Dr. REN Ge Gary, BSc, MPhil, MSc, PhD

Research Assistant Professor

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QUALIFICATIONS

PhD in Medical Physics	The Hong Kong Polytechnic University	*2018 - 2021*
MSc in Medical Physics	Duke University	*2016 - 2018*
MPhil in Fermentation Engineering	Jiangnan University	*2014 - 2016*
BSc in Biological Engineering	Jiangnan University	*2010 - 2014*

BRIEF OUTLINE OF EXPERIENCE AND POSTS HELD

Research Assistant Professor	The Hong Kong Polytechnic University	*2021.07-now*

RESEARCH INTERESTS

Development of novel artificial intelligence strategies for disease diagnosis, radiation therapy treatment planning, therapeutic guidance, prognosis, and outcome assessment in the lung region

SERVICE TO PROFESSIONAL & SCIENTIFIC BODIES, CONSULTANCY, MEMBERSHIP OF PROFESSIONAL & LEARNED SOCIETIES

Guest Associate Editor	Medical Physics	*2021-now*
Member	Hong Kong Association of Medical Physics	*2021-now*
Full Member	American Association of Physicists in Medicine (AAPM)	*2016-now*
Associate Member	Hong Kong Thoracic Society (HKTS)	*2021-now*

AWARDS

Best Oral Award, 22nd Asia-Oceania Congress on Medical Physics, AFOMP	*2022*
Semi-finals of the 2021 Global Healthcare Innovation Academy, GHIA	*2021*
Faculty Distinguished Thesis Award, FHSS, PolyU	*2021*
Final List of Young Investigator Award of AAPM|COMP meeting, AAPM	*2020*
HTI Reward of Conference Oral Presentation Awards (3rd and 2nd levels), PolyU	*2019, 2020*

HTI Postgraduate Symposium (3rd place), PolyU *2020*

Future Health Technology Star, Greater Bay Area Health Tech Future Forum 2022

PATENTS

放射性肺炎预警模型的训练的方法及应用 3IN220390DD1F under review

灌注图像生成方法、装置、设备及介质 202211377373.1 under review

REPRESENTATIVE PUBLICATIONS

JOURNAL ARTICLES

1. **Ren G**, Li B, Lam S, Xiao H, Huang Y, Cheung A, Lu Y, Mao R, Ge H, Ho W, Cai J. A Transfer Learning Framework for Deep Learning-Based CT-to-Perfusion Mapping on Lung Cancer Patients. Frontiers in Oncology. 2022;12: 883516.
2. **Ren G**, Jiang Z, Li T, Xiao H, Cheung A, Ho W, Qin J, Cai J. Deep Learning-Based Computed Tomography Perfusion Mapping (DL-CTPM) for Pulmonary CT-to-Perfusion Translation. International Journal of Radiation Oncology* Biology* Physics. 2021;110(5):1508-1518.
3. **Ren G**, Lam S, Jiang J, Xiao H, Cheung A, Ho W, Qin J, Cai J. Investigation of a Novel Deep Learning-Based Computed Tomography Perfusion Mapping Framework for Functional Lung Avoidance Radiotherapy. Frontiers in Oncology. 2021;11(644703).
4. **Ren G**, Xiao H, Lam S, Yang D, Li T, Teng X, Qian J, Cai J. Deep learning-based bone suppression in chest radiographs using CT-derived features: a feasibility study. Quantitative Imaging in Medicine and Surgery. 2021; 11(12):4807.
5. **Ren G**, Lam S, Ni R, Yang D, Qin J and Cai J. The Effectiveness of Data Augmentation for Bone Suppression in Chest Radiograph using Convolutional Neural Network. Austin J Cancer Clin Res. 2021; 8(2): 1095.
6. **Ren G**, Ho W, Qin J, Cai J. Deriving Lung Perfusion Directly from CT Image Using Deep Convolutional Neural Network: A Preliminary Study. Springer International Publishing. Nguyen D, Xing L, Jiang S (Eds.), Artificial Intelligence in Radiation Therapy. 2019; pp. 102-109.
7. **Ren G**, Zhang Y, Ren L. Assessing the feasibility of using deformable registration for onboard multimodality-based target localization in radiation therapy. Cancer Translational Medicine. 2018;4(6):143-52.
8. **Ren G**, Wang Z, Li Y, Hu X, Wang W. Effects of lipopolysaccharide core sugar deficiency on Colanic Acid biosynthesis in Escherichia coli. Journal of Bacteriology. 2016;198(11):1576-1584.
9. Yang D, **Ren G**, Ni R, Huang Y, Lam N, Sun H, Wan S, Wong M, Chan K, Tsang H, Xu L, Wu T, Kong F, Wang Y, Qin J, Chan W, Ying M, Cai J. Deep learning attention-guided radiomics for COVID-19 chest radiograph classification. Quantitative Imaging in Medicine and Surgery. 2022.
10. Sun H, **Ren G**, Teng X, Song L, Li K, Yang J, Hu X, Zhan Y, Wan B, Wong M, Chan K, Tsang H, Wu L, Kong F, Wang Y, Qin J, Chan W, Ying M, Cai J. Artificial intelligence-assisted multistrategy image enhancement of chest X-rays for COVID-19 classification. Quantitative Imaging in Medicine and Surgery. 2022; 13(1); 394-416.
11. Li B, **Ren G**, Guo W, Zhang J, Lam S, Zheng X, Teng X, Wang Y, Yang Y, Dan Q, Meng L, Ma Z, Cheng C, Tao H, Lei H, Cai J, Ge H. Function-Wise Dual-Omics analysis for radiation pneumonitis prediction in lung cancer patients. Computational Intelligence in Personalized Medicine. 2022; pp.110.
12. Li W, Xiao H, Li T, **Ren G**, Lam S, Teng X, Liu C, Zhang J, Lee F, Au K, Lee H, Chang T, Cai J. Virtual Contrast-Enhanced Magnetic Resonance Images Synthesis for Patients With Nasopharyngeal Carcinoma Using Multimodality-Guided Synergistic Neural Network. International Journal of Radiation Oncology* Biology* Physics. 2022;112(4):1033-1044.

13. Xiao H, Ni R, Zhi S, Li W, Liu C, **Ren G**, Teng X, Liu W, Wang W, Zhang Y, Wu H, Lee H, Cheung A, Chang H, Li T, Cai J. A dual‐supervised deformation estimation model (DDEM) for constructing ultra‐quality 4D‐MRI based on a commercial low‐quality 4D‐MRI for liver cancer radiation therapy. Medical Physics. 2022;49(5): 3159-3170.
14. Li W, Lam S, Li T, Cheung A, Xiao H, Liu C, Zhang J, Teng X, Zhi S, **Ren G**, Lee F, Au K, Lee V, Chang A, Cai J. Multi-institutional Investigation of Model Generalizability for Virtual Contrast-Enhanced MRI Synthesis. International Conference on Medical Image Computing and Computer-Assisted Intervention. 2022; pp. 765-773.
15. Huang Y, Teng X, Zhang J, Chen Z, Ma Z, **Ren G**, Cai J. Extracting lung function-correlated information from CT-encoded static textures. https://arxiv.org/abs/2210.16514
16. Huang Y, **Ren G**, Xiao H, Yang D, Kong F, Ho W, Cai J. Volumetric multiphase ventilation imaging based on four-dimensional computed tomography for functional lung avoidance radiotherapy. Medical Physics. 2022.
17. Lam N, Sun H, Song L, Yang D, Zhi S, **Ren G**, Chou P, Wan S, Wong M, Chan K, Tsang H, Wáng Y, Qin J, Chan L, Ying M, Cai J. Development and validation of bone-suppressed deep learning classification of COVID-19 presentation in chest radiographs. 2022;12(7): 3917.
18. Ni R, Zhou T, **Ren G**, Zhang Y, Yang D, Tam V, Leung W, Ge H, Lee S, Cai J. Deep Learning–Based Automatic Assessment of Radiation Dermatitis in Patients With Nasopharyngeal Carcinoma. International Journal of Radiation Oncology* Biology* Physics. 2022.
19. Teng X, Zhang J, Ma Z, Zhang Y, Lam S, Li W, Xiao H, Li T, Li B, Zhou T, **Ren G**, Lee F, Au K, Lee V, Chang A, Cai J. Improving radiomic model reliability using robust features from perturbations for head-and-neck carcinoma. Frontiers in Oncology. 2022;12.
20. Tang X, Shen Y, Meng Y, Hou L, Zhou C, Yu C, Jia H, Wang W, **Ren G**, Cai J, Li X, Yang H, Kong F. Radiation-induced lung damage in patients treated with stereotactic body radiotherapy after EGFR-tkis: Radiation-induced lung damage in patients treated with stereotactic body radiotherapy after EGFR-tkis: Is there any difference from stereotactic body radiotherapy alone? Annals of palliative medicine. 2021;10(3): 2832-2842.
21. Xiao H, Teng X, Liu C, Li T, **Ren G**, Yang R, Shen D, Cai J. A review of deep learning-based three-dimensional medical image registration methods. Quantitative Imaging in Medicine and Surgery. 2021;11(12):4895.
22. Lam S, Zhang Y, Zhang J, Li B, Sun J, Liu C, Chou P, Teng X, Ma Z, Ni R, Zhou T, Peng T, Xiao H, Li T, **Ren G**, Cheung A, Lee F, Yip C, Au K, Lee V, Chang A, Chan L, Cai J. Multi-organ omics-based prediction for adaptive radiation therapy eligibility in nasopharyngeal carcinoma patients undergoing concurrent chemoradiotherapy. Frontiers in oncology. 2021;11.
23. Li T, Cui D, **Ren G**, Hui E, Cai J. Investigation of the Effect of Acquisition Schemes on Time-Resolved Magnetic Resonance Fingerprinting. Physics in Medicine and Biology. 2021; 66(9):095013.
24. Tang X, Shen Y, Meng Y, Hou L, Zhou C, Yu C, Jia H, Wang W, **Ren G**, Cai J, Li X, Yang H, Kong F. Radiation-induced lung damage in patients treated with stereotactic body radiotherapy after EGFR-TKIs: Is there any difference from stereotactic body radiotherapy alone. Annals of Palliative Medicine. 2021;20(1116).
25. Xiao H, **Ren G**, Cai J. A review on 3D deformable image registration and its application in dose warping. Radiation Medicine and Protection. 2020;1(4):171-178.
26. Chen S, Zhou Q, Tan X, Li Y, **Ren G**, Wang X. The Global Response of Cronobacter sakazakii Cells to Amino Acid Deficiency. Frontiers in Microbiology. 2018;9(1875).
27. Wang Z, J Wang, **Ren G**, Wang W. Effect of core oligosaccharide structural transformation on auto aggregation in Escherichia coli, Journal of Food Science and Biotechnology. 2017;36(6):569-575.

28. Wang Z, Wang J, **Ren G**, Li Y, Wang X. Deletion of the genes waaC, waaF, or waaG in Escherichia coli W3110 disables the flagella biosynthesis. J Basic Microbiol. 2016;56(9):1021-35.
29. Wang Z, Wang J, **Ren G**, Li Y, Wang X. Influence of core oligosaccharide of lipopolysaccharide to outer membrane behavior of Escherichia coli. Marine Drugs. 2015;13(6):3325-3339.

CONFERENCE PRESENTATIONS

1. **Ren G**, Lam Y, Cai J. Cone Beam Computed Tomography Based Lung Perfusion Imaging via Deep Learning Technique for Functionally Adaptive Radiation Therapy. The 22nd Asia-Oceania Congress on Medical Physics, 2022. Taipei.
2. **Ren G**. Deep learning-based computed tomography perfusion mapping (DL-CTPM) for pulmonary CT-to-perfusion translation. The 16th Jinan Radiation Oncology Summit Forum. 2022.
3. **Ren G**. 基于深度学习的肺功能成像技术研究. AI and big data in clinical applications meeting. 2022. Henan cancer hospital, Zhengzhou, China.
4. Zhu J, Chen W, Huang Y, Nicol A, Lam Y, Cai J, **Ren G**. Hybrid Adversarial Network for Ultra-Quality Pulmonary Anatomy Imaging from Cone-Beam CT Images. American Association of Physicists in Medicine (AAPM) Annual Meeting, 2022. (Oral)
5. Huang, Yu-Hua, **Ge Ren**, Haonan Xiao, Yimeng Li, Zhi Chen, Xinzhi Teng, Zongrui Ma, and Jing Cai (2022). Phase-Resolved Lung Ventilation Imaging Method Based on Four-Dimensional Computed Tomography. 2022 AAPM 64th Annual Meeting, oral.
6. **Ren G**, Li B, Lu Y, Mao R, Ge H, Kong F, Ho W, Cai J. Evaluation of deep learning based CT to Perfusion mapping method with MAA SPECT in lung cancer patients. Lung Function Imaging Workshop, 2021. (Oral)
7. **Ren G**, Li B, Lu Y, Mao R, Ge H, Kong F, Ho W, Cai J. Evaluation of CT-derived Lung Perfusion with Deep Learning in Radiotherapy Patients. American Association of Physicists in Medicine (AAPM) Annual Meeting, 2021. (Oral)
8. **Ren G**, Ho W, Xiao H, Cheung A, Qin J, Cai J. Evaluation of Deep Learning Based CT Perfusion Imaging (DLCT-PI) for Functional Lung Avoidance Radiation Therapy (FLART). The 23rd Annual Meeting of Chinese Society of Clinical Oncology (CSCO), 2020. Beijing, China. (Oral)
9. **Ren G**, Ho W, Xiao H, Cheung A, Qin J, Cai J. CT-based Lung Perfusion Mapping Using Attention Residual Neural Network for Functional Avoidance Radiation Therapy. Final List of J.R. Cunningham Young Investigator Symposium in Joint AAPM | COMP, 2020. (Oral)
10. **Ren G**, Ho W, Qin J, Cai J. Deriving Lung Perfusion Directly from CT Image Using Deep Convolutional Neural Network: A Preliminary Study. International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2019. Shenzhen, China. (Oral)
11. **Ren G**, Zhang Y, Yin F, Ren L. Enhancing on-board image contrast using prior images and deformable registration for target localization: a feasibility study. AAPM Annual meeting, 2019. Nashville, TN, United State. (Abstract)
12. **Ren G**, Cai J. Assessing the Feasibility of Using Deformable Image Registration for On-board Multi-Modality Based Target Localization in Radiation Therapy. AAPM Seminar, 2018, Shanghai, China. (Abstract)
13. **Ren G**, Qin J, Ho W, Cai J. 基于深度卷积神经网络的肺功能图像合成. The 16th National Congress of Radiation Oncology (NSRO), 2019. Shenzhen, China. (Abstract)
14. **Ren G**, Qin J, Ho W, Cai J. 基于深度卷积神经网络的肺通气显像. Chinese Society of Medical Physics (CSMP), 2019. Zhengzhou, China. (Abstract)
15. Li W, Lam S, Xiao H, Li T, **Ren G**, Zhi S, Teng X, Liu C, Zhang J, Lee F, Au K, Lee V, Chang A, Cai J. Gadolinium-free Contrast-enhanced MRI (GFCE-MRI) Synthesis via Generalizable

MHDgN-Net for Patients with Nasopharyngeal Carcinoma. ISMRM-ESMRMB Annual meeting, 2022. LONDON, ENGLAND, UK. (Abstract)

16. Li T, Cui D, **Ren G**, Hui E, Cai J. Investigation of Different Acquisition Schemes for Four-dimensional Magnetic Resonance Fingerprinting. ISMRM & SMR Annual meeting & Exhibition, 2021. An online experience. (Abstract)
17. Xiao H, Li T, Zhang J, Ni R, **Ren G**, Zhang Y, Liu W, Wang W, Wu H, Lee V, Cheung A, Chang H, Cai J. Ultra-quality 4D-MRI synthesis using deep learning-based deformable image registration. ISMRM & SMR Annual meeting & Exhibition, 2021. An online experience. (Abstract)
18. Li W, **Ren G**, Li T, Xiao H, Lee F, Au K, Cai J. CE-Net: multi-inputs contrast enhancement network for nasopharyngeal carcinoma contrast enhanced T1-weighted MR synthesis. ISMRM & SMR Annual meeting & Exhibition, 2021. An online experience. (Abstract)

RESEARCH GRANTS

Start-up Fund for RAPs under the Strategic Hiring Scheme. HKD 250,000

Artificial Intelligence-assisted CT-to-Perfusion mapping for functional lung avoidance radiation therapy in lung cancer patients

Role: Principal investigator

Health and Medical Research Fund (COVID190211). HKD 2,569,000

AI-empowered chest X-ray and CT quantitative analysis for COVID-19 patient management

Role: Co-investigator

Health and Medical Research Fund (07183266). HKD1,495,000

Investigation of a Novel Deep Learning-based Pulmonary Ventilation Imaging Method for Lung Cancer Functional Avoidance Radiotherapy

Role: Co-investigator