出國報告（出國類別：開會）

國立台灣大學醫學院附設醫院北護分院

2024世界復健醫學會

服務機關：國立臺灣大學醫學院附設醫院北護分院

姓名職稱：韓德生醫師兼醫療部主任

派赴國家：澳洲

出國期間：113年5月30日至6月7日

報告日期： 113 年 6 月 13 日

摘要

復健醫學為人口老化過程之重要課題，世界復健醫學大會則為復健領域年度全球最大的會議。本次參與2024年復健醫學大會主要完成四項任務：發表個人在肌少症生物指標的創新研究、參加世界復健醫學會教育委員會年會、與各國菁英交流腦力激盪並學習復健新知、競選個人會員亞太區代表。

回顧此次與會成果包括：在復健新知學習上，比較並研討了不同疾病的生物指標；在老人照護上，研討關於跌倒及衰弱的預防；在醫院參訪中，了解高階神經復健、機器人復健的設置；在代表權爭取方面，成功於四位候選人中脫穎而出，成為會員代表。

關鍵字：復健醫學、肌少症、生物指標、會員代表

目次

壹、目的

復健醫學為人口老化過程之重要課題，世界復健醫學大會又為復健領域年度全球最大的會議。此會議與世界衛生組織(World Health Organization, WHO)合作認可，更顯其重要性。此次參與會議目標包括：

1. 發表個人在肌少症生物指標的創新研究，
2. 參加世界復健醫學會教育委員會的年會，
3. 與各國菁英交流、腦力激盪，學習復健新知
4. 競選個人會員亞洲區代表。

2024年世界復健醫學會(International Society of Physical & Rehabilitation Medicine)輪由亞洲的澳大利亞舉辦，會場在雪梨國際會議中心(International Convention Centre Sydney, ICC Sydney)，時間6/1-6/6。此次四項目標皆圓滿達成。未來對於發展「老年醫學與長期照護的最佳照護模式」、「結合社區照護資源，為社區民眾提供優質照護」之服務架構與願景皆會有所助益。

貳、過程簡要

6月1日, Sat：會前超音波工作坊

超音波檢查技術日新月異，早已成為臨床醫師的第二聽診器！熟悉超音波檢查及注射技術，已是現代醫師不可或缺的生存必備能力，對於熟悉肌肉骨骼系統的復健專科醫師更是不能例外。北護分院每年辦理兩次國際超音波工作坊，有口皆碑。此次利用難得的國際場合，參加由澳洲當地印度裔醫師辦理的超音波工作坊，希望他山之石、可以為錯。

整體而言，北護分院舉辦的工作坊相較有下列優點：1.配有示範用MODEL，方便標準化學習；2.有精美的講義及學習清單，便於學員快速了解並統一講員之間的歧異；3.控制學員人數，確保師生比以及都有hand-on的機會。

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<tr><td> 
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<tr><td>超音波工作坊議程</td><td>超音波工作坊講員</td></tr>
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<tr><td>講員介紹</td><td>工作坊實況</td></tr>
</table>

6月2日, Sun：上午於亞太工作坊演講「新穎肌少症生物指標」，下午參與教育委員會會議

此次由亞太復健醫學會提出「傑出講演工作坊(luminary series workshop)」匯集了亞太區菁英提供新穎主題供會眾聆聽。本人榮幸受邀演講「新穎肌少症

生物指標」；其他台灣代表包括台大醫院王亭貴副院長講述超音波於吞嚥困難之應用發展、長庚醫院陳柏旭教授講述下背痛的新穎注射治療、羅東博愛醫院鄧復旦副院長講述肉毒桿菌注射對髕股症候群的治療、亞大附醫周立偉副院長講述肌膜疼痛症候群的新治療、奇美佳里醫院周偉倪院長講述運動生理評估新儀器發展，佳評如潮，交流豐碩。

下午參加教育委員會例會，與來自各國的代表討論：學術活動認證流程、雋永教育題材製作、建立專科教育標準等三項議題。

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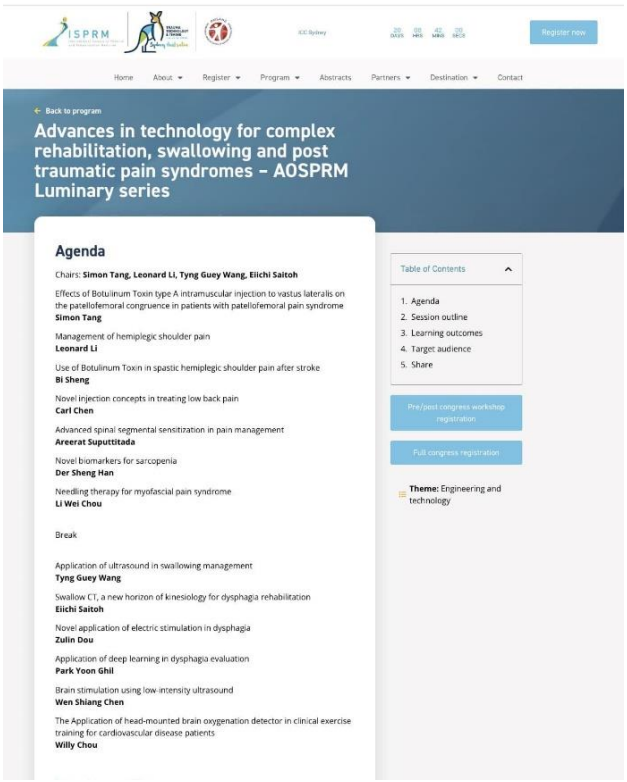
<tr><td>  </td><td> 
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<tr><td>亞太工作坊成員合影</td><td>亞太工作坊議程</td></tr>
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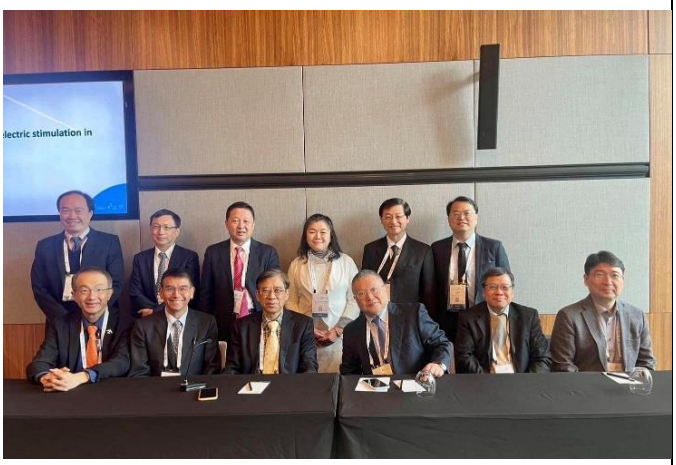
</td><td>  </td></tr>
<tr><td>講者演講台留影</td><td>所有講者留影</td></tr>
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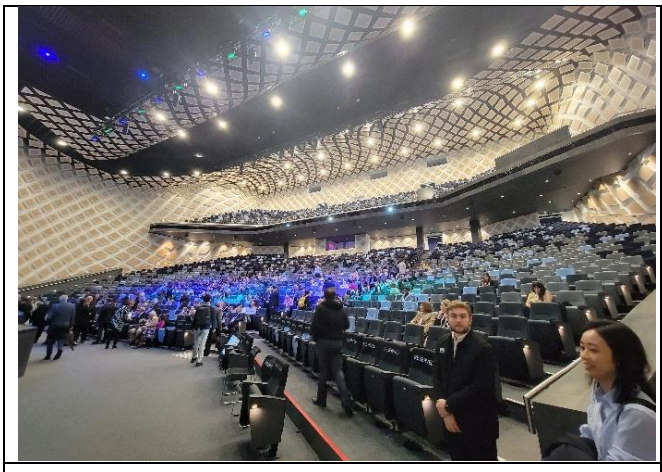
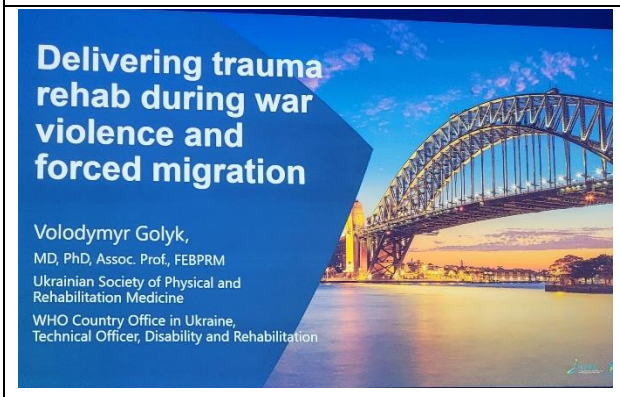
亞太工作坊	會議實況

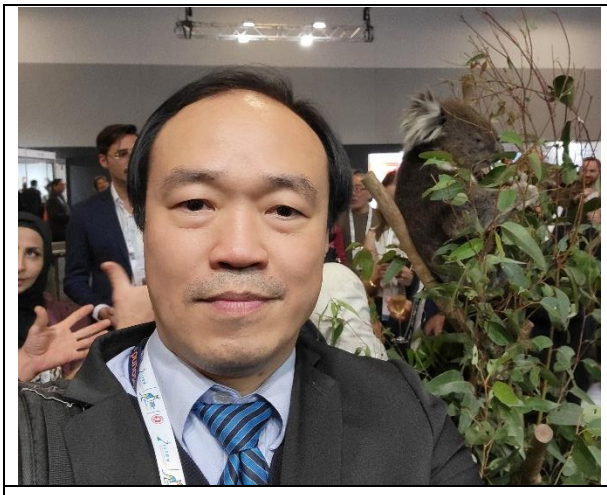
6月3日, Mon：開幕式及開幕晚會

2024年世界復健醫學會輪由亞洲的澳大利亞舉辦，會場在雪梨國際會議中心(International Convention Centre Sydney, ICC Sydney)，時間6/1-6/6。此次主題為3T (trauma, technology and timing)，希望針對創傷、科技、與時機加強研討。開幕式於6/3舉行，分別由大會主席John Oliver及紐西蘭復健醫學會理事長正式宣布大會開始，接下來由世界復健醫學會主席致詞。

身為處置失能的醫學專科，今年的世界復健醫學會邀請深受戰火摧殘的烏克蘭醫師Golyk副教授作開幕大會演講，真是再恰當不過了！烏克蘭原有人口五千萬，經過戰火摧殘、難民移出，目前人口三千八百萬人。聯合國人權組織估計直接因戰火死亡人數超過三萬人，受傷無數。然而烏克蘭的復健發展相對年輕，需面對大量因戰火產生的截肢、脊髓損傷、腦外傷、癱瘓的典型復健科病人，相當吃力。幸賴聯合國WHO、歐洲復健醫學會、德國協助，健全強化復健醫學臨床服務及人力培育。

	
雄偉的雪梨國際展覽館(ICC)	ICC大會堂

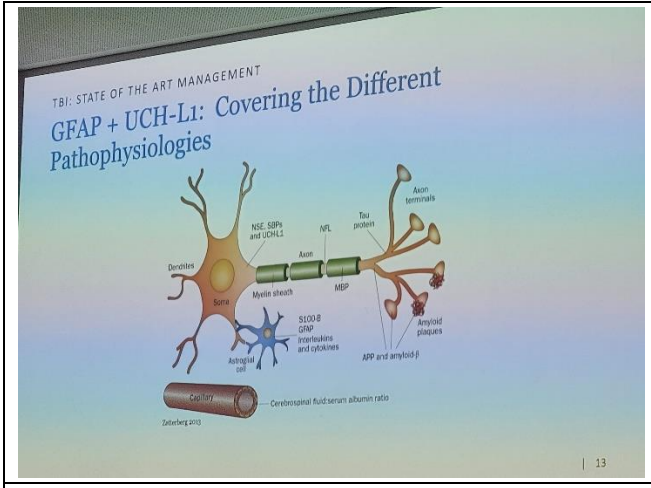
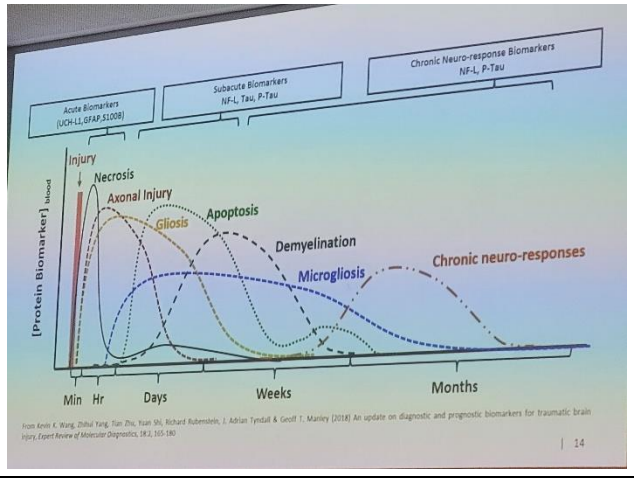
	
台灣代表於報到處合影	電子報到機台
	
大會主席John Oliver致詞	世界復健醫學會主席致詞
	
開幕主題演講	Golyk教授演講
	
烏克蘭喪失雙下肢士兵接受復健	烏克蘭喪失上肢士兵接受復健

	
開幕晚會的無尾熊是焦點	與負鼠合照

6月4日, Tue：參加個人會員大會，競選個人會員代表；輕度腦傷之生物指標

世界復健醫學會以會員代表大會(Assembly of Delegate, AOD)為最高權力機構，具有投票權可以選舉理事長。AOD的組成除了理事會成員外，還包括國家代表及個人會員代表(Delegate of Individual Member, DIM)；台灣的國家代表為長庚醫院的陳柏旭教授。今年有一位亞太區代表出缺，共有兩位韓國、一位孟加拉、及一位台灣代表(韓德生教授)競選。需在個人會員大會中提出參選意願，以成為候選人；故利用此難得場合，與各國領袖爭取支持。

輕度腦傷受限於影像學之靈敏度不足，一直苦無合適生物指標可以追蹤預後或療效。McQuiston教授提出血液中來自神經細胞(neuron)的UCH-L1以及神經膠細胞(glial cell)的Glial fibrillary acidic protein (GFAP)具備更快速、敏感的特性，對臨床評估與治療具有重要角色。

	
輕度腦傷生物指標	輕度腦傷過程中不同時序出現的生物指標

	
與現任理事長合影	與前任理事長合影
	
與亞太復健醫學會理事長合影	與Annals of Rehabilition Medicine主編合影
	
雪梨達令港夜景	電子海報展示

6月5日, Wed：選舉下屆理事長、個人會員代表；肌肉張力注射治療及老人衰弱

上午選舉下屆理事長、及個人會員代表，個人積極向國內、國外與會代表爭取支持。

腦中風後肢體張力(post-stroke spasticity)降低病人自我功能，也增加照顧困難，好在有肉毒桿菌素(botulinum toxin)注射可以有效降低肌肉張力、增進功能。為了訓練注射治療能力，除了紙本指引教學，還有專家辯論、線上投票，甚至虛擬實境機器人輔助模擬器訓練！科技進步日新月異，減少了各領域的進入障礙。

老人衰弱與跌倒預防向來為復健醫學會關注的主題之一，此次由與我同屬學術委員會委員的Eleftheria教授主講衰弱的國際觀，引發聽眾相當迴響。

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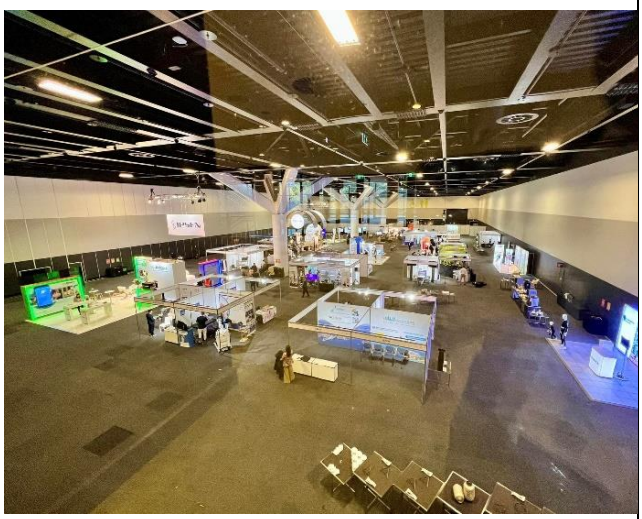
<tr><td>與投票支持之各國代表合影</td><td>與投票支持之台灣代表合影</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>會展區鳥瞰</td><td>體驗虛擬實境注射練習</td></tr>
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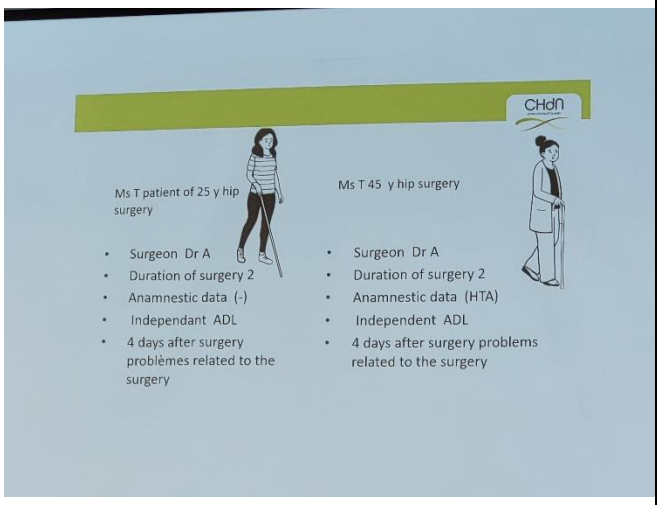
Eleftheria教授主講老人衰弱	老人衰弱專題演講
	
老人預防跌倒演講	病例分享

6月6日, Thu：閉幕典禮及Royal Rehab醫院參訪

此次會議參與人數超過2800人，共有14場大會演講、21場會前工作坊、260篇口頭報告、590篇海報。圓滿順利結束! 大家相約明年死海(Dead sea)見!

Royal Rehab是一家非營利組織，收入來源包括政府、募款、病人收費、捐贈等，設備良善。由於其在神經及機器人復健領域具標竿水準，故安排參訪。除了專任醫師24小時在院輪值之外，其他職種包括物理治療師、職能治療師、語言治療師、護理師、臨床心理師、社會工作師、營養師等共同照護病人。多數治療為一對一，鮮少團體治療。提供適當輪椅、輔具，並有技師現場調整。整體環境明亮寬敞，有26張脊髓損傷床及16張腦創傷病床。

Certificate of Participation

This is to certify

was an oral presenter during the official program at the 18th World Congress of the International Society of Physical and Rehabilitation Medicine (ISPRM) in Sydney, Australia.

John Olver
ISPRM 2024 Congress President

Lee Laycock
ISPRM 2024 Congress Chair

Steven Faux
ISPRM 2024 Scientific Program Chair

演講證明

Certificate of Attendance

This is to certify

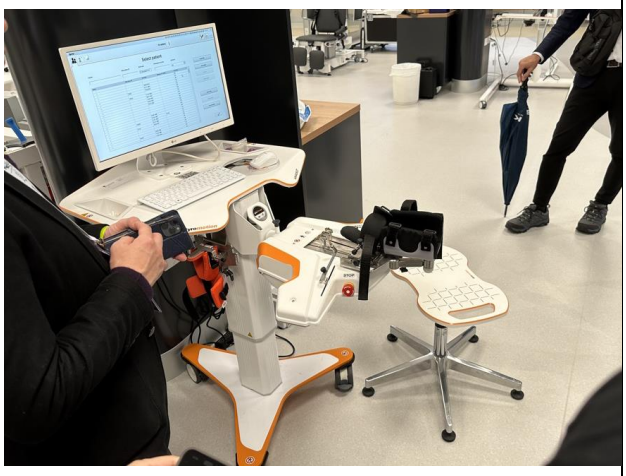
has attended the 18th World Congress of the International Society of Physical and Rehabilitation Medicine (ISPRM) in Sydney, Australia.

John Olver
ISPRM 2024 Congress President

Lee Laycock
ISPRM 2024 Congress Chair

Steven Faux
ISPRM 2024 Scientific Program Chair

與會證明

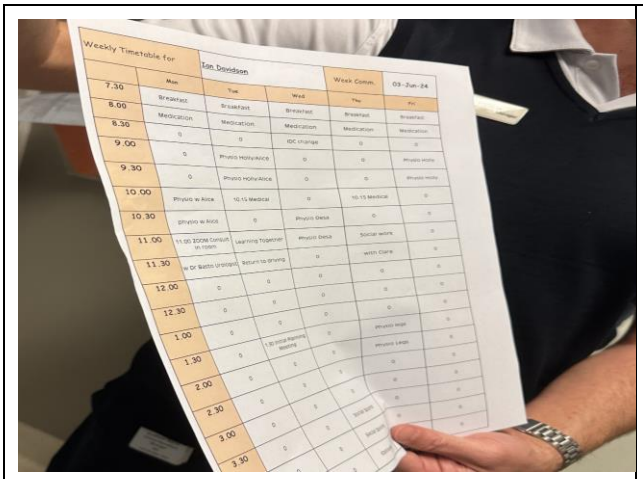
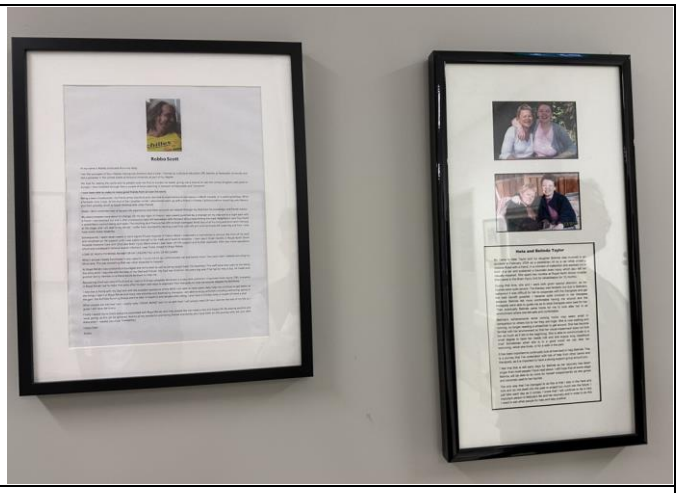
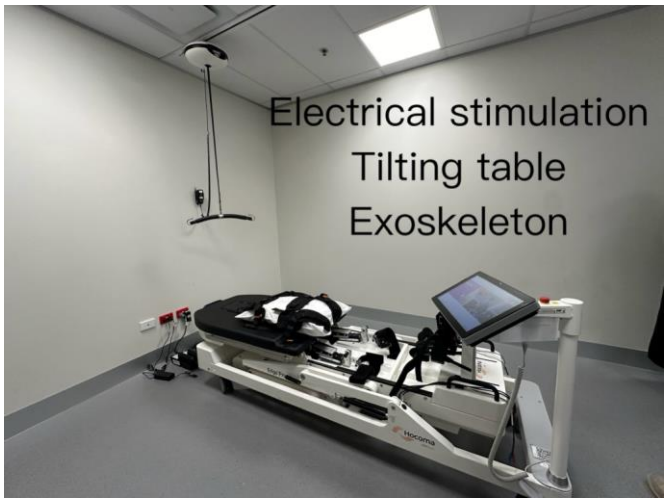
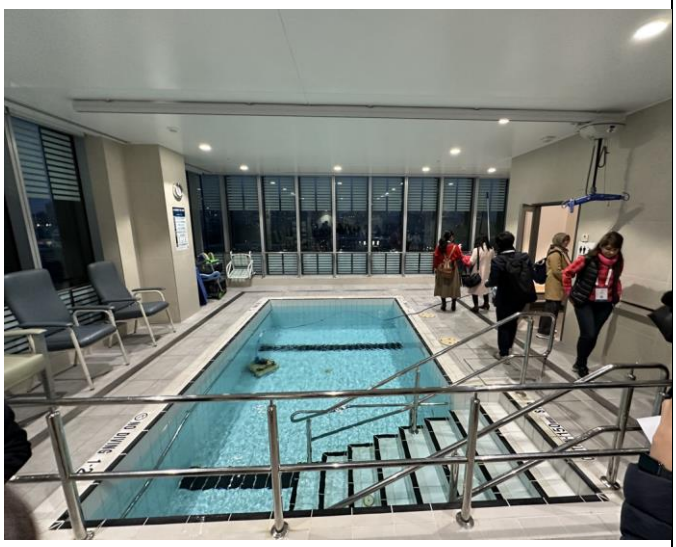


上肢機器人

下肢機器人

病房懸吊移位系統

病房無障礙廁所

	
一對一復健訓練課表	病人復健故事介紹
	
日常生活訓練室	電刺激外骨骼機器人
	
壓力感測投影遊戲跑步機	水療池

參、心得及建議

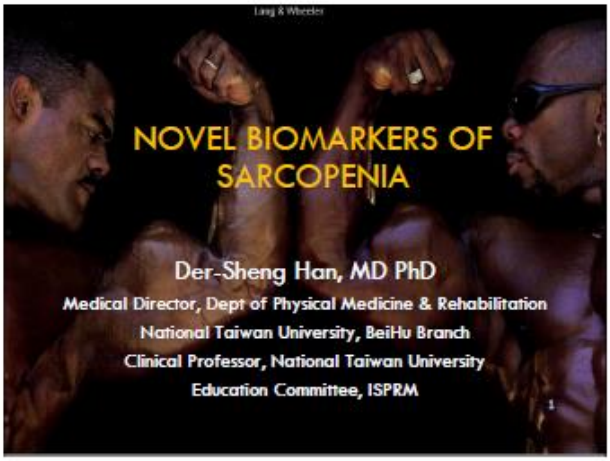
一、機器人復健不但標準化復健治療流程，更能大大加強治療次數與劑量，這個配合科技發展的大趨勢銳不可擋! 除了積極引進相關設備之外，應該思考利用台灣科技島的優勢，製作新穎復健機器人，以其後發先至，加入先行者行列。

二、超音波檢查對於復健科醫師已是基本能力，必須更加精進技術，以提供病人最適當的醫療服務。

三、衰弱症及肌少症為老年社會中越發重要的議題。值得進一步投入與經營，以增進老人健康福祉。

四、籌辦會議要有在地特色，才能凸顯所在地國家特質，讓與會者留下深刻印象。

附錄：新穎生物指標演講內容



Disclosure

- NO CONFLICTS

OUTLINE

- Classification of biomarkers
- Definition of sarcopenia
- Protein
- Metabolomic & lipidomic
- miRNA
- Microbiota
- Take home

BIOMARKERS

- Biomarkers have been playing the pivotal role in medical researches. Physicians are used to diagnose disease through blood sample.
- There are principally 4 types of molecular biomarkers: GENOMIC, TRANSCRIPTOMIC, PROTEOMIC, and METABOLOMIC. (SOC INT UROL J. 2020; 1(1):8–15)

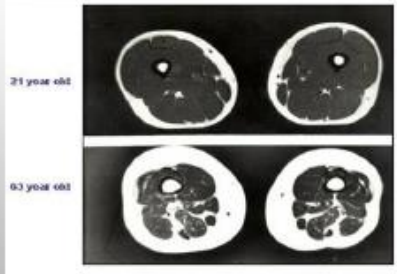
CLASSIFICATION OF BIOMARKERS

(FDA-NIH BIOMARKER WORKING GROUP. FDA-NIH; 2016-)

- DIAGNOSTIC: lead to a diagnosis, eg. PSA, CRP
- PROGNOSTIC: provide overall outcome, eg. tumor recurrence
- PREDICTIVE: predict treatment outcome, eg. HER2/neu in breast cancer
- PHARMACODYNAMIC: biological response after treatment, eg. LDL level to statin

SARCOPENIA

- 'SARCO': FLESH, 'PENIA': POVERTY



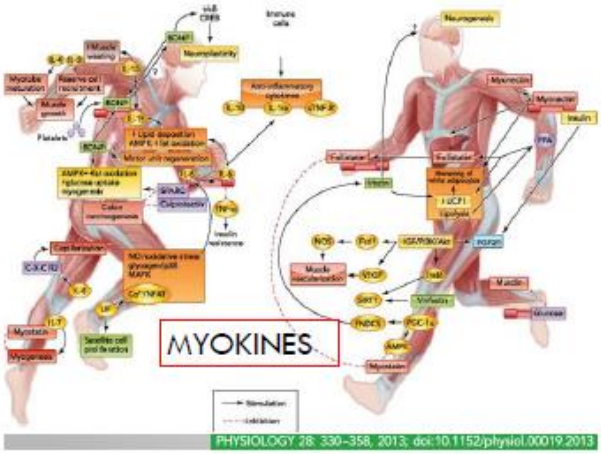
Age-related changes in muscle mass in thigh cross-sectional area of two people with similar BMI

EWGSOP2 DEFINITION OF SARCOPENIA

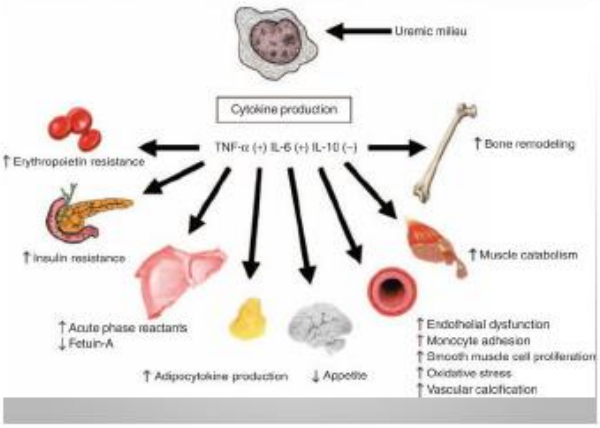
(AGE AND AGEING 2019; 48: 16–31)

Probable sarcopenia is identified by Criterion 1.
Diagnosis is confirmed by additional documentation of Criterion 2.
If Criteria 1, 2 and 3 are all met, sarcopenia is considered severe.

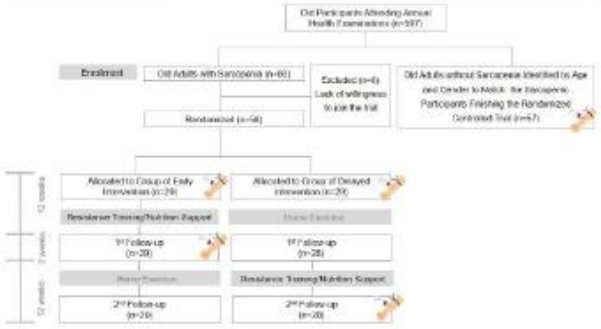
(1) Low muscle strength
(2) Low muscle quantity or quality
(3) Low physical performance



PHYSIOLOGY 28: 330–358, 2013; doi:10.1152/physiol.00019.2013



STUDY DESIGN



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Research Paper

Enhanced serum levels of tumor necrosis factor-α, interleukin-1β, and -6 in sarcopenia: alleviation through exercise and nutrition intervention

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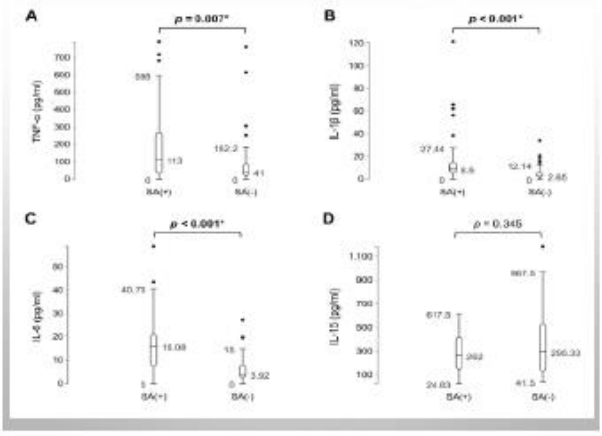
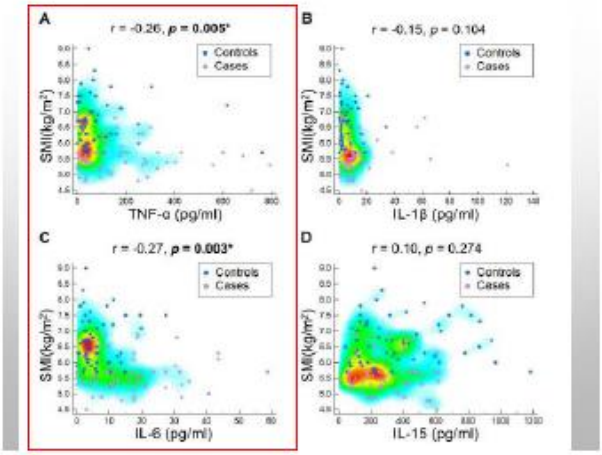
Table 1. Comparison of demographics, grip strength, skeletal muscle mass index and pro-inflammatory cytokines between participants with and those without sarcopenia.

	Controls (n = 57)	Sarcopenic cases (n = 57)	p-value
Demographic			
Gender (female)	44 (77.2%)	44 (77.2%)	1.000
Age (year)	75.00 ± 5.87 (73.44-76.56)	75.02 ± 5.91 (73.45-76.59)	0.987
Height (cm)	155.12 ± 7.63 (153.10-157.15)	154.48 ± 7.04 (152.58-156.37)	0.629
Weight (kg)	61.82 ± 9.14 (59.40-64.25)	52.44 ± 7.42 (50.47-54.40)	<0.001*
Body mass index (kg/m²)	25.71 ± 3.61 (24.75-26.67)	21.92 ± 2.11 (21.36-22.48)	<0.001*
Physical performance			
Hand grip strength (kg)	20.95 ± 6.21 (19.30-22.59)	17.63 ± 6.36 (15.94-19.32)	0.006*
Body Composition			
Skeletal muscle index (kg/m²)	6.71 ± 0.74 (6.51-6.91)	5.61 ± 0.56 (5.46-5.76)	<0.001*
Pro-Inflammatory cytokines			
TNF-α (pg/mL)	86.70 ± 134.08 (51.12-122.28)	179.60 ± 194.19 (128.07-231.12)	0.007*
IL-1β (pg/mL)	5.26 ± 6.38 (3.57-6.95)	14.11 ± 19.88 (8.83-19.38)	<0.001*
IL-6 (pg/mL)	6.08 ± 5.48 (4.58-7.40)	16.80 ± 12.45 (13.50-20.11)	<0.001*
IL-15 (pg/mL)	365.77 ± 275.24 (292.74-438.80)	291.49 ± 174.25 (245.25-337.72)	0.345

* Indicates p <0.05. The continuous variables are expressed by the mean and standard deviation (95% confidence interval of mean), whereas the categorical variables are shown by the number (percentage). TNF, tumor necrotizing factor; IL, interleukin.





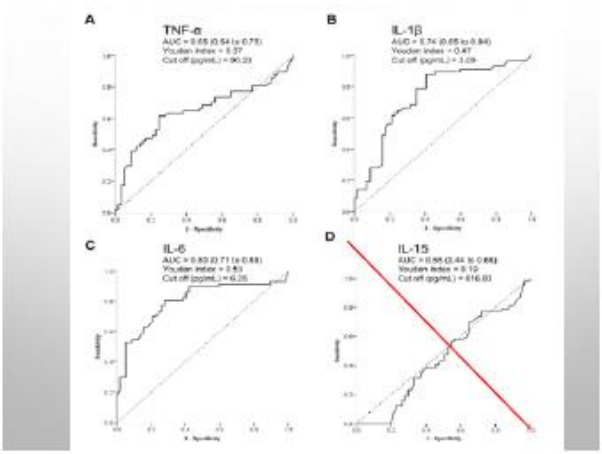


Table 2. Comparison of grip strength, skeletal muscle mass index and pro-inflammatory cytokines before and after exercise and nutrition intervention in patients with sarcopenia.

	Before	After	Difference (After-Before)	p-value
Physical performance				
Hand grip strength (kg)	17.63 ± 6.36 (15.94-19.32)	20.53 ± 5.78 (18.99-22.06)	2.89 ± 4.80 (1.62-4.17)	<0.001*
Body Composition				
Skeletal muscle index (kg/m²)	5.61 ± 0.56 (5.46-5.76)	5.98 ± 0.75 (5.78-6.18)	0.37 ± 0.43 (0.26-0.48)	<0.001*
Pro-Inflammatory cytokines				
TNF-α (pg/mL)	179.60 ± 194.19 (128.07-231.12)	130.76 ± 121.04 (98.64-162.88)	-48.84 ± 130.8 (-83.55--14.12)	0.003*
IL-1β (pg/mL)	14.11 ± 19.88 (8.83-19.38)	8.72 ± 9.05 (6.32-11.13)	-5.38 ± 17.21 (-9.95--0.82)	0.012*
IL-6 (pg/mL)	16.80 ± 12.45 (13.50-20.11)	13.22 ± 10.56 (7.76-18.68)	-3.58 ± 21.67 (-9.39-2.22)	0.001*
IL-15 (pg/mL)	291.49 ± 174.25 (245.25-337.72)	356.93 ± 230.31 (295.83-418.04)	65.44 ± 221.2 (6.75-124.14)	0.072

* Indicates p <0.05. The continuous variables are expressed by the mean and standard deviation (95% confidence interval o mean). TNF, tumor necrotizing factor; IL, interleukin.

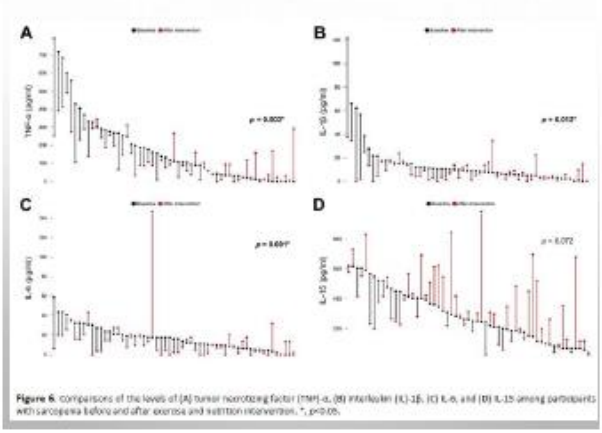


Figure 6. comparisons of the levels of (A) tumor necrotizing factor (TNF)-α, (B) interleukin (IL)-1β, (C) IL-6, and (D) IL-15 among participants with sarcopenia before and after exercise and nutrition intervention. *, p<0.05.

Table 5. Association of the level of pro-inflammatory cytokine with ages in years, sex, sarcopenia and intervention using exercise and nutrition support analyzed using generalized estimating equation.

	Age (Year)	Sarcopenia	Intervention	Female gender
TNF-α (pg/mL)	1.80	92.86	-48.84	22.29
	(-3.38 to 6.98)	(32.34 to 153.39)	(-82.50 to -15.17)	(-49.91 to 94.49)
	$p = 0.496$	$p = 0.003$*	$p = 0.005$*	$p = 0.545$
IL-1β (pg/mL)	0.24	8.85	-5.38	0.11
	(-0.05 to 0.54)	(3.50 to 14.19)	(-9.81 to -0.96)	(-4.34 to 4.57)
	$p = 0.107$	$p = 0.001$*	$p = 0.017$*	$p = 0.960$
IL-6 (pg/mL)	-0.09	10.77	-3.58	-1.45
	(-0.42 to 0.24)	(7.28 to 14.27)	(-9.21 to 2.05)	(-6.01 to 3.11)
	$p = 0.602$	$p < 0.001$*	$p = 0.212$	$p = 0.533$
IL-15 (pg/mL)	-1.85	-74.25	65.44	-13.14
	(-9.12 to 5.41)	(-157.88 to 9.38)	(8.52 to 122.37)	(-112.97 to 86.69)
	$p = 0.617$	$p = 0.082$	$p = 0.024$*	$p = 0.796$

* Indicates $p < 0.05$. The values are shown by their β coefficients and 95% confidence interval. TNF, tumor necrotizing factor; IL, interleukin.

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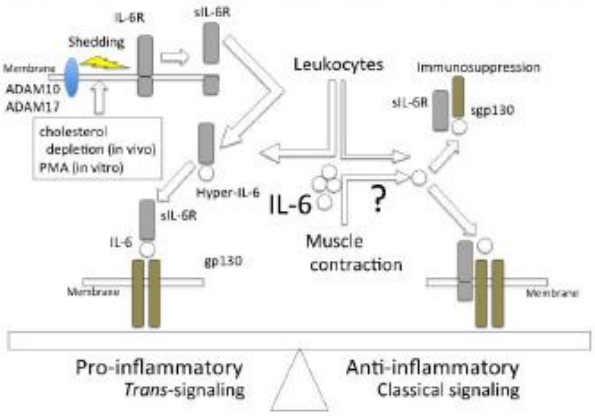

NOVEL METABOLIC AND LIPIDOMIC BIOMARKERS OF SARCOPENIA

- Journal Of Cachexia, Sarcopenia, And Muscle Wasting Disease (Revision)
- Wei-hsiang Hsu#, San-yuan Wang#, Yen-ming Chao, Ke-vin Chang, Der-sheng Han*, Yun-lian Lin*
- Metabolomic: to quantitatively measure the dynamic multi-parametric metabolic responses of living systems to pathophysiological stimuli
- Lipodomic: the study of cellular lipids changes in living systems in response to internal and external perturbations, providing further insights into the complex pathophysiology of diseases

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Method	Features	HMDB ID	FC (P1 vs Control)	p value (P1 vs Control)	FDR value (P1 vs Control)	VIP score (P1 vs Control)	AUC (Patient vs. Control)	FC (post- vs pre-intervention)	p value (pre- vs post-intervention)
NMR	Indoxyl	HMDB0000682	0.86±0.04	0.0005	0.011	1.043	0.7606	1.01±0.70	0.9177
	Carnitine	HMDB0000062	1.05±0.01	0.0118	0.060	1.070	0.7167	0.97±0.05	0.0963
LC-MS	1-Methylhistamine/3-Methylhistamine	HMDB0000898/ HMDB0001861	1.24±0.14	0.0029	0.004	1.054	0.7074	0.77±0.03	0.0004
	Creatinine	HMDB0000562	0.71±0.04	1.93E-05	0.001	1.355	0.8127	1.08±0.19	0.1092
	Carnosine	HMDB0000033	0.71±0.04	0.0007	0.011	2.567	0.7867	1.32±0.15	0.0423
	Ureidopropionic acid	HMDB0000026	0.61±0.10	0.0107	0.034	1.389	0.7012	1.01±0.67	0.9236
	Uric acid	HMDB0000289	0.88±0.03	0.0083	0.037	1.512	0.7034	1.02±0.34	0.6152
	PC(18:2/20:0)	HMDB0013436	0.69±0.03	0.0010	0.046	2.369	0.7347	1.25±0.07	0.0372
	PC(20:2/18:0)	HMDB0008033	0.78±0.06	0.0014	0.047	2.333	0.7357	1.24±0.32	0.0587
	PC(18:1/20:1)	HMDB0008077	0.74±0.05	0.0015	0.042	2.865	0.7130	1.18±0.13	0.1073
	PI 32:1	HMDB0009778	0.72±0.17	0.0066	0.043	1.035	0.9272	0.28±0.06	0.0029
	PI 34:3	HMDB0240034	1.38±0.13	0.0063	0.039	1.006	0.7867	0.63±0.11	0.0038

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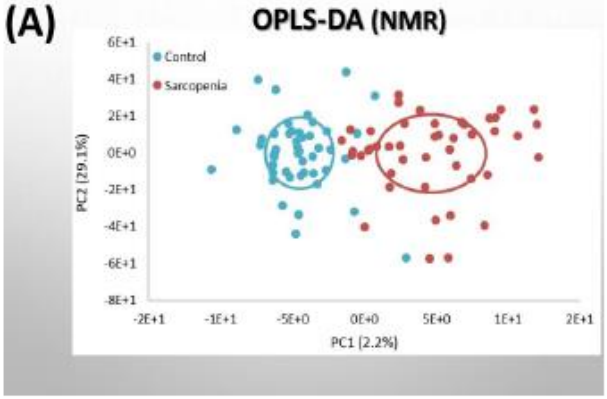

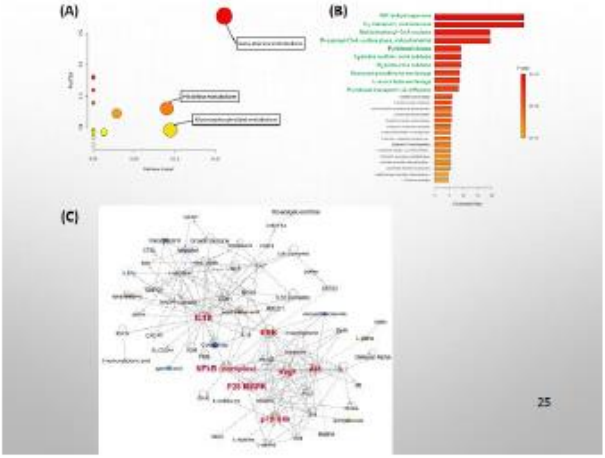

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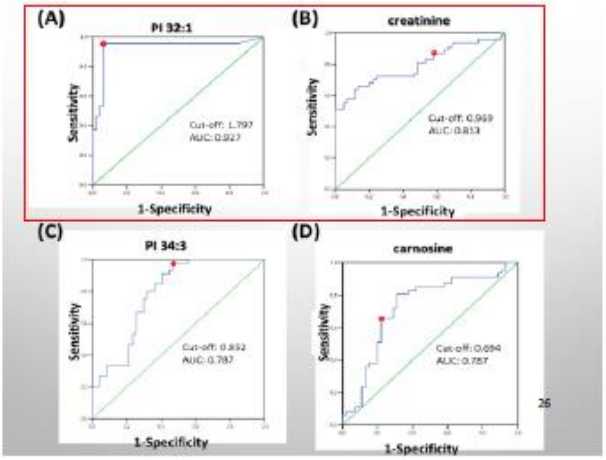
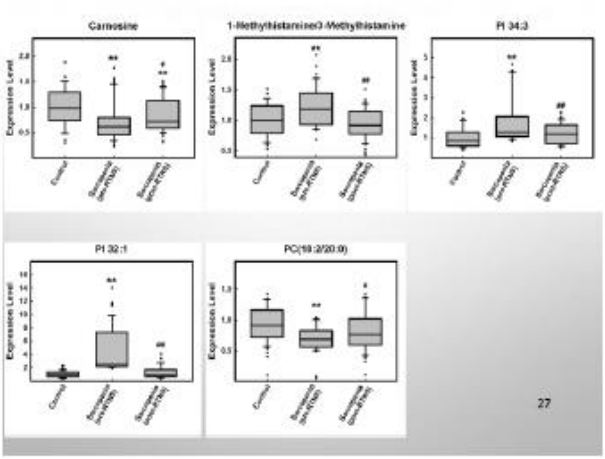
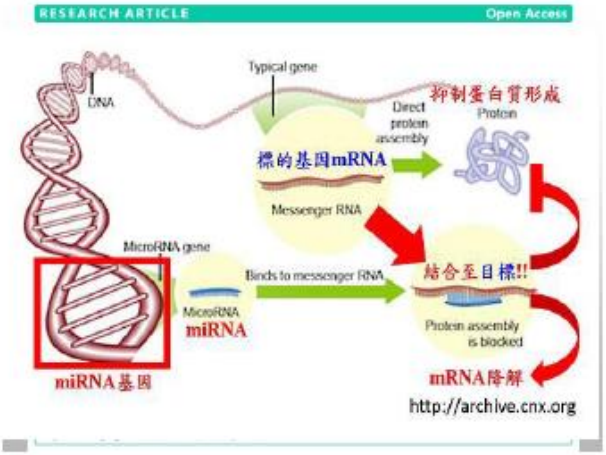
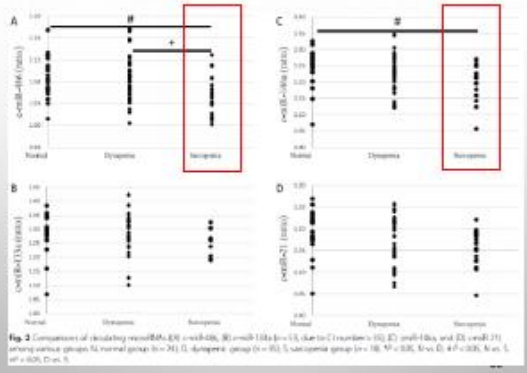


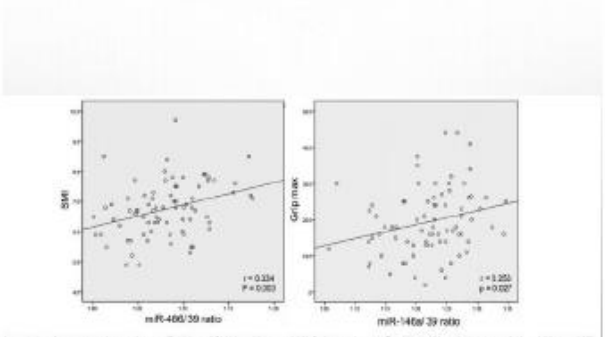


CONCLUSION

- We identified 12 potential biomarkers of sarcopenia: isoleucine, carnitine, 1-methylhistamine/3-methylhistamine, creatinine, carnosine, ureidopropionic acid, uric acid, PC(18:2/20:0), PC(20:2/18:0), PC(18:1/20:1), PI 32:1 and PI 34:3. (1st reported)
- 5 potential biomarkers could be reversed by our intervention: 1-methylhistamine/3-methylhistamine, carnosine, PC(18:2/20:0), PI 32:1, and PI 34:3







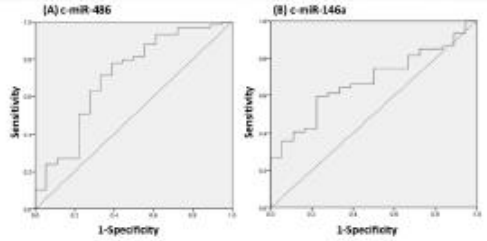


Fig. 5 ROC curves analysis of c-miRNAs for predicting sarcopenia. a c-miR-486 AUC was .788 (95% CI: 561–.855, $p = .008$). b c-miR-146a .676 (95% CI: 551–.801, $p = .024$). ROC, receiver operating characteristic; AUC, area under the curve; CI, confidence interval

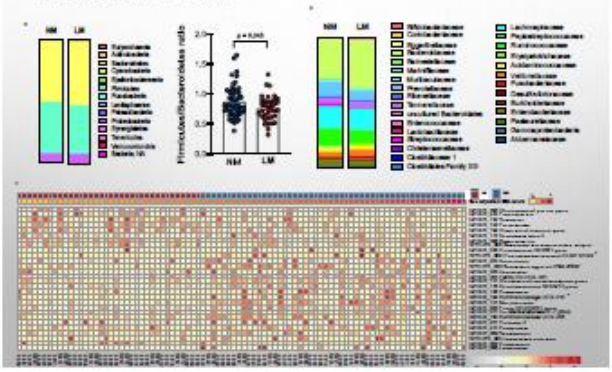
CONCLUSION

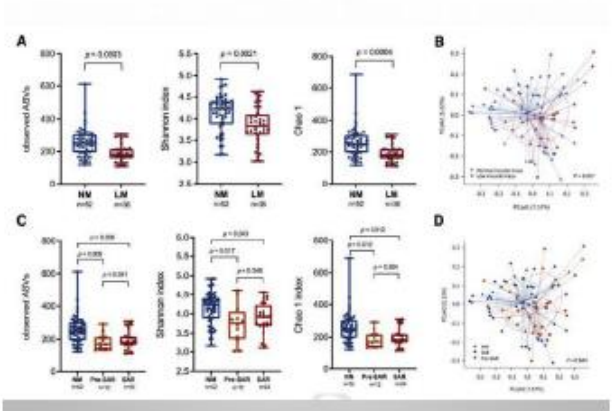
- Both c-miR-486 and c-miR-146a levels are positively associated with muscle mass, whereas only inflammation-related c-mir-146a level is directly related to muscle strength in the older adults.
- myo-miRNA and inflammation-related miRNA may serve as biomarkers of age-related sarcopenia

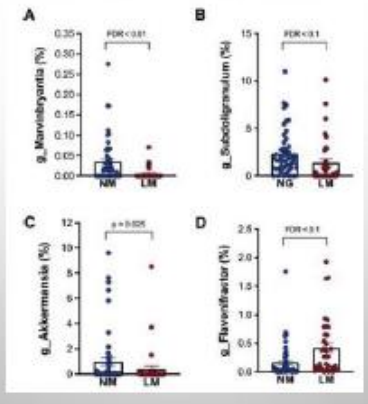
The recommended protein intake is around 1.2 g/kg/day: leucine-e

HOW ABOUT STOOL?

Differences in the gut microbiome and reduced fecal butyrate in elders with low skeletal muscle mass







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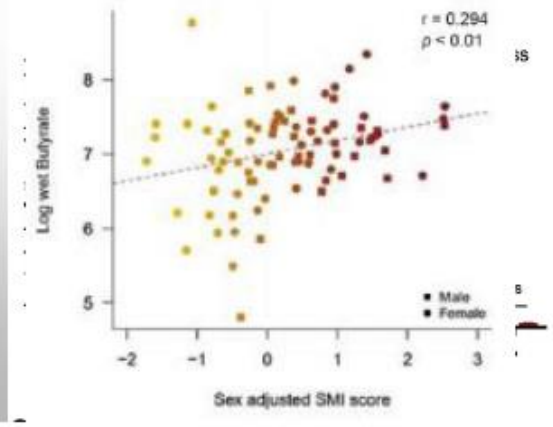

CONCLUSION

- The elders with low skeletal muscle mass have altered gut microbial community
- SCFAs-producing *Marvinbryantia sp.*, *Akkermansia sp.*, and *Subdoligranulum sp.* were enriched in the feces of normal elders while the flavonoid-degrading *Flavonifractor spp.* were increased in that with low muscle mass.
- Fecal butyrate level is robustly measured to be higher in normal elders when comparing with low muscle mass elders and correlates positively with the SMI.

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SUMMARY

	AUC for sarcopenia	R for SMI	Intervention
Metabolomic			
PI32:1	0.927	-0.650	*
Creatinine	0.813	0.430	
PI34:3	0.787	-0.430	*
Carnosine	0.787	0.393	*
Cytokine			
IL-6	0.80	-0.27	*
IL-1b	0.74	-0.15	*
TNF-a	0.65	-0.26	*
IL-15	0.55	0.10	
miRNA486	0.708	0.334	
miRNA146a	0.676	0.253	
Stool butyrate		0.294	

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TAKE-HOME

- Plasma is a convenient source of biomarker of sarcopenia.
- Judging by area under curve (>0.7), PI32:1, creatinine, PI34:3, carnosine, IL-6, IL-1β and miRNA486 are potential biomarker of sarcopenia.
- PI32:1, PI34:3, carnosine, IL-6 and IL-1β are potential biomarker of resistance training in sarcopenic patients.
- Future validation research are needed.

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THANK YOU VERY MUCH FOR YOUR ATTENTION!

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