damage in the quadriceps of one limb and following recovery, repeat the exercise in the contralateral limb. If the subsequent damage was less in the contralateral limb than had been observed in the previously exercised limb, this would be evidence of a central neural effect. A localized mechanism would not be plausible since no work had been previously carried out on the second limb. Thus, the purpose of the current investigation was to assess whether an unaccustomed exercise bout on one limb, resulting in muscle damage, could provide a protective effect from similar exercise when performed on the opposing limb? If so, signs and symptoms of muscle damage would be significantly decreased in the following limb following a repeated bout of exercise.

文獻來源: *J Sports Sci Med. 2002 Sep; 1(3): 80–86.*