update date: 2024.03

Laboratory of Peripheral Nerve System and Rehabilitation

Lab Introduction:

The target of the laboratory is to investigate the movement disorders and disability in neurological or musculoskeletal system by integrating the knowledge of the neuromuscular skeletal system, biomechanics, movement control and quantitative information obtained from motion analysis system, electrography or other devices. The combination of research results and clinical opinions would help identify the relations between problems and performance outcomes and innovate the optimized treatment plans for promoting the medical care level.

Principal Investigator:

Yi-Jung Tsai, Ph.D.

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Educations:

Ph.D.	National Cheng Kung University	Biomedical Engineering
M.S.	National Cheng Kung University	Physical Therapy
B.S.	National Cheng Kung University	Physical Therapy

Academic Experiences:

Duration	Department	Position
2014-2015	Medical Device Innovation Center, National Cheng Kung University	Postdoctoral Research Fellow
2008-2014	Department of Biomedical Engineering, National Cheng Kung University	Research Assistant
2004-2006	Department of Physical Therapy, National Cheng Kung University	Research Assistant
2003-2006	Bureau of Education, Tainan City Government	Physical Therapist
2003-2004	Department of Rehabilitation, Ministry of Health and Welfare, Tainan Hospital	Physical Therapist

Honors and Awards:

2014 Finalist oral competition_ Honorable Mention Award_ 9th Asian-Pacific Conference on Medical and Biological Engineering, Taiwan
2014 Professor Guan-Liang Chang Memorial Scholarship
2013 7th East Asian Consortium on Biomedical Engineering-student workshop Session Chair
2012 Excellent Poster Presentation Award_2012 Graduate Research Forum, Niigata, Japan
2011 Excellent Poster Presentation Award_ 2011 Annual Symposium on Biomedical Engineering and Technology, Taiwan
2009 First Prize, Leadership program for the future elites, College of Engineering, National Cheng Kung University, Taiwan
2009 Best English Fluency and Host in Ph.D. English Academic Seminar Competition, Department of Biomedical Engineering, National Cheng Kung University
2006 Excellent Graduate Student, Department of Physical Therapy, National Cheng Kung University

Team Members:

Collaborators:

Yuan-Kun Tu Cheng-Yo Yen Yu-Hwan Hsieh
Chih-Kun Hsiao Ho-Sheng Lee

Assistants:

Jing-Yu Chen Zheng-Xin Wang

Techniques & Equipment

Motion capture system, Surface electromyography system, Force plate, Biodex, GAITRite walkway system, Hand-held dynamometer

Research Projects

Project titles	PI	Source	Duration
The Efficacy of an Incentive Spirometer in Enhancing Inhalation Medication Education for Patients with Pulmonary Obstruction	Lee, Ho-Sheng	E-Da Hospital	2023.01.01 ~ 2023.12.30
Design and development of an upper arm shoulder-elbow assistant rehabilitation device	Tu, Yuan-Kun	Ministry of Science and Technology	2022/11/01 ~ 2023/10/31

To investigate the movement control and rehabilitation program effects in patients after nerve transfer by the multi-joint evaluation system	Tsai, Yi-Jung	National Science and Technology Council	2020/08/01 ~ 2023/03/31
To Evaluate the Hand Function in Brachial Plexus Injury and Spinal Cord Injury Patients Received Contralateral Cervical 7th Nerve Transfer Method	Tu, Yuan-Kun	National Science and Technology Council	2020/08/01 ~ 2023/03/31
The effects of total knee arthroplasty on the biomechanics and functional movements in knee and ankle joint	Yen, Cheng-Yo	E-Da Cancer Hospital	2020/01/01 ~ 2020/12/31
To investigate the correlation between shoulder stability and functional movements in patients with brachial plexus injuries	Tsai, Yi-Jung	Ministry of Science and Technology	2019/08/01 ~ 2020/07/31
To design the shoulder assessment method and novel training device for traumatic brachial plexus injury	Tu, Yuan-Kun	Ministry of Science and Technology	2019/08/01 ~ 2020/07/31
To investigate the training effects of novel rehabilitation program on brachial plexus injury patients after free functioning muscle transfer reconstruction	Chung,Tzu-Chun	E-Da Hospital	2019/03/01 ~ 2020/02/29
To establish the biomechanical model of free functioning muscle transfer and clinical evaluation in patients with brachial plexus injuries	Tu, Yuan-Kun	Ministry of Science and Technology	2018/08/01 ~ 2019/07/31
Construction of database of functional recovery for brachial plexus palsies patients and building of prediction model using neural network	Tu, Yuan-Kun	Ministry of Science and Technology	2017/08/01 ~ 2018/07/31
The Influence of Combining Lower Limb Muscle Training and Upper Limb Diagonal Movement Training on Function of Patients of Chronic Obstructive Pulmonary Disease—Evaluated with Sit-to-Stand Test	Lee, Ho-Sheng	E-Da Hospital	2017/01/01 ~ 2018/03/31
To establish the evaluation model for functional movement assessments of lower extremity in patients with patellar tendon rupture after surgical repair	Tsai, Yi-Jung	E-Da Hospital	2016/12/01 ~ 2018/02/28
Biomechanical study on three dimensional kinematics and function assessment of non-fusion lumbar stabilization systems under various type of cyclic loading	Tu, Yuan-Kun	Ministry of Science and Technology	2016/08/01 ~ 2017/07/31

Outcomes evaluation of the rehabilitation protocol based on the proprioceptive neuromuscular facilitation concept—functional evaluation and novel home-use training device design	Tsai, Yi-Jung	Ministry of Science and Technology	2016/08/01 ~ 2017/07/31
Biomechanical Comparison of Suture Techniques at the Different Sites of Patellar Tendon Repair	Yen, Cheng-Yo	E-Da Hospital	2016/01/01 ~ 2016/12/31
Outlook of Future Healthcare Technology and Service Mode	Su, Fong-Chin	Ministry of Science and Technology	2015/08/01 ~ 2018/07/31
An investigation on the classification of movement strategies during elbow flexion in patients with traumatic brachial plexus injuries	Tu, Yuan-Kun	Ministry of Science and Technology	2015/08/01 ~ 2016/07/31
An investigation on the improvement of temperature elevation and wear resistance of orthopedic bone drills treated with cryogenic process and Cr-C coating	Hsiao, Chih-Kun	Ministry of Science and Technology	2015/08/01 ~ 2016/07/31

Publications:

[Journal Paper]

1. CK Hsiao, YW Chiu, HY Hsiao, YJ Tsai, CH Lee, CY Yen, YK Tu (2023). Cyclic Stability of Locking Plate Augmented with Intramedullary Polymethyl Methacrylate (PMMA) Strut Fixation for Osteoporotic Humeral Fractures: A Biomechanical Study. Life 13:2110.

2. CK Hsiao, HY Hsiao, YJ Tsai, CM Hsu, YK Tu (2023). Influence of Simulated State of Disc Degeneration and Axial Stiffness of Coupler in a Hybrid Performance Stabilisation System on the Biomechanics of a Spine Segment Model. Bioengineering

3. CK Hsiao, YJ Tsai, CY Yen, YC Li, HY Hsiao, YJ Tu (2023). Biomechanical Effect of Hybrid Dynamic Stabilization Implant on the Segmental Motion and Intradiscal Pressure in Human Lumbar Spine. Bioengineering 2023, 10, 31.
4. YC Chen, YK Tu, YJ Tsai, YP Tsai, CK Hsiao (2022). Local thermal effect of power-on setting on monopolar coagulation: a three-dimensional electrothermal coupled finite element study. Medical & Biological Engineering & Computing. https://doi.org/10.1007/s11517-022-02689-8
5. YJ Tsai, CK Hsiao, FC Su, YK Tu (2022). Clinical Assessment of Functional Recovery Following Nerve Transfer for Traumatic Brachial Plexus Injuries. Int. J.

Environ. Res. Public Health 19(19), 12416.

6. CK Hsiao, YJ Tsai, CW Lu, JC Hsiung, HY Hsiao, YC Chen, YK Tu (2022). Effects of Kinesio taping on forearm supination/pronation performance fatigability. BMC Musculoskelet Disord 23, 131. https://doi.org/10.1186/s12891-022-05068-4
7. HS Lee, YF Wei, YJ Tsai, PH Wang, CY Chen, SW Pan, CC Shu (2022). Prevalence of Latent Tuberculous Infection in Patients With Nontuberculous Mycobacterial Lung Disease and Colonization: A Prospective Study in an Intermediate Tuberculosis Burden Country. Open Forum Infectious Diseases 9(3).
8. IF Cheng, LC Kuo, YJ Tsai, FC Su (2021) The Comparisons of Physical Functional Performances between Older Adults with and without Regular Physical Activity in Two Different Living Settings. Int J Environ Res Public Health. 2021 Mar 30;18(7):3561. d (SSCI, IF=3.390, 41/176, PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH)
9. YL You, CJ Lin, HF Chieh, YJ Tsai, SY Lee, CF Lin, YC Hsu, LC Kuo, FC Su (2020). Comparison of knee biomechanical characteristics during exercise between pinnacle and step trainers. Gait & Posture 77:201-206. (SCI, IF=2.349, 29/82, Orthopedics)
10. YC Chen, CK Hsiao, YK Tu, YJ Tsai, AC Hsiao, CW Lu, CY Yang (2020) Assessment of heat generation and risk of thermal necrosis during bone burring by means of three-dimensional dynamic elastoplastic finite element modelling. Medical Engineering & Physics 81:1-12. (SCI, IF=1.737, 62/87, Engineering/ Biomedical)
11. CK Hsiao, YK Tu, YJ Tsai, CY Yang, CW Lu. (2020) Forearm muscular strength and performance fatigability in orthopaedic surgeons when performing bone screw fixations. Applied Ergonomics. 87: 103135 (SSCI, IF=3.145, 18/84, Psychology, Applied)
12. CY Yen, YJ Tsai*, CK Hsiao, FC Kao, YK Tu (2019) Biomechanical evaluation of patellar tendon repair using Krackow suture technique. Biomed Eng Online. 18(1):64. doi: 10.1186/s12938-019-0680-z. (SCI, IF=2.059, 56/87, Engineering/ Biomedical)(co-corresponding)
13. YL You, SY Lee, YJ Tsai, CF Lin, LC Kuo, FC Su (2019). Effects of body

weight support and pedal stance width on joint loading during pinnacle trainer exercise. Gait & posture.74:45-52. (SCI, IF=2.349, 29/82, Orthopedics)

[Conference Paper]

1. Jing-Yu Chen, Yuan-Kun Tu , Nan-Chun Chen, Yi-Jung Tsai* (2022) Standing Balance after Combined High Tibial Osteotomy and Layered Chondrocyte Sheet Implantation versus High Tibial Osteotomy alone. 5th Global Conference on Biomedical Engineering (GCBME), Taipei, Taiwan, Dec. 15-17.
2. Chih-Kun Hsiao, Yen-Wei Chiu, Yi-Jung Tsai, Yuan-Kun Tu, Yung-Chuan Chen (2022) Local thermal effect of power-on setting on electrosurgical coagulation: a three-dimensional electrothermal coupled finite-element study. 5th Global Conference on Biomedical Engineering (GCBME), Taipei, Taiwan, Dec. 15-17.
3. Yen-Wei Chiu, Hao-Yuan Hsiao, Zhi-Yan Wang, Wen-Fan Chen, Chih-Kun Hsiao, Yi-Jung Tsai, Yuan-Kun Tu (2022) Quantitative Estimation of the Forearm Performance Fatigability in a Screw Driving Model. 5th Global Conference on Biomedical Engineering (GCBME), Taipei, Taiwan, Dec. 15-17.
4. Yi-Ching Chen, Zong-Lin Wu, Chih-Kun Hsiao, Teng-Yao Yang, Yuan-Kun Tu, Yi-Jung Tsai* (2020) Comparison of Isometric Knee Extension Force Measured Using Three Assessment Methods. XXIII ISEK Virtual Congress, July 12 – 14.
5. Zong-Lin Wu, Yi-Ching Chen, Chih-Kun Hsiao, Cheng-Yo Yen, Yuan-Kun Tu, Yi-Jung Tsai* (2020) Assessment of Isometric Knee Strength and Muscle Activities in Various Dynamometer Devices. XXIII ISEK Virtual Congress, July 12 – 14.
6. Yi-Ching Chen, Zong-Lin Wu, Yu-Ching Lu, Ho-Sheng Lee, Tzu-Tzu Kuo, Yu-Pei Cheng, Wei-Ting Lin, Yi-Jung Tsai* (2019) Static balance following 6-minute walking in patients with chronic obstructive pulmonary disease. The 9th WACBE World Congress on Bioengineering, Taipei, Taiwan, Aug. 16-19.
7. Yi-Ching Chen, Zong-Lin Wu, Wei-Ting Lin, Ho-Sheng Lee, Yi-Jung Tsai* (2019) Influence of Chair Height on Postural Control during 5-repetition Sit-to-stand Task. The 9th WACBE World Congress on Bioengineering, Taipei, Taiwan, Aug. 16-19.

[Patent]

1. Knee Tendon Stripper. US, Taiwan, and China patent.
2. Measuring device for wrist joint. Taiwan and China patent
3. Knee flexion and extension force measurement fixture that can be inserted into a hand-held dynamometer. Taiwan patent.