

Sheng-Chieh (Leon) Chiu

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EDUCATION BACKGROUND

The University of Alabama at Birmingham (UAB), Alabama, USA

Sep 2020 – Aug 2025

Ph.D. in Biomedical Engineering

GPA: 3.85/4

"Optimizing Quantification in Alzheimer's Disease with PET Imaging through Advanced Imaging and Deep Learning Techniques"

National Cheng Kung University (NCKU), Tainan, Taiwan

Sep 2016 - Jun 2020

B.S. in Biomedical Engineering

GPA: 3.76/4.30

Upper Division GPA: 3.86/4.30

RESEARCH EXPERIENCE

Postdoctoral Researcher

Feb 2026 – Present

Digital Medicine and Smart Healthcare Research Center

National Yang Ming Chiao Tung University (NYCU), Taipei, Taiwan

- Focus on sovereign AI and digital twin technologies for healthcare, contributing to the development of trustworthy, locally governed AI systems for neurological and surgical applications.
- Design a cross-modality generative AI pipeline to synthesize amyloid PET images from structural MRI, aiming to enable amyloid burden estimation for patients without access to PET scanning while ensuring safety against false-positive generation in healthy populations.
- Develop a foundation model-based framework for resting-state fMRI to learn healthy brain dynamics through self-supervised learning, establishing a validated baseline representation before extending to clinical perturbation modeling and digital twin applications.
- Build a real-time computer vision system for DaVinci robotic-assisted gynecologic surgery, integrating object detection and promptable segmentation models for intraoperative anatomical structure identification, with a focus on visibility-aware tracking and surgical safety under occlusion.

Graduate Research Assistant

Sep 2020 – Aug 2025

Department of Biomedical Engineering

The University of Alabama at Birmingham (UAB), Birmingham, AL, USA

- Developed and validated a series of novel image processing and deep learning methods to improve the accuracy, efficiency, and accessibility of amyloid PET quantification for Alzheimer's disease.
- Designed deep learning segmentation models for both MRI-assisted and MRI-less amyloid PET quantification, demonstrating quantitative equivalence to the conventional FreeSurfer standard and robust diagnostic performance across large-scale multi-site neuroimaging cohorts.
- Proposed a tracer characteristic-based co-registration method for simultaneous PET/MRI motion correction and contributed to the development of a novel PET biomarker for predicting MCI-to-AD progression, both leveraging domain-specific knowledge of tracer binding and brain anatomy to enhance PET quantification.
- Performed large-scale statistical analyses including Centiloid calibration, equivalence testing, ROC analysis, and bootstrap methods, and collaborated across nuclear medicine, radiology, neurology, and computer science in a multidisciplinary research environment.

PUBLICATIONS

Classification of tau status with machine learning models in amyloid-positive cohorts

Jul 2026

Lin YC, Chiu SC, Massey R, Fang YHD

Developed and externally validated a machine-learning surrogate for tau-PET status using structural MRI and amyloid-PET features, achieving an AUC of 0.92 across ADNI, OASIS-3, and SCAN cohorts and identifying MCI patients at increased risk of progression to AD.

- Alzheimer's & Dementia. 2026 Jul 31; <https://doi.org/10.1002/alz.71683>

Amyloid PET quantification with deep learning segmentation models without MRI

Mar 2026

Chiu SC, Lin YC, McConathy J, Lin SY, Fang YHD

Developed and validated deep learning models for MRI-less amyloid PET quantification by leveraging synthetic CT data for training, achieving statistical equivalence to the MRI-based standard and demonstrating robust diagnostic performance on external PET/CT cohorts.

- EJNMMI physics. 2026 Mar 11; <https://doi.org/10.1186/s40658-026-00854-8>

Motion correction of simultaneous brain PET/MR images based on tracer uptake characteristics Jul 2025

Chiu SC, Perucho JA, Fang YHD

Developed a novel tracer characteristic-based co-registration (TCBC) method that outperforms conventional approaches by reducing PET/MR misalignment, improving quantification accuracy, and enhancing the detectability of investigational task using PET quantification.

- EJNMMI physics. 2025 Jul 30; <https://doi.org/10.1186/s40658-025-00789-6>

Prediction of MCI-to-AD progression with atrophy-weighted standard uptake value ratios of ¹⁸F-Florbetapir PET Mar 2023

Fang YHD, Perucho JA, **Chiu SC**, Lin YC, McConathy JE

Proposed and validated a novel PET quantitative parameter, the atrophy-weighted SUVR (awSUVR), combining ¹⁸F-Florbetapir amyloid PET uptake with MR-measured hippocampal volume to predict MCI-to-AD progression, achieving over 90% accuracy across 3-, 5-, and 7-year prediction criteria in large ADNI cohorts and outperforming conventional SUVR-based approaches.

- medRxiv. 2023 Mar 14; <https://doi.org/10.1101/2023.03.09.23287059>

PAPERS UNDER REVIEW AND IN PREPARATION

Under Review

- Deep learning MR-based segmentation approach for amyloid PET quantification. **EJNMMI Physics**
Chiu SC, Lin YC, McConathy J, Lin SY, Fang YHD

In Preparation

- Accelerated tau deposition is associated with COVID infection in the ADNI cohort
Lee J, **Chiu SC**, Lin YC, McConathy J, Fang YHD
- Evaluating the association between cerebral atrophy and tau deposition in amyloid-positive individuals across the Alzheimer's Disease continuum
Lin YC, Massey R, **Chiu SC**, Lee J, Fang YHD
- A simplified scoring system for MCI-to-AD conversion prediction based on Centiloid and cognitive tests
Massey R, Perucho J, **Chiu SC**, Lin YC, Lee J, Fang YHD

POSTER PRESENTATION

Society of Nuclear Medicine and Molecular Imaging Jun 2024

- **Chiu SC** & Fang YHD (2024). Evaluation of Deep Learning Models for Brain Parcellation in Neuroimaging of Alzheimer's Disease.
https://jnm.snmjournals.org/content/65/supplement_2/242449.abstract
- Perry J, Nikpanah M, **Chiu SC**, Fang YHD, McConathy J (2024). Volumetric Brain Tumor Segmentation in High-Grade Glioma Using a Semi-Automated Workflow.
https://jnm.snmjournals.org/content/65/supplement_2/242500.abstract

Society of Nuclear Medicine and Molecular Imaging Jun 2023

- **Chiu SC** (2023). Correction for Involuntary Motion of Simultaneous PET/MR Brain Scans Based on the Regional Tracer Characteristics.
https://jnm.snmjournals.org/content/64/supplement_1/P1340.abstract

World Molecular Imaging Congress Oct 2021

- **Chiu SC** (2021). Development of an Extension Framework to Enable Deep Learning-Based Image Processing and Analysis with Cloud Computing for Open-Source Imaging Software.
<https://www.xcdsystem.com/wmis/program/QSb7b5D/index.cfm?pgid=2585&sid=23773&abid=84541>
- <https://github.com/IQMLatUAB/IQMLServer>

TECHNICAL SKILLS

- Deep Learning: Python, PyTorch, Generative AI
- Medical Imaging Processing: PET, MRI, Co-Registration, Segmentation, Quantification
- Medical Imaging Tools: MATLAB, 3D Slicer, SPM, FSL, FreeSurfer, MRICroGL