

國立成功大學

112學年度碩士班招生考試試題

編 號：253

系 所：體育健康與休閒研究所

科 目：運動生理學

日 期：0207

節 次：第 3 節

備 註：不可使用計算機

※. 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

■名詞解釋(50%)

1. Proprioceptors
2. Blood doping
3. Insulin
4. Muscle atrophy
5. Endorphin
6. Diuretic
7. Cortisol
8. Hypothalamus
9. Lactate threshold
10. Wind chill index

■申論題(50%)

1. Delayed-onset muscle soreness 的可能機制為何？如何避免？(8分)
2. 請說明 acute exercise 和 chronic exercise 對發炎指標與神經滋養因子的效果。(12分)
3. 請簡單描述以下兩篇論文(a) & (b)之摘要內容，並論述你的看法。(30分)  
(a) A comparison of different exercise intensities for improving bone mineral density in postmenopausal women with osteoporosis: A systematic review and meta-analysis (引用來源：Kitagawa et al. (2022) Bone Rep. 17:101631.)  
**Objective:** This study aimed to compare the effects of moderate- and high-intensity resistance and impact training (MiRIT and HiRIT, respectively) on changes in bone mineral density (BMD) in postmenopausal women with osteoporosis.  
**Methods:** Randomized controlled trials that compared the intervention effects of MiRIT and HiRIT were used as selection criteria to assess study patients with osteoporosis or an osteoporotic condition. Database searches were conducted on August 25, 2022, using CENTRAL, PubMed, CINAHL Web of Science, EMBASE, and MEDLINE. A risk of bias assessment was performed using Revised Cochrane risk of bias tool for the assessment of randomized controlled trials. Point estimates and 95 % confidence intervals of change in BMD derived using dual-energy X-ray absorptiometry were collected as outcomes, and a meta-analysis was performed using the amount of change in BMD before and after the intervention. Adverse event data were also collected.  
**Results:** The search yielded six studies (391 patients, mean age 53-65 years) that met the inclusion criteria. The intervention duration ranged from 24 weeks to 13 months. Compared with the MiRIT group, the HiRIT group showed significantly improved BMD of the lumbar spine (standardized mean difference 2.37 [0.10-4.65]). However, a high degree of heterogeneity was observed for three studies (154 patients, I<sup>2</sup> = 98 %). Almost all studies reported minimal adverse events. The certainty of evidence

was extremely low because of the risk of bias, inconsistency among studies, and imprecision in terms of sample size.

**Conclusion:** Postmenopausal women with osteoporosis may achieve more significantly improved lumbar spine BMD with HiRIT than with MiRIT.

(b) Loss of association between plasma irisin levels and cognition in Alzheimer's disease. (引用來源：Kim et al. (2022) Psychoneuroendocrinology 136:105624.)

**Background:** Irisin, an exercise-induced myokine, has been shown to have beneficial effects on cognitive and metabolic functions. However, previous studies assessing the levels of circulating irisin in patients with Alzheimer's disease (AD) or diabetes mellitus (DM) have provided inconsistent results. This suggests that the normal physiological action of irisin may be altered by disease-associated pathological conditions in target organs.

**Objective:** To investigate the association of plasma levels of irisin with cognition and brain structures according to the presence or absence of AD and DM.

**Methods:** Plasma levels of irisin, multi-domain cognition, and volumes of relevant brain regions were assessed using enzyme-linked immunoassay, neuropsychological test, and magnetic resonance imaging, respectively. We classified 107 participants by cognitive (cognitively normal [CN, n = 23], mild cognitive impairment [MCI, n = 49], and AD [n = 35]) and metabolic (non-DM [n = 75] and DM [n = 32]) states.

**Results:** Disease state-stratified multiple regression analyses showed that plasma levels of irisin were positively associated with cognition only in participants without AD (CN plus MCI). By contrast, in participants with AD, these associations lost significance, and furthermore, higher levels of irisin indicated smaller hippocampal, superior temporal, and inferior frontal volumes. The association between plasma irisin levels and cognition was not affected by the presence of DM. Consistently, moderation analysis revealed that the relationship between plasma irisin levels and cognition or brain structures was significantly modified by the presence of AD, not that of DM.

**Conclusion:** Our findings suggest that the beneficial actions of circulating irisin on cognition may be attenuated by AD-induced pathological conditions in the brain.