

Biomechanics Laboratory

Lab Introduction:

Our team integrates the medical science and principles of biomedical engineering to develop and create innovative and high quality medical products. We emphasizes the principles of experiments and theories, and train the biomedical engineering talents to strengthen and upgrade the hospitals practice level.

Principal Investigator:

Chih-Kun Hsiao, Ph.D.

Contact Information:

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Educations:

Degree: Ph.D. (National Cheng Kung University)

Academic Experiences:

<u>Duration</u>	<u>Department</u>	<u>Position</u>
2010-2013	Biomedical Engineering	Assistant Professor

Honors and Awards: (Optional)

Team Members:

Collaborators:

Yuan-Kun Tu

Yu-Hsien Kao

Ching-Hou Ma

Cheng-Yo Yen

Shang-Won Yu

Jih-His Yeh

Chin-Hsien Wu

Shih-Chieh Yang

Fong-Cheng Kao

Assistants:

Yen-Wei Chiu

Techniques & Equipments (Optional)**Research Projects**

Project titles	PI	Source	Duration
To establish the biomechanical model of free functioning muscle transfer and clinical evaluation in patients with brachial plexus injuries (MOST 107-2314-B-650-003)	Yuan-Kun Tu	MOST	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 (MOST 106-2314-B-650-003)	Yuan-Kun Tu	MOST	2017.08.01 ~ 2018.07.31
Biomechanical study on three dimensional kinematics and function assessment of non-fusion lumbar stabilization systems under various type of cyclic loading (MOST 105-2314-B-650-009)	Yuan-Kun Tu	MOST	2016.08.01 ~ 2017.07.31
Outcomes evaluation of the rehabilitation protocol based on the proprioceptive neuromucular facilitation concept—functional evaluation and novel home-use training device design (MOST 105-2221-E-650 -001)	Yi-Jung Tsai	MOST	2016.08.01 ~ 2017.07.31
An investigation on the improvement of temperature elevation and wear resistance of orthopedic bone drills treated with cryogenic process and Cr-C coating (MOST 104-2221-E-650-001)	Chih-Kun Hsiao	MOST	2015.08.01 ~ 2016.07.31

<p>An investigation on the classification of movement strategies during elbow flexion in patients with traumatic brachial plexus injuries (MOST 104-2314-B-650-003)</p>	<p>Yuan-Kun Tu</p>	<p>MOST</p>	<p>2015.08.01 ~ 2016.07.31</p>
<p>An investigation on the effectiveness of anti-cold welding in Ti plate/screw locked interface treated with Cr-C coating (MOST 103-2314-B-650-003)</p>	<p>Yuan-Kun Tu</p>	<p>MOST</p>	<p>2014.08.01 ~ 2015.07.31</p>

Publications:

1. **Chih-Kun Hsiao**, Yen-Wei Chiu, Hao-Yuan Hsiao, Yi-Jung Tsai, Cheng-Hung Lee, Cheng-Yo Yen*, Yuan-Kun Tu*. Cyclic Stability of Locking Plate Augmented with Intramedullary Polymethyl Methacrylate (PMMA) Strut Fixation for Osteoporotic Humeral Fractures: A Biomechanical Study. *Life-Basel* 2023, 13, 2110.
2. **Chih-Kun Hsiao**† , Hao-Yuan Hsiao†, Yi-Jung Tsai, Chao-Ming Hsu,* and Yuan-Kun Tu*. 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* 2023, 10, 1042.
3. **Chih-Kun Hsiao**, Yi-Jung Tsai1, Chih-Wei Lu, Jen-Chou Hsiung, Hao-Yuan Hsiao, Yung-Chuan*, Chen, Yuan-Kun Tu* Effects of Kinesio taping on forearm supination/pronation performance fatigability. *BMC Musculoskeletal disorders*. 2022, 23:131 (P1-10),
4. Shih-Hao Chen, **Chih-Kun Hsiao**, Chih-Wei Wang, Hsiang-Ho Chen, Zheng-Cheng Zhong. Biomechanical Comparison between Isobar and Dynamic Transitional Optima (DTO) Hybrid Lumbar Fixators: A Lumbosacral Finite Element and Intersegmental Motion Analysis. *BioMed Research International*, Volume 2022, Article ID 8273853, 13 pages.
5. Yung-Chuan Chen , Yuan-Kun Tu* , Yi-Jung Tsai , Yi-Shan Tsai , Cheng-Yo Yen , Shih-Chieh Yang , **Chih-Kun Hsiao***. Assessment of thermal necrosis risk regions for different bone qualities as a function of drilling parameters. *Computer Methods and Programs in Biomedicine*. 2018 Aug. (162) 253-261..
6. **Chih-Kun Hsiao**, Yuan-Kun Tu, Cheng-Hung Lee, Cheng-Yo Yen, Feng-Chen Kao, Yi-Jung Tsai. Biomechanical Study on The Cyclic Stability of Distal Radius C2 Type Osteoporotic Fractures Using Locking Plates in a Cadaver Model. *Journal of Medical and Biological Engineering*. October 2018, Volume 38, Issue 5,

- pp 707–714.
7. Yung-Chuan Chen, Yuan-Kun Tu*†, Jun-Yan Zhuang, Yi-Jung Tsai, Cheng-Yo Yen, **Chih-Kun Hsiao***, Evaluation of the parameters affecting bone temperature during drilling using a three-dimensional dynamic elastoplastic finite element model. *Medical & Biological Engineering & Computing*. 2017 March,
 8. **Chih-Kun Hsiao**, Yi-Jung Tsai, Cheng-Yo Yen, Cheng-Hung Lee, Teng-Yao Yang, Yuan-Kun Tu*, Intramedullary cortical bone strut improves the cyclic stability of osteoporotic proximal humeral fractures. *BMC Musculoskeletal Disorders*, (2017).
 9. Yung-Chuan Chen, **Chih-Kun Hsiao*†**, Ji-Sih Ciou, Yi-Jung Tsai, Yuan-Kun Tu*. Effects of implant drilling parameters for pilot and twist drills on temperature rise in bone analog and alveolar bones. *Medical Engineering and Physics 2016*. Sept. 20:5..
 10. **Chih-Kun Hsiao***, Yi-Jung Tsai, Teng-Yao Yang, Chia-Jung Hsu, Yuan-Kun Tu. Cyclic Stability of Locking Plate in a Cadaveric Distal Femoral Osteoporotic Fracture Model. *Bone Joint J*. Jan 2016, 98-B (SUPP 2) 50.
 11. **Chih-Kun Hsiao***, Yi-Jung Tsai, Shang-Hua Yu, Yuan-Kun Tu. Effects of Position of Intramedullary Support on The Stability of Proximal Humeral Fractures. *Bone Joint J* Jan 2016, V98-B (S 2) 49.
 12. Yi-Jung Tsai, Yuan-Kun Tu, **Chih-Kun Hsiao**, Fong-Chin Su*. Within-session reliability and smallest real difference of muscle strength following nerve transfers in patients with brachial plexus injuries. *Journal of Hand Surgery Am*. 2015 Jun;40(6):1196-201.
 13. Yi-Hung Ho, Yuan-Kun Tu, **Chih-Kun Hsiao*†**, Chih-Han Chang*. Outcomes after minimally invasive lumbar decompression: a biomechanical comparison of unilateral and bilateral laminotomies. *BMC Musculoskeletal Disorders*, (2015) 16: 208. DOI 10.1186/s12891-015-0659-2.
 14. Yi-Jung Tsai, Fong-Chin Su, **Chih-Kun Hsiao**, and Yuan-Kun Tu*. Comparison of Objective Muscle Strength in C5-C6 and C5-C7 Brachial Plexus Injury Patients after Double Nerve Transfer. *Microsurgery*, 2015 February V35, Issue 2, p107–114, DOI 10.1002/micr 22283.
 15. Su-Chun Cheng, **Chih-Kun Hsiao**, Jui-Yi Tsou, Ruey-Mo Lin, Fong-Chin Su. Predicting The Vertebral Body Position Based on Palpated Spinous Process Position. *Journal of Mechanics in Medicine and Biology*. Vol. 14, No. 1 (2014) 1450010 (13 pages) doi: 10.1142/S0219519414500109
 16. Yuan-Kun Tu, Yi-Jung Tsai, Chih-Han Chang, Fong-Chin Su, **Chih-Kun Hsiao**, Jacqueline Siau-Woon Tan. Surgical treatment for total root avulsion type brachial plexus injuries by neurotization - a prospective comparison study between total and

- hemi-contralateral c7 nerve root transfer. *Microsurgery*. 2014 February, V34, Issue 2, p91–101. doi: 10.1002/micr. 22148.
17. Cheng-Hung Lee, Kui-Chou Huang, **Chih-Kun Hsiao**, Sung Cheng, Yau-Chih Liu, and Chih-Han Chang. Biomechanical Comparison of the Role of Inlay Graft in Proximal Humerus Fracture Fixed with Conventional Plate and Locking Plate. *Journal of Mechanics in Medicine and Biology*, August 2013, Vol. 13, No. 04.1350055 (8 pages)
 18. Yuan-Kun Tu, Li-Wen Chen, Ji-Sih Ciou, **Chih-Kun Hsiao**, Yung-Chuan Chen. Finite element simulations of bone temperature rise during bone drilling based on a bone analog. *Journal of Medical and Biological Engineering*, Vol. 33, No.3. p269-274 (2013).
 19. Cho-Lin Wang, **Chih-Kun Hsiao**, Ming-Chou Ku and Chih-Han Chang, Arthroscopic Anterior Cruciate Ligament Reconstruction with LARS Artificial Ligament: An 8-15 Year Follow-up *Journal of Mechanics in Medicine and Biology*. Vol. 13, No. 2 (2013), 1350046 (11 pages).
 20. Cho-Lin Wang, **Chih-Kun Hsiao**, Ar-Tyan Hsu, Ching-Ze Dung, Chih-Han Chang, Biocompatibility and Mechanical Property of LARS Artificial Ligament with Tissue Ingrowth *Journal of Mechanics in Medicine and Biology*. Vol. 12, No. 1., March, 2012 p1250012 (11 pages).