

■ **WORK EXPERIENCE**

2023-11 ~	大安丰采睡眠醫學診所	<i>Director</i>
2023-11 ~	School of Respiratory Therapy, College of Medicine, Taipei Medical University, Taipei, Taiwan	<i>Associate Professor</i>
2023-10 ~	Division of Pulmonary Medicine, Department of Internal Medicine, Shuang Ho Hospital, Taipei Medical University, New Taipei City, Taiwan	<i>Attending Physician</i>

■ **EDUCATION**

2011-2~2020-2	Department of Engineering Science, National Cheng Kung University, Tainan, Taiwan
1989~1996	Taipei Medical University, School of Medicine, Taipei, Taiwan

Board Certification

- Physician License (醫字第 026953 號, November 1996)
- Board of Internalist , R.O.C. No.6095 (內專醫字第 006095 號, December 2001)
- Board of Pulmonologist, The Society of Pulmonary and Critical Care Medicine R.O.C. (台胸學會證字第 0654 號, December 2003)
- Board of Critical Care Specialist, The Society of Pulmonary and Critical Care Medicine R.O.C. (重聯專字第 01790 號, December 2005)
- Board of Sleep Medicine Specialist, The Society of Sleep Medicine, R.O.C. No. 204 (台睡醫字第 204 號, March 2013)
- Board of Weight Management Specialist, Chinese Taipei Society for The Study of Obesity, Taiwan, R. O. C. No. 00414. (肥胖學會專醫證字號第 00414 號)
- Board of Assistant Professor Certificate, Minister of Education, R.O.C. No.036051 (教育部部定助理教授證書, 助理字第 036051 號)
- Board of Associate Professor Certificate, Minister of Education, R.O.C. No.144927 (教育部部定副教授證書, 副字第 144927 號)

Dr. Wen-Te Liu Adjunct Associate Professor at Taipei Medical University College of Medicine,
PhD in Engineering Science at National Cheng Kung University

Dr. Wen-Te Liu is an associate professor at Taipei Medical University College of Medicine and directs the in-service Master's Program in Artificial Intelligence in Medicine at the College of Medicine. He also serves as the director of the Sleep Center and an attending physician in the Department of Pulmonary and Critical Care Medicine at Shuang Ho Hospital, Ministry of Health and Welfare. His research interests include chest medicine, pulmonary rehabilitation, sleep-disordered breathing, monitoring of chronic lung diseases, and telemedicine. During his previous service at the Department of Chest Medicine at Chang Gung Memorial Hospital in Linkou, in addition to clinical research in medicine, he was

also an adjunct associate research fellow at the National Center for High-Performance Computing of National Applied Research Laboratories from 2004-2006, conducting interdisciplinary research that combined information technology and medical innovation. He helped co-develop the “Asthma Grid”, which integrated networks and chest care to serve as a real-time monitoring and environmental information (such as weather and air quality) platform for patients with chronic asthma. This platform was later upgraded to become the “Asthma Cell Phone Care System”, which officially launched in May 2006 in cooperation with a domestic telecom operator (Chunghwa Telecom). It was also selected for an Oral Presentation at the 2007 International Conference of American Thoracic Society. Part of the research results were published in the renowned international journal European Respiratory Journal in 2011 (European Respiratory Journal 2011; 37(2):310-317). Additionally, beginning in 2005, he concurrently developed a system that utilizes musical rhythm to adjust pace for use in home exercise training for patients with chronic obstructive pulmonary disease, incorporating mobile telehealth technology. Preliminary research results were selected for an Oral Presentation at the 2006 International Conference of American Thoracic Society and were also published in the European Respiratory Journal in 2008 (2008; 32(3):651-9). At the same time, he applied for patents for this exercise assessment and training method in multiple countries, and obtained approval in Taiwan (Announcement Date: 2006/10/01). Furthermore, regarding inhalation devices used by patients with chronic respiratory diseases, he also conducted research to improve these devices, obtaining the domestic patent “Inhaler Device and Device and Method Capable of Recording Medication Data” (R.O.C. Patent, Type: Invention, Patent No.: I310905, Announcement Date: 2009/06/11). In recent years, in addition to continuing to promote telemedicine, he has also conducted research applying wearable devices to home monitoring and evaluation of sleep breathing patterns for patients with chronic respiratory diseases. He has also begun a series of studies on the correlation between air pollution and sleep-disordered breathing, obtaining many research achievements. In addition, over the past few years he has actively collaborated with many domestic and foreign start-up companies to jointly develop smart medical platforms for sleep monitoring that incorporate wearable devices and expert dialogue systems to establish overall care models for sleep medicine encompassing new modalities, while also conducting research related to sleep medicine that utilizes artificial intelligence and Internet of Things technologies. He is the primary investigator of several major research projects funded by the Ministry of Science and Technology (MOST), including “Developing Precision Sleep Medicine through Integration of Artificial Intelligence and Internet of Things Technologies” (2018/01/01- 2021/12/31), “Revolutionizing Chronic Disease Healthcare and Management through Integration of Artificial Intelligence, Digital Health, and Big Data – Developing Metabolic Syndrome and Neurodegenerative Disease Healthcare Platforms Incorporating Sleep-Disordered Breathing Health Big Data” (2021/11/01-2024/10/31), and “Constructing Sleep Health Care Models by Integrating Wearable Devices and Clinical Big Data” (2023/08/01-2026/07/31), broadly and closely combining engineering and medicine. Since 2021, he has also obtained numerous patents related to sleep medicine and engineering (including sleep-disordered breathing audio signals, respiratory event-related awakenings and airway audio frequencies, sleep-dependent memory consolidation, mattresses and improvement of sleep-disordered breathing, applying heart rate variability to assessment of mental states, prediction of abnormal sleep breathing events, virtual eyeglasses and vision adjustment, etc.), with a total of 14 patents, as he continues to establish more interdisciplinary innovative medical research and development. Beginning in October 2023, he will

collaborate with dentist Dr. Ma Yung-Chang to leverage previous research and development outcomes in sleep and respiratory medicine to establish the “Dr. BreathE” brand, while jointly planning the “Abundant Sleep Medicine & Aesthetic Dentistry Joint Clinic”, utilizing an interdisciplinary, cross-domain approach with the goal of scientifically improving sleep and breathing to further develop innovative medical modalities

■ **Employment Record**

2021-8~2023-9	Director, Professional Master Program in Artificial Intelligence in Medicine
2018-8~2023-9	Director, Sleep Center of Shuang Ho Hospital
2018-2~2023-9	Associate Professor, School of Respiratory Therapy, College of Medicine, Taipei Medical University, Taipei, Taiwan
2011-8~2023-9	Attending Physician, Division of Pulmonary Medicine, Department of Internal Medicine, Shuang Ho Hospital, Taipei Medical University, New Taipei City, Taiwan
2011-8~2023-9	Attending Physician, Division of Pulmonary Medicine, Department of Internal Medicine, Shuang Ho Hospital, Taipei Medical University, New Taipei City, Taiwan
2004~2006	Adjunct Researcher, National Center For High-Performance Computing
2003~2011-06	Attending physician, Department of Thoracic Medicine, Chang Gung Memorial Hospital, Chang Gung University
2001~2003	Fellowship of Pulmonary and Critical Care Medicine, Department of Thoracic Medicine II Chang Gung Memorial Hospital, Taipei, Taiwan
200~2003	Fellowship of Pulmonary and Critical Care Medicine, Department of Thoracic Medicine II Chang Gung Memorial Hospital, Taipei, Taiwan
1995~1996	Internship, Veterans General Hospital-Taipei, Taipei, Taiwan

Chinese Medical License NO

- 醫字第 026953 號 北市衛安醫執字第 11210180330 號

Professional Affiliations

- Taiwan Medical Association, R.O.C.
- The Society of Internal Medicine, R.O.C.
- The Society of Pulmonary and Critical Care Medicine, R.O.C.
- Taiwan Society of Critical Care Medicine R.O.C.
- Taiwan Society of Sleep Medicine R.O.C.
- Chinese Taipei Society for The Study of Obesity, Taiwan, R. O. C.

Professional Activities

- 2005: Member of Medical Education Committee,
Department of Internal Medicine, Chang Gung Memorial Hospital
- 2008~2010-03: Member of Medical Records Committee, Chang Gung Memorial Hospital

Research Interest

- Sleep Medicine
- Artificial Intelligence in Medicine
- Pulmonary Medicine
- Pulmonary Rehabilitation
- Telemedicine and Telecare
- Weight Management

Research Project

Ministry of Science and Technology (MOST) Research Projects:

- Exploring the Roles of NF- κ B and NF- κ B Repressing Factor (NRF) in Systemic Inflammation Induced by Chronic Obstructive Pulmonary Disease (Principal Investigator: Liang-Yen Lee, Co-PI: Wen-Te Liu, 2010/8/1-2013/7/31)
- Long-term Healthcare System for Patients with Respiratory Disorders – Umbrella Project and Subproject 3: Front-end Circuit Design Applied to Healthcare for Patients with Respiratory Disorders (1/3) (PI: Po-Chun Huang, Co-PI: Wen-Te Liu, 2012/5/1-2015/4/30, 3-year project)
- CMOS Broadband Radar System for Analyzing Respiratory and Gait Signals in Patients with Chronic Respiratory Diseases – Umbrella Project and Subproject 4: Digital Signal Processing of Radar for Human Respiratory Pattern and Gait Analysis (1/3) (PI: Yuan-Hao Huang, Co-PI: Wen-Te Liu, 2012/5/1-2015/4/30, 3-year project)
- Exploring the Correlation and Efficacy of Exercise Training Programs on Pro-inflammatory and Anti-inflammatory Cytokines in Patients with Chronic Obstructive Pulmonary Disease (PI: Shu-Chuan Ho, Co-PI: Wen-Te Liu, 2014/8/1-2015/7/31)
- Home Monitoring System for Sleep Apnea – Umbrella Project and Subproject 4: Respiratory Feature Extraction and Core Circuits for Home Monitoring System of Sleep Apnea (PI: Po-Chun Huang, Co-PI: Wen-Te Liu, 2015/05/01-2016/05/31)
- Establishing Smart Medical Innovation Service Systems Using AI and IoT Technologies – Developing Precision Sleep Medicine through Integration of Artificial Intelligence and Internet of Things Technologies (PI: Wen-Te Liu, 2018/01/01-2021/12/31)
- Big Data Platform for Smart Non-Contact Physiological Signal Analysis and Its Innovative Cloud-Based Service Applications in Behavior Recognition (PI: Chuan-Yi Tang, Co-PI: Wen-Te Liu, 2021/8/1-2024/7/31)
- (Integrated Project) Revolutionizing Chronic Disease Healthcare and Management through Integration of Artificial Intelligence, Digital Health, and Big Data – Subproject 8: Developing Healthcare Platforms for Metabolic Syndrome and Neurodegenerative Diseases Incorporating Sleep-Disordered Breathing Health Big Data (PI: Li-Chen Fu, Subproject 8 PI: Wen-Te Liu, 2021/11/01-2023/10/31)
- Applying Artificial Intelligence and Internet of Things to Sleep Breathing Audio Recognition and Home Care (PI: Shu-Han Liao, Co-PI: Wen-Te Liu, 2023/08/01-2024/07/31)
- Dynamic Process of Sleep Disruption Reactions: Exploring Related Factors and Clinical Phenomena (PI: Chien-Ming Yang, Co-PI: Wen-Te Liu, 2023/08/01-2024/07/31)

Chang Gung Memorial Hospital Research Projects

- Chang Gung Research Project CMRPG360271, Principal Investigator, 2007/07/01 to 2009/06/30, The Influence of Environmental Factors on Asthma Control

Bibliography

A. Journal articles :

- Yang MC, Liu WT, Lin HC, Huang CJ, Huang SF, Kuo HP*. Churg-Strauss Syndrome After Corticosteroid Withdrawal in Asthma Patients: Report of Two Cases not Related to Leukotriene Receptor Antagonists, Thoracic Medicine 2003; 18(3):251-8
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- Huang CJ, Liu WT, Lin CL, Chen YM, Wang CH, Kuo HP*. A Case of Difficult Asthma: Churg-Strauss Syndrome, Thoracic Medicine 2003; 18(3):275-9
https://www.airitilibrary.com/Common/Click_DOI?DOI=10.29806/TM.200306.0013
- Huang CJ, Wang CH, Liu WT, Yang MC, Lin HC, Yu CT, Shiao CJ, Tan CC, Yang CK, Kuo HP*. Zafirlukast improves pulmonary function in patients with moderate persistent asthma receiving regular inhaled steroids: a prospective randomized control study, Chang Gung Medical Journal 2003; 26(8):554-60
<https://pubmed.ncbi.nlm.nih.gov/14609035/>
- Chou PC, Lin CL, Liu WT, Lin HC, Kuo HP*. Safety of the Methacholine Challenge Test in Patients with Severe Airway Obstruction, Thoracic Medicine 2003; 18(4):329-37
<https://tpl.ncl.edu.tw/NclService/pdfdownload?filePath=IV8OirTfsslWcCxlPbUfvOO3kZLyeucCu-vET6KBcKansXRLBEQrWciokqpURMz&imgType=Bn5sH4BGpJw=&key=OJRNcJXye8yA37KdNHJsfP2HqQeiNOMYj3QU6eZ4QJgeVVU9OyINO4qBZJhLTxWd&xmlId=0004783056>
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https://tpl.ncl.edu.tw/NclService/pdfdownload?filePath=IV8OirTfsslWcCxlPbUfvOO3kZLyeucCu-vET6KBcLePNypCrgem0bw9UWP4zbv&imgType=Bn5sH4BGpJw=&key=kjKMX4zgP1eSN4LdS7GLVSu88xVvpCT0PZ4_tOy7nQoeVVU9OyINO4qBZJhLTxWd&xmlId=0004815108
- Huang CD, Wang CH, Liu CY, Lin SM, Chou CL, Liu WT, Lin HC, Kuo HP*. Eosinophils from Asthmatics Release IL-5 in an Autocrine Fashion to Prevent Apoptosis Through Upregulation of Bcl-2 Expression, Journal of Asthma 2005; 42(5): 395-403. PMID: 16036415. DOI: 10.1081/JAS-63001
[10.1081/JAS-63001](https://doi.org/10.1081/JAS-63001)
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<https://www.ers-education.org/lr/show-details/?idP=7075>
- Liu CY, Lin HC, Yu CT, Lin SM, Lee KY, Chen HC, Chou CL, Huang CD, Chou PC, Liu WT, Wang CH,

- Kuo HP* The concentration-dependent chemokine release and pro-apoptotic effects of neutrophil-derived α -defensin-1 on human bronchial and alveolar epithelial cells, *Life Science* 2007; 80(8):749-58. PMID: 17141275 DOI: 10.1016/j.lfs.2006.11.016
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- Tseng ST, Kao YH, Peng CC, Liu JY, Chu SC, Hong GF, Hsieh CH, Hsu KT, Liu WT, Huang YH, Huang SY, Chu TS. A 65nm CMOS low power impulse radar for respiratory feature extraction. *Radio Frequency Integrated Circuits Symposium (RFIC), 2015 IEEE.*
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- Liu YS, Liu WT, Lin SY, Ho SC. NREM sleep stages are associated with Aβ42 and Tau in Obstructive Sleep Apnea. *European Respiratory Journal* 2020 56: 2120; DOI: 10.1183/13993003.congress-2020.2120. (ERS)
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C. Books:

- Chan YS, Liu WT, Chiu CT. Classifying and Predicting Respiratory Function based on Gait Analysis. “Advanced Biosignal Processing and Diagnostic Methods” 2016 Jul 21.
- <https://www.intechopen.com/chapters/51454>

D. Oral Presentations :

- Liu WT, Wang CH, Lin SM, Lin HC, Chou PC, Huang CD, Liu CY, Kuo HP. A New Cell-Phone-Based Exercise Program for Patients with Chronic Obstructive Airway Disease. International Conference of American Thoracic Society, San Diego, USA. May 22, 2006. (Oral Presentation)
- Liu WT, Wang CH, Huang CD, Kuo HP. A novel mobile phone-based self-care system improves asthma

control. International Conference of American Thoracic Society, San Francisco, USA. May 20, 2007. (Oral Presentation)

- Telemedicine in patients with chronic asthma – CGMH experience, International Conference of Airway Disease Symposium, Taipei, Taiwan. Mar 17~18, 2007.
- How to execute Home-based pulmonary rehabilitation equipped with GPRS cell-phone. International Conference of Asia Pacific COPD summit 2007, Taipei, Taiwan. Sep 29~30, 2007

Honor &/or Awards

- First Prize Winner of 2004 Outstanding Chest Medicine Paper Award, Thoracic Society of Taiwan
- 2012 Gold Medal, Nuremberg Invention Fair, Germany (Dose Inhaler Related Recording Device And Method For Dose Inhaler)
- First Prize Winner of Outstanding Paper Award for Oral Presentation Original Paper, 17th Third Member Assembly and Academic Conference, Thoracic Society of Taiwan, 2019

Patents

- Juang JN, Kuo HP, Liu WT, Hung SH, Liang KY. Method for exercise tolerance measurement. Oct 01, 2006 偵測運動耐受性的方法, 中華民國專利, 類型：發明, 專利證書號: I262782, 公告日: 2006/10/01)
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- Liu WT. 居家睡眠監測器、居家睡眠監測系統以及居家睡眠監測及睡眠呼吸事件分類方法 HOUSEHOLD SLEEPING MONITOR, HOUSEHOLD SLEEPING MONITORING SYSTEM AND HOUSEHOLD SLEEP MONITORING AND METHOD FOR SLEEP BREATHING EVENT CLASSIFICATION。類型：發明，專利證書號：I728839 中華民國 2021/5/21-2040/6/11
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[TWI758107B](#)
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- Liu WT. 呼吸道音頻分析系統以及呼吸道音頻分析方法 RESPIRATORY TRACT AUDIO ANALYSIS

SYSTEM AND RESPIRATORY TRACT AUDIO ANALYSIS METHOD 中華民國專利，類型：發明，
專利證書號：I770528 中華民國 2022/7/11-2040/6/10

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- **Liu WT.** 呼吸裝置以及呼吸裝置輸出氣流調整方法 BREATHING DEVICE AND METHOD FOR ADJUSTING OUTPUT AIRFLOW OF BREATHING DEVICE 中華民國專利，類型：發明，專利證書號：I779486 中華民國 2022/10/01-2041/02/08

[TWI779486B](#)

- **Liu WT.** 居家睡眠監測系統與方法 HOME SLEEP MONITORING SYSTEM AND METHOD 中華民國專利，類型：發明，專利證書號：I788782 中華民國 2023/01/01-2041/02/08

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- **Liu WT, Lin SY.** 睡眠異常呼吸事件預測及調控系統、方法以及呼吸器裝置 PREDICTION AND REGULATION SYSTEM AND METHOD FOR ABNORMAL RESPIRATORY EVENT IN SLEEP DURATION AND RESPIRATOR DEVICE 中華民國專利，類型：發明，專利證書號：I814663 中華民國 2023/09/01-2042/12/11

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- **Liu WT.** 人際互動狀態分析建議系統及方法 INTERPERSONAL INTERACTION STATE ANALYSIS SUGGESTION SYSTEM AND METHOD 中華民國專利，類型：發明，專利證書號：I816089 中華民國 2023/09/21-2041/02/23

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- **Liu WT.** 身心狀態分析建議系統 PSYCHOSOMATIC STATE ANALYSIS SUGGESTION SYSTEM 中華民國專利，類型：發明，專利證書號：I817090 中華民國 2023/10/01-2041/02/23

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