

Bone mineral density, bone metabolism, training load and life history of middle-aged male long distance runners: A long-term follow-up study

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Abstract

Long distance running is one of the typical endurance exercise. From viewpoints of health promotion, sports medicine and even evolution, long distance running is known to improve health, provide preventive and therapeutic efficiencies for chronic diseases, and play as a critical role in the evolution process of human being. In the past decades, the increasing number of amateur distance runners seems to correlate to those academic researches.

However, the effects of long distance running on bone health has been a controversial issue. In Taiwan, the number of middle-aged amateur distance runners has been vigorous increased for the last decades and there were over 500 distance running race hold in 2017. The current project reviewed the weakness about the past related studies, which included the inappropriate research tools, human studies were mostly focused on young and elite runners, the weakness in statistical method, and few follow-up studies. The principal investigator and colleagues will investigate the dynamic of bone health in male middle-aged (40-60 years old) runners during 1) a short period of before and after a marathon race, and 2) a long period of a year round training seasons. Methods of serum bone/energy indices analyses, bone mineral density measurements, training/life history record by using questionnaire and wearable devices will be included in the current project.

The findings of the current study are expected to become important reference for the fast increasing sport population. And, the using of wearable devices is associated with an Industry-University Collaboration. Thus, development of related commercial products are expected.

Keywords: bone metabolism, bone mineral density, long distance runner, wearable devices

The current project is part of the “NCKU Triathletes’ Coach Project”. Based on the agreement of the subjects of the “NCKU Triathletes’ Coach Project”, we further analyze the data collected from their wearable devices only for research ([Link to privacy policy](#)).

中壯年男性長距離跑者骨密度、骨代謝、訓練負荷及生活歷程之長期追蹤研究

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摘要

長距離跑是典型的耐力性運動之一，從健康促進、運動醫學甚至從人類學的觀點來看，長距離跑可對健康水準有所提昇，對慢性病有預防及治療的效果，以及在人類演化過程中長距離跑的能力已被證實是人類存活下來的重要因素。近年來，業餘跑者的快速增加呼應著上學術研究的對長距離跑的正面觀點。

然而，長距離跑者的骨骼健康影響，卻一直是一個存在有爭議的研究主題。面對近年來中壯年業餘跑者的人數快速增加，我國每年的跑步賽事已增加到 500 場以上，此一議題的爭議急待釐清。本計畫歸納過去研究不足之處，包括研究工具的不足、研究對象多以年輕運動員為主、統計方的缺失以及觀查時間不夠長等等問題，擬規劃以（1）單一馬拉松賽事前後之短期與（2）為期一年的追蹤式研究，與實驗期間進行受試者的骨代謝指標、能量代謝指標、骨質密度以及訓練與生活歷程之量測與記錄，以了解從事長距離跑運動對中壯年男性（40-60）骨健康的影響。

預期研究成果可成為近年快速激增之運動族群的重要健康參考文獻，此外，本研究的重要研究工具——穿戴式裝置，除了可提供受試者完整訓練及生活歷程的重要資訊外，研究過程中與產業的合作，預期將使本案額外衍生產業價值。

關鍵詞：骨代謝、骨質密度、長距離跑、穿戴式裝置

本案為 NCKU 鐵人三項教練計畫之一部份，該計畫在受試者同意後，得分析受試者穿戴式裝置之資料，並僅供研究之用（[使用者之隱私政策連結](#)）。