

國立嘉義大學104學年度

體育與健康休閒學系碩士班（甲組）招生考試試題

科目：運動生理文章評述

請參考下列期刊文獻摘要，回答問題：

一、

Abstract

Dietary fish consumption contributes to a reduced risk of cardiac mortality. In the present study, the effect of low-dose fish oil (FO) supplementation on heart rate (HR) response to intense exercise and recovery was investigated in physically fit males. The subjects ($n = 26$) were supplemented (double-blind, parallel design) with ($2 \times 1 \text{ g/d}$) soya bean oil (control) or tuna FO providing the long-chain $n-3$ PUFA DHA (560 mg) and EPA (140 mg). Erythrocyte omega-3 index (%EPA+DHA), HR, HR variability and HR recovery were analysed during rest, intense exercise and recovery at baseline and after 8 weeks of supplementation. The mean erythrocyte omega-3 index, which did not differ between the groups at baseline (control 4.2 (SEM 0.2), $n = 13$; FO 4.7 (SEM 0.2), $n = 13$), remained unchanged in the control group (3.9 (SEM 0.2)), but increased in the FO group (6.3 (SEM 0.3); $P < 0.01$). The mean HR during supine resting conditions (control 56 (SEM 10); FO 59 (SEM 9)) was not affected by FO supplementation. Poincaré analysis of HR variability at rest exhibited a decreasing trend in parasympathetic activity in the FO group (SD1 (standard deviation of points perpendicular to the axis of line of identity)/SD2 (standard deviation of points along the axis of line of identity): control 0.02 (SEM 0.01); FO -0.05 (SEM 0.02); $P = 0.18$). Peak HR was not affected by supplementation. However, during submaximal exercise over 5 min, fewer total heart beats were recorded in the FO group (-22 (SEM 6) ($= -4.5$ beats/min)), but not in the control group ($+1$ (SEM 4)) ($P < 0.05$). Supine HR recovery (half-time) after cycling was significantly faster after FO supplementation (control -0.4 (SEM 1.2) s; FO -8.0 (SEM 1.7) s; $P < 0.05$). A low intake of FO increased the omega-3 index and reduced the mean exercise HR and improved HR recovery without compromising the peak HR. A direct influence of DHA via reductions in the cardiac intrinsic beat rate was balanced by a reciprocal decrease in vagal tone.

Key words: Heart rate; Exercise recovery; Fish oils; DHA

文獻來源：Macartney, M. J., Hingley, L., Brown, M. A., Peoples, G. E., & McLennan, P. L. (2014). Intrinsic heart rate recovery after dynamic exercise is improved with an increased omega-3 index in healthy males. *British Journal of Nutrition*, 112(12), 1984-1992. doi: 10.1017/S0007114514003146.

(一) 請寫出本文的中文摘要。(15分)

(二) 請寫出本文的實驗方法和主要的發現。(10分)

二、

ARTICLE INFO	ABSTRACT
<p>Article history: Received 18 January 2014 Received in revised form 18 February 2014 Accepted 1 March 2014 Available online xxx</p> <p>Keywords: Arterial compliance Pulse wave velocity Marathon Endurance Inflammation DOMS</p>	<p>There is increasing evidence that select forms of exercise are associated with vascular changes that are in opposition to the well-accepted beneficial effects of moderate intensity aerobic exercise.</p> <p>Objectives: To determine if alterations in arterial stiffness occur following eccentrically accentuated aerobic exercise, and if changes are associated with measures of muscle soreness.</p> <p>Design: Repeated measures experimental cohort.</p> <p>Methods: Twelve ($m = 8/f = 4$) moderately trained ($\text{VO}_2\text{max} = 52.2 \pm 7.4 \text{ ml kg}^{-1} \text{ min}^{-1}$) participants performed a downhill run at -12° grade using a speed that elicited 60% VO_2max for 40 min. Cardiovascular and muscle soreness measures were collected at baseline and up to 72 h post-running.</p> <p>Results: Muscle soreness peaked at 48 h ($p < 0.001$). Arterial stiffness similarly peaked at 48 h ($p = 0.04$) and remained significantly elevated above baseline through 72 h.</p> <p>Conclusions: Eccentrically accentuated downhill running is associated with arterial stiffening in the absence of an extremely prolonged duration or fast pace. The timing of alterations coincides with the well-documented inflammatory response that occurs from the muscular insult of downhill running, but whether the observed changes are a result of either systemic or local inflammation is yet unclear. These findings may help to explain evidence of arterial stiffening in long-term runners and following prolonged duration races wherein cumulative eccentric loading is high.</p> <p>© 2014 Sports Medicine Australia. Published by Elsevier Ltd. All rights reserved.</p>

文獻來源：Burr, J. F., Boulter, M., & Beck, K. (2014). Arterial stiffness results from eccentrically biased downhill running exercise. *Journal of Science and Medicine in Sport*. doi: 10.1016/j.jsams.2014.03.003.

(一) 請寫出本文的結論 (15分)。

(二) 請評析本文的結論是否合乎研究目的及主題。(10分)。

三、

摘要

目的：探討咖啡因對中高強度間歇運動後超額攝氧量 (excess post exercise oxygen consumption, EPOC) 的影響。**方法：**8 位健康男性受試者 (年齡：24.4 ± 0.3 歲、身高：174.7 ± 2.4 公分；體重：70.8 ± 2.8 公斤； $\dot{V}O_2\text{peak}$ ：38.6 ± 1.7 ml/kg/min) 參與兩次平衡交叉，雙盲且間隔至少一週的實驗處理，一次攝取 250 毫克的咖啡因膠囊，一次則為安慰劑，兩次增補後統一安靜休息 90 分鐘，隨即進行中高強度運動，運動方式為先以 60% $\dot{V}O_2\text{peak}$ 的強度進行腳踏車運動 20 分鐘後，再進行 3 組 80% $\dot{V}O_2\text{peak}$ 運動 1 分鐘，休息 1 分鐘的間歇性腳踏車運動。採集受試者攝取咖啡因或安慰劑後第 0、25、55、85 分鐘之安靜心跳率 (heart rate, HR)、呼吸交換率 (respiratory exchange ratio, RER) 及攝氧量 (oxygen uptake, $\dot{V}O_2$)。實驗過程中也採集受試者增補前 (pre-90)、運動前立即 (pre-exe)、運動後恢復期的第 4 分鐘、240 分鐘及 480 分鐘 (post-4、post-240、post-480) 之前臂靜脈血液，以及運動後 60 分鐘之攝氧量。統計方法以相依樣本 *t* 考驗檢定總 EPOC、快速期 EPOC 及慢速期 EPOC；以重複量數雙因子 (treatment × time) 變異數分析考驗 HR、RER、 $\dot{V}O_2$ 及血乳酸濃度之交互作用及差異顯著情形。**結果：**安靜攝氧量部分，時間與組別交互作用達顯著 ($F = 7.68, p = .028$)，咖啡因處理在第 25 分鐘 (5.50 ± 0.36 ml/kg/min, $p = .004$)、第 55 分鐘 (5.17 ± 0.21 ml/kg/min, $p = .032$) 及第 85 分鐘 (5.36 ± 0.23 ml/kg/min, $p = .010$) 之攝氧量，皆顯著高於第 0 分鐘 (4.35 ± 0.19 ml/kg/min)。EPOC 部分，僅咖啡因處理 (750.86 ± 91.39 ml) 之 EPOC 快速期顯著高於安慰劑處理 (600.27 ± 72.19 ml) ($p = .043$)。結論：攝取 250 mg 咖啡因可顯著增加安靜時代謝速率，及中高強度間歇運動後之能量消耗，若日後欲進行中高強度間歇運動，且欲增加能量消耗時，建議可於運動前搭配攝取咖啡因。

關鍵詞：心跳率、攝氧量、血乳酸

文獻來源：黃香萍、蘇玫尹、林嘉志、謝仲裕、王鶴森 (2014)。咖啡因對中高強度間歇運動後超額攝氧量的影響。體育學報，47 (3)，349-358。

(一) 請評析本文之優缺點為何？(15 分)

(二) 依據本文，請評析未來可延續之研究主題。(10 分)

四、

摘要

本研究目的在探討單次不同阻力運動搭配不同加壓負荷對運動後代謝壓力與合成激素反應的影響。本研究招募 15 名健康男性，依對抗平衡次序原則分為：一、高強度阻力 (70% 1 RM [repetition maximum])；二、低強度阻力 (40% 1 RM)；三、高強度阻力/低加壓 (70% 1 RM + 70% SBP [systolic blood pressure])；四、低強度阻力/高加壓 (40% 1 RM + 130% SBP) 與五、低強度阻力/低加壓 (40% 1 RM + 70% SBP)，間隔為五日。採雙腿斜坐推蹬方式 (5 組、12 次)，運動時加壓於雙腿大腿近端。比較運動前、運動後立即、15、30、60 分鐘時，血清生長激素與睪固酮、乳酸與自覺努力程度之差異；並比較運動前與運動後 60 分鐘對肌力之影響。研究結果顯示：高強度阻力/低加壓的模式在運動後有較高的生長激素且持續至運動後 30 分鐘；相較於低強度阻力下的各種模式，高強度阻力/低加壓的模式在運動後立即有較高的睪固酮濃度，且能在運動後引起較高的壓力反應 (乳酸與 RPE 值) 並降低最大等長肌力表現，以及增加肌纖維微召。本研究結論：高強度阻力運動搭配低加壓壓力的運動模式可顯著提高體內代謝壓力，同時可刺激更多生長激素與睪固酮分泌，對肌肉組織合成作用具有正面效益。

關鍵詞：加壓運動、生長激素、睪固酮、肌電圖

文獻來源：周峻忠、陳一凡、王宇涵、廖翊宏、林信甫、林正常 (2014)。單次不同阻力運動與加壓負荷對運動後代謝壓力與合成激素反應的影響。大專體育學刊，16(4)，412-422。

(一) 請評析本文的研究目的及其應用。(15 分)

(二) 請評析本文之研究方法步驟是否合宜。(10 分)