出國報告（出國類別：出席國際會議）

2016 年農業與生物系統工程機電國際學術會議 (2016 ISMAB)

(2016 International Symposium on Machinery and Mechatronics for Agriculture and Biosystems Engineering, 2016 ISMAB)

服務機關：國立嘉義大學
姓名職稱：陳信良教授
派赴國家：日本
出國期間：2016 年 05 月 18 日至 23 日
報告日期：2016 年 06 月 10 日

摘　要

農業與生物生產系統機電整合國際學術會議（International Symposium on Machinery and Mechatronics for Agricultural and Biosystems Engineering, ISMAB）係由臺灣、日本和韓國三個國家之農業機械學會，於 2000 年共同協議輪流舉辦之學術會議。該學術會議每隔兩年舉行一次，主要與會人員以臺日韓三國農機學會會員為主，會議舉辦時間和地點由輪值國決定。ISMAB 的主要目的為提供學術交流平台，供臺日韓三國農機相關之產學界專家發表研發成果，促進各國間之合作研究工作及國際友誼。

因應各國農機科系之轉型發展，歷年來在 ISMAB 發表之論文除了傳統農機領域之田間動力農機具，及收穫後農產及食品加工處理機之外，亦包括整合性科技例如機電整合技術、感測科技、資訊與電機、系統工程、精準農業、生物與再生能源、生物機電與機器人、食品安全、設施與環境工程、廢棄物處理、生物技術和畜產、漁業養殖及醫學工程等領域。

2016 年農業與生物生產系統機電整合國際學術會議（International Symposium on Machinery and Mechatronics for Agricultural and Biosystems Engineering, 2016ISMAB），此會議是由日本農機與食品工程學會主辦，開會地點在日本新潟朱鷺 (TPKI MESSE)新潟會議中心，會議期間：105 年 05 月 23-25 日。本出國計畫為出席找運用計畫管理費款項之經費，將執行計畫的研究成果，研究論文於該會議中報告發表與交流。

關鍵詞：國際學術會議、生物機電、機電整合、農業機械學會、新潟朱鷺

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壹、計畫緣起與目的

農業與生物生產系統機電整合國際學術會議(International Symposium on Machinery and Mechatronics for Agricultural and Biosystems Engineering, ISMAB）係由臺灣、日本和韓國三個國家之農業機械學會，於 2000 年共同協議輪流舉辦之學術會議。該學術會議每隔兩年舉行一次，主要與會人員以臺日韓三國農機學會會員為主，會議舉辦時間和地點由輪值國決定。ISMAB 的主要目的為提供學術交流平台，供臺日韓三國農機相關之產學界專家發表研發成果，促進各國間之合作研究工作及國際友誼。

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第一屆會議（ISMAB2002）於 2002 年 11 月 3 日至 7 日在臺灣嘉義市國立嘉義大學召開，由該校生物機電工程學系負責籌劃。本次學術會議提供世界各國農業與生物生產系統機電整合之研究人員交換彼此的研究成果與經驗，與會者來自產官學界，總計參與人數：國內約 140 人，國外約 60 人分別來自日本、韓國、美國、英國、馬來西亞、泰國、德國、沙烏地阿拉伯，共發表 74 篇論文演講與 19 篇海報展示。會議並安排 7 場專題演講，其中含蓋農業機械發展、食品科技、生物奈米技術、與生醫工程，此安排使與會者了解『農業機械』至『機電整合』的演化，並進而應用於『生物系統』的概念。

第二屆會議（ISMAB2004）於 2004 年 9 月 21 日至 23 日在日本神戶大學召開，由該校生物系統工程學系負責主辦。第三屆會議（ISMAB2006）於 2006 年 11 月 23 日至 25 日在韓國首爾市世貿中心（COEX）召開，由韓國農業機械學會負責主辦。第四屆會議（ISMAB2008）於 2008 年 5 月 27 日至 29 日在臺灣臺中市國立中興大學舉辦，主辦單位為中興大學生物產業機電工程學系。第五屆會議（ISMAB2010）於 2010 年 4 月 5 日至 7 日在日本九州福岡市九州大學舉辦。第六屆會議（ISMAB2012）於 2012 年 6 月 18 日至 20 日在韓國全州(Jeonju)市全北大學(Chonbuk National University)舉辦。第七屆會議(ISMAB2014)將於 2014 年 5 月 21 日至 23 日在臺灣宜蘭市國立宜蘭大學召開，本屆主辦單位為宜蘭大學生物機電工程學系。歷年來，各國皆以不落人後心態承辦 ISMAB，因此該會議 12 年來之盛況、參與人數、發表論文篇數及成果，一年勝過一年。

ISMAB 在臺灣舉辦時，其負責籌劃單位由臺灣各大學農機相關學系接力擔任。臺灣承擔之校系依次為 2002 年國立嘉義大生物機電工程學系，2008 年國立中興大學生物產業機電工程學系，2014 年國立宜蘭大學生物機電工程學系。ISMAB 每隔六年重返臺灣乙次，每次

皆由臺灣農機學會協調相關校系輪流籌劃事宜。依此原則，2020 年將由國立屏東科技大學生物機電工程系籌辦，2026 年將由國立臺灣大學生物產業機電工程學系籌辦。臺灣農機學會和國立臺灣大學農業機械工程學系（2001 年更名為生物產業機電工程學系）曾於 1997 年 11 月 17 日至 22 日在台北市世貿中心國際會議中心召開農業機械化與自動化國際研討會（International Symposium on Agricultural Mechanization and Automation, ISAMA97），相當於 ISMAB 前身。

2016 年農業與生物生產系統機電整合國際學術會議（International Symposium on Machinery and Mechatronics for Agricultural and Biosystems Engineering, 2016ISMAB），此會議是由日本農機與食品工程學會主辦，開會地點在日本新潟朱鷺 (TPKI MESSE)新潟會議中心，會議期間：105 年 05 月 22-24 日。本出國計畫為出席找運用計畫管理費款項之經費，將執行計畫的研究成果，研究論文於該會議中報告發表與交流。

貳、參加研討會過程與內容

一、會議議程及議場主題

第八屆農業機械生物機電與系統工程國際學術研討會議『The 8th International Symposium on Machinery and Mechatronics for Agricultural and Bio-systems Engineering (簡稱 ISMAB2016)共有 14 個專業領域，如生物工程(Biological Engineering)、農業生物機電與機器人(Biomechatronics & Robotics in Agriculture)、田間動力機械(Farm Power & Machinery)、精準農業(Precision Agriculture)、食品工程(Food Engineering)、收穫後技術(Postharvest Technology)、食品安全(Food Safety)、結構與環境技術(Structure & Environmental Technology)、生質與再生能源(Bioenergy & Renewable Energy)、廢棄物處理(Waste Management)、綠色技術(Green Technology)、資訊與電子(Information & Electronics)、感測技術(Sensor Technology)、 一般領域(General Aspects)。參與 ISMAB2016 論文發表會，除了農業機械與生物機電研究領域之外，各國專家學者都積極的從事於新興科技的研究，如微奈米科技、生醫工程和感測技術的開發。在生物機電未來的研究上，運用新興科技是生物機電工程人員必須著墨的範疇。

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下午 5 點 45 分報到，5 月 23 日上午 9 點 30 分開始進行開幕，之後邀請韓國、台灣日本、義大利及土耳其分別報告該國的農業機械的發展狀況及未來發展（如附件一），下午開始四場次的分組議場的論文主題口頭發表（摘錄如附件二），5 月 24 日上午從 9 點 30 分到 12 點，下午從 2 點 30 分到 5 點 30 分，有四場次的分組議場的論文主題口頭發表（摘錄如附件三），而論文壁報發表時間為 5 月 23 日及 5 月 24 日下午從 1 點 15 分到 2 點（如附件四），其中口頭發表的論文篇數有 127 篇，壁報發表的論文篇數有 117 篇，合計論文篇數有 244 篇。所有出席參與者的論文發表過程順利，發表論文的摘要內容如（附錄一），論文發表者除了台灣外，主要有來自日本、韓國、泰國等國。

5 月 25 日大會安排參觀日本株式會社久保田(KUBOTA)公司，其創立於 1890 年，作為日本最大的農機製造商，長期以來在“水”、“土”、“環境”、“城市”、“居住”等與人類生活和文化息息相關的五大事業領域中，不斷開發符合時代要求的先進技術和產品，為人類富裕美好的生活積極創造基礎。目前在農業機械（聯合收割機、插秧機、拖拉機）、小型建機、小型柴油發動機、鑄鐵管等領域處於世界前列。發動機製造方面，久保田擁有 85 年的生產經驗，累計銷售超過 2600 萬台，在中小馬力發動機領域具有壓倒性的優勢地位；在小型挖掘機製造方面，久保田幾十年專注於小挖的研發和製造，從 0.5 噸-6 噸，共 33 個機種，年銷量達 23000 台，累計銷量達到 280000 台，連續多年小挖全球銷量第一，始終以市場實績和品質優勢成為全球小挖行業的領跑者！

該公司主要為農業機械方面的研究，參觀的實驗室包括曳引機及引擎動力檢驗測定室、農產加工機械研發中心、田間機械研究室。該所於參觀當日陳列上述各領域在近年來所研發之農機。一般而言 ,其研究成果品質甚高，頗多值得國內學習借鏡的地方。之後走訪新潟縣的鄉村與其鬧區。由此參訪中，可以感受到日本在研究發展與都市建設的用心。大力投資研發，以其與世界先進國家並駕齊驅；在都市建設上，力求經濟發展的同時，也提供人民良好的生活品質以及文化遺產的保護。

二、與會見聞或新知

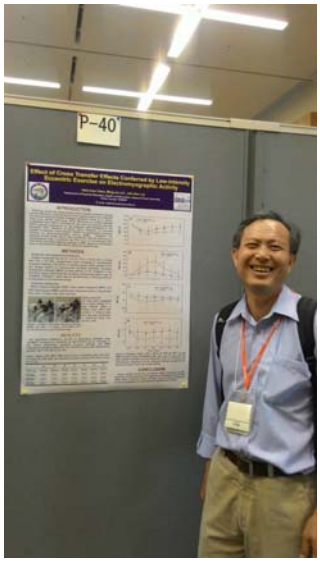
2016 年農業與生物生產系統機電整合國際學術會議（International Symposium on Machinery and Mechatronics for Agricultural and Biosystems Engineering, 2016ISMAB），提高機械工程與自動化工程相關的技術研究人員和從業人員之间的溝通。本次參與此國際會會議期能瞭解目前國際在細胞力學方面的各種應用，以期未來能夠進一步做相關方面的研究。口頭發表及壁報發表的過程順利，充分強調研究的重點，會後也和與會人士討論相關的研究主題及成果，收穫豐富。

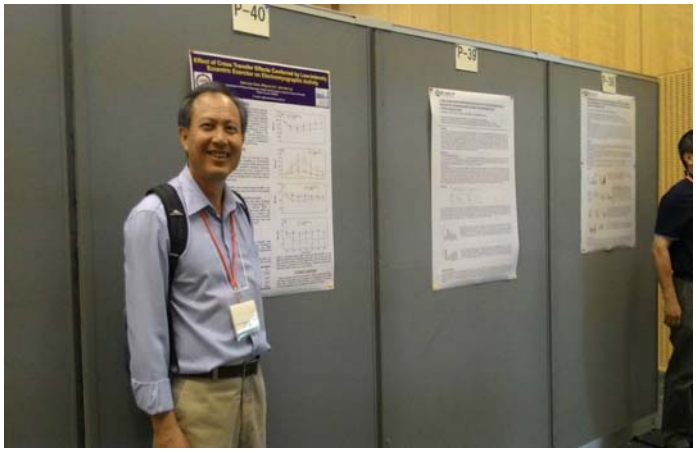
會後攜回參加會議論文發表證明及相關資料如下：

1. 研討會場報到及參加相片



研討會報到及參加大會開幕





壁報論文發表

2. ISMAB2016 會議程序手冊及論文摘要集

Technical Sessions: Poster Presentation

[Room 201]
Core time: May 23 13:15 - 14:15, May 24 13:15 - 14:15

No.	Title
	Biological Engineering (BE)
P-38	**Long-term Antihypertensive Effects of Far Infrared Rays Irradiated from Wooden Board in Spontaneously Hypertensive Rats** Tzong-Shean Chin[1], Hsin-I Chang[2], Tzung-Chieh Tsai[3], Cheng-Nan Chen[2]* [1] Department of Aquatic Biosciences, National Chiayi University, Taiwan [2] Department of Biochemical Science and Technology, National Chiayi University, Taiwan [3] Department Microbiology, Immunology and Biopharmaceuticals, National Chiayi University, Taiwan
P-39	**Upregulation of Bone Morphogenetic Protein-2 Synthesis and Consequent Collagen II Expression in Leptin-stimulated Human Chondrocytes** Shih Rong Kuo[1], Hsin-I Chang[2], Tzung-Chieh Tsai[3], Cheng-Nan Chen[2]* [1] Department of Aquatic Biosciences, National Chiayi University, Taiwan [2] Department of Biochemical Science and Technology, National Chiayi University, Taiwan [3] Department Microbiology, Immunology and Biopharmaceuticals, National Chiayi University, Taiwan
P-40	**Effect of Cross Transfer Effects Conferred by Low Intensity Eccentric Exercise on Electromyographic Activity** Hsin-Lian Chen, Ming-Ju Lin*, Jian-Han Lai Department of Physical Education, Health & Recreation, National Chiayi University, Taiwan
P-41	**Lettuce Appearance Measurement Using Image Processing** Yung-Chuan Chiou[1], Jhen Ru Huang[1], Chyung Ay[1], Ying-Jen Huang[1]*, Wei-Ru Kuo[2], Jeng-Liang Lin[1] [1] Department of Biomechatronic Engineering, National Chiayi University, Taiwan [2] Department of Horticulture, National Chiayi University, Taiwan
P-42	**Study of the Fluid Shear Stress on Imflammatory Rat Aorta Abdominalis** Kuan-Fu Liu, Hao-Hsuan Hsu, Cheng-Wen Chen, Chyung Ay* Dept. of Biomechatronic Engineering, National Chiayi University, Taiwan
P-43	**Stress Analyses of Fruit Stacks** Young-Chaun Chen[1], Hsun-Heng Tsai[2]*, [1] Dept. of Vehicle Engineering, National Pingtung University of Science and Technology, Taiwan [2] Dept. of Biomechtronics Engineering, National Pingtung University of Science and Technology, Taiwan
P-44	**Development of Automated System to Pick Seedlings Up for Vegetable Transplanters** T.G.kang[1]*, S.W.kim[1], Y.K.kim[1], S.H.Lee[1], H.J.Jun[1], I.S.Choi[1], H.G. Kim[1], O.Y. Yang[2], K.S. Jang[3] [1] Department of Agricultural Engineering in National Academy of Agricultural Science (NAAS), Korea [2] National Institute of Horticultural and Herbal Science, Korea [3] Gyeongsangbuk-do Agricultural Research & Extension Services, Korea
P-45	**Investigation of Brain Situation Attention Using Brainwave Mind Games** Zhao-Wei Chen, Ming-Ling Cheng, Ya-Ting Chang , Chun-Yu Tsai, Chyung Ay* Dept. of Biomechatronic Engineering, National Chiayi University, Taiwan
P-46	**The Effects on Spectral Characteristics of Brainwave Under Stimulation of Binaural Beats Music** Hsueh-Ming Chiang, Pei-Hsuan Tseng, Liang-Huang Kuo, Chun-Yu Tsai, Chyung Ay* Dept. of Biomechatronic Engineering, National Chiayi University, Taiwan

P-40

Effect of Cross Transfer Effects Conferred by Low Intensity Eccentric Exercise on Electromyographic Activity

Hsin-Lian Chen, Ming-Ju Lin*, Jian-Han Lai

Department of Physical Education, Health & Recreation, National Chiayi University, Taiwan

Abstract : Previous study has demonstrated low intensity eccentric training can be effective in preventing the limb muscles due to the reduction of exercise-induced muscle damage symptoms. Moreover, to confirm whether a repeated bout effect conferred by one limb of eccentric exercise (ECC) against subsequent by the opposite limb. However, no previous studies to explore cross transfer effects of low-intensity eccentric training on electromyographic activity (EMG). This study tested hypothesis that the dominant or non-dominant legs to perform the first bout of low-intensity ECC (10%-ECC) would be affected changes in EMG against a subsequent bout of maximal ECC (MAX-ECC) using the opposite leg. Sixteen untrained men were assigned to low intensity eccentric training (10%-ECC) or control group (CON) groups (n=10 per group) based on pre-exercise maximal voluntary isometric contraction strength (MVIC) at knee flexion of 900. Subjects in the 10%-ECC group performed 30 eccentric contractions with a load of 10%MVIC, followed 1 week later by 30 MAX-ECC of the knee flexors of dominant or non-dominant legs. MVIC, muscle soreness (SOR), relaxed knee joint angle (RANG), mean power frequency (MPF), and root mean square (RMS) activity were measured before, immediately after, and 0~5 days after each exercise. All date were compared by a mixed design of two-way ANOVA. The results of the present study showed that no significant difference ($p>.05$) in dependent variables after 10%MVIC compared to baseline for the10%-ECC group. Changes in the above dependent variables (muscle damage and EMG indicators) following MAX-ECC for 10%-ECC group was significantly smaller than CON group. These results found that protective effect conferred by the first limb of low-intensity ECC against a subsequent bout of the other limb. Therefore, these findings may provide as evidence of neural adaptation to contralateral repeated bout effect.

參、心得與建議事項

一、心得

能夠有機會參與 2016 年農業與生物生產系統機電整合國際學術會議（2016ISMAB），並與生物機電研究的相關領域跟各地專家相互討論交流與分享研究成果，感覺獲益良多。在相關議題相互討論及分享研究成果與實務經驗，進而強化國內相關學術研究領域應用視野，對與會的國內學者有顯著助益。

與來自各地的專家學者齊聚一堂，針對生醫工程與生物機電研究的相關議題相互討論、彼此交流、分享研究成果與實務經驗，實在是獲益良多。會議期間與數位大陸優秀學者進行學術交流，瞭解到現今中國學術研究已漸漸蓬勃發展，深深地覺得台灣要繼續保持學術優勢需不斷的提升自我的學術能力，多與全球進行學術交流，擬定學術研究正確的方向，避免閉門造車之撼。

二、建議事項

參加這次會議，有些感觸與建議，這裡提出幾點建議意見：

1. 由此次的參與過程可知，在舉辦國際研討會可交由專門公司承包，可減輕承辦人員的負擔。反觀我國所有大小事情全需要承辦單位包辦，但事事受限於會計法，承辦人員會很累。
2. 由大會中發表的論文可看出，除了生物醫學工程和機電控制研究領域之外，各國專家學者都積極的從事於新興科技的研究，如微奈米科技、生醫工程和感測技術的開發。此在生物機電未來的研究上，運用新興科技是生物機電工程人員必須著墨的範疇。

肆、附錄

附錄一 論文接受通知信函

ISMAB2016
International Symposium on
Machinery and Mechatronics for
Agriculture and Biosystems Engineering

15 February 2016

ABSRTACT ACCEPTANCE LETTER

This is a confirmation that the abstract entitled:

"Effect of Cross Transfer Effects Conferred by Low Intensity Eccentric Exercise on Electromyographic Activity"
Author(s): Hsin-Lian Chen, Ming-Ju Lin, Jian-Han Lai,

has been accepted for presentation at ISMAB 2016

Name of event:
ISMAB 2016 (8th International Symposium on Machinery and Mechatronics for Agricultural and Biosystems Engineering)
Dates: May 23 – 25, 2016
Place: Niigata, Japan

芽生寛司

Kenji Imou
Chairman of the Program Committee for ISMAB 2016

ISMAB 2016 Secretary
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附錄二 論文發表摘要

EFFECT OF CROSS TRANSFER EFFECTS CONFERRED BY LOW-INTENSITY ECCENTRIC EXERCISE ON ELECTROMYOGRAPHIC ACTICVITY

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Abstract

PURPOSE: This study tested hypothesis that the dominant or non-dominant legs to perform the first bout of low-intensity ECC (10%-ECC) would be affected changes in EMG against a subsequent bout of maximal ECC (MAX-ECC) using the opposite leg. **METHODS:** Sixteen untrained men were assigned to low-intensity eccentric training (10%-ECC) or control group (CON) groups (n=10 per group) based on pre-exercise maximal voluntary isometric contraction strength (MVIC) at knee flexion of 30˚. Subjects in the 10%-ECC group performed 60 eccentric contractions with a load of 10%MVIC, followed 1 week later by 60 MAX-ECC of the knee flexors of dominant or non-dominant legs. MVIC, muscle soreness (SOR), mean power frequency (MPF), and root mean square (RMS) activity were measured before, immediately after, and 1~5 days after each exercise. All date were compared by a mixed design of two-way ANOVA. **RESULTS:** No significant difference ($p>.05$) in dependent variables after 10%MVIC compared to baseline for the10%-ECC group. Changes in the above dependent variables (muscle damage and EMG indicators) following MAX-ECC for 10%-ECC group was significantly smaller than CON group ($p<.05$). **CONCLUSIONS:** These results found that protective effect conferred by the first limb of low-intensity ECC against a subsequent bout of the other limb. Therefore, these findings may provide as evidence of neural adaptation to contralateral repeated bout effect.

Key Words: maximal voluntary isometric contraction strength, repeated bout effect, mean power frequency, root mean square, muscle damage

INTRODUCTION

Previous study has demonstrated low intensity eccentric training can be effective in preventing the limb muscles due to the reduction of exercise-induced muscle damage symptoms (Chen et al., 2012a; Chen et al., 2012b; Chen et al., 2013). Moreover, to confirm whether a repeated bout effect conferred by one limb of eccentric exercise (ECC) against subsequent by the opposite limb (Howatson & van Someren, 2007; Starbuck & Eston, 2012). However, no previous studies to explore cross transfer effects of low-intensity eccentric training on electromyographic activity (EMG) . Therefore, the purpose of this study was to test hypothesis that the dominant or non-dominant legs to perform the first bout of low-intensity ECC (10%-ECC) would be affected changes in EMG against a subsequent bout of maximal ECC (MAX-ECC) using the opposite leg.

METHODS

Subjects and general procedures

Sixteen untrained men (21.5 ± 1.4 yrs, 172.1 ± 4.5 cm, 68.7 ± 7.6 kg, and 74.4 ± 9.6 Nm, respectively) were assigned to low-intensity eccentric training (10%-ECC) or control group (CON) groups (n=10 per group) based on pre-exercise maximal voluntary isometric contraction strength (MVIC) at knee flexion of 30˚. Subjects in the 10%-ECC group performed 60 eccentric contractions with a load of 10%MVIC, followed 1 week later by 60 MAX-ECC of the knee flexors of

dominant or non-dominant legs.

Criterion measures

MVIC, muscle soreness (SOR), mean power frequency (MPF), and root mean square (RMS) activity were measured before, immediately after, and 1~5 days after each exercise.

Data analysis

All date were compared by a mixed design of 2-way ANOVA. When a simple main effect was evident, a Tukey's post hoc test was conducted. A significant level was set at $\alpha \leq .05$.

RESULTS

No significant difference ($p>.05$) in dependent variables after 10%MVIC compared to baseline for the10%-ECC group. Changes in the above dependent variables (muscle damage and EMG indicators) following MAX-ECC for 10%-ECC group was significantly smaller than CON group ($p<.05$).

Table 1. MVIC, SOR, MPF, RMS before (Pre), immediately after (D0), and 1~5 days (D1~D5) after low-intensity eccentric training (10%-ECC) of the KF (n = 8).

	Pre	D0	D1	D2	D3	D4	D5
MVIC (Nm)	110.4±10.1	108.5±11.4	107.5±8.3	111.3±9.7	109.6±8.7	109.9±7.2	110.5±9.9
SOR (mm)	0.0±0.0	0.9±2.1	0.3±0.7	1.0±2.1	0.8±2.1	0.7±1.6	0.0±0.0
RMS (mV)	1.6±0.9	1.2±1.2	1.0±1.4	1.5±1.4	1.0±1.4	1.1±1.2	1.2±1.8
MPF (Hz)	70.6±7.7	73.6±2.1	72.7±5.5	73.1±5.8	73.3±7.2	74.0±5.0	72.8±6.0

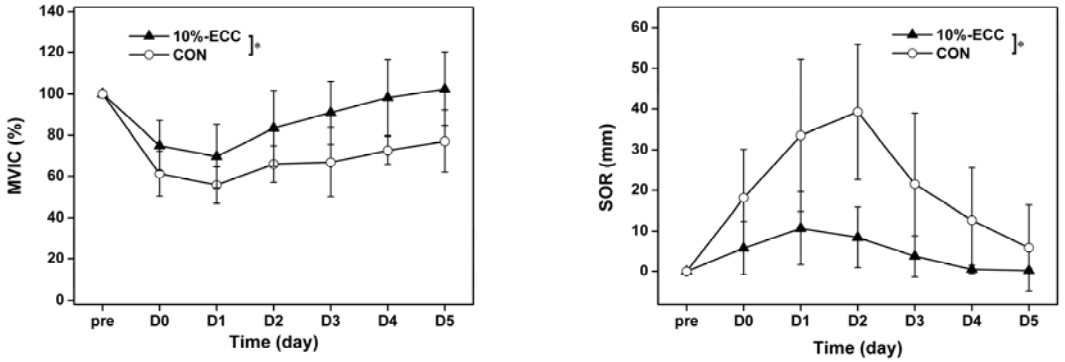

Figure1. Changes (mean ± SD) in MVIC (left) and SOR (right) before (Pre), immediately after (D0), and 1~5 days (D1~D5) after maximal eccentric exercise (MAX-ECC) of KF for 10%-ECC and CON groups. *Significant ($p<.05$) difference between groups for the interaction effect shown by a 2-way ANOVA.

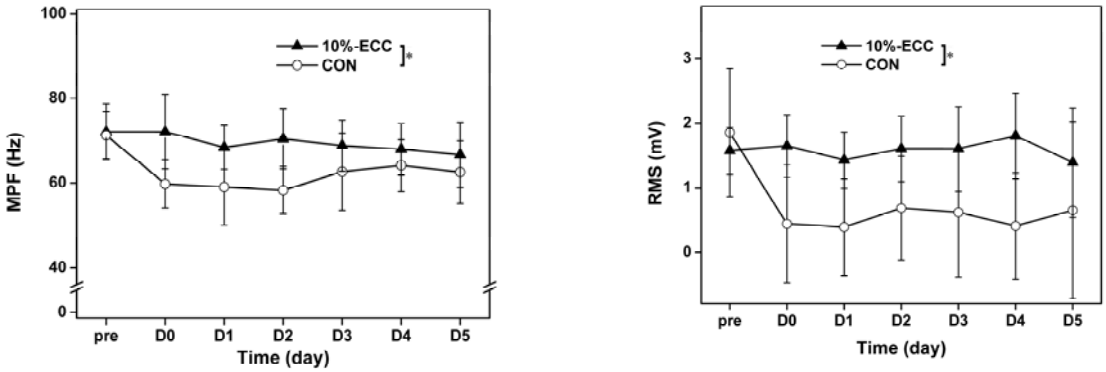

Figure2. Changes (mean ± SD) in MPF (left) and RMS (right) before (Pre), immediately after (D0), and 1~5 days (D1~D5) after maximal eccentric exercise (MAX-ECC) of KF for 10%-ECC and CON groups. *Significant ($p<.05$) difference

between groups for the interaction effect shown by a 2-way ANOVA.

CONCLUSIONS

These results found that protective effect conferred by the first limb of low-intensity ECC against a subsequent bout of the other limb. Therefore, these findings may provide as evidence of neural adaptation to contralateral repeated bout effect.

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