**Year: __2024___** **Type of Awards (Young)**

**Name of Principal Investigator: _ Yazhen Li _** **Affiliated Institution: _ Shanghai Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine _**

**About of the PI** (within 300 words, 12-point single-spaced font.)

- As an orthodontist at the Ninth People's Hospital affiliated with the Shanghai Jiao Tong University School of Medicine, I am deeply passionate about orthodontics, choosing clinical practice, education, and research in orthodontics as my life long work. Over the years, I have transitioned from a resident to an orthodontist, acquiring expertise in a wide range of orthodontic procedures. Notable projects include collaborating on interdisciplinary approaches to complex cases. I have created many beautiful smiles and received recognition for my contributions to orthodontic research. I am particularly intrigued by research areas such as the effects of stress loading on the temporomandibular joint and the application of artificial intelligence in dentistry. Related research results have been published in major academic journals, including the Journal of Orthopaedic Surgery and Research, Journal of Dentistry, and Bioactive Materials. Looking ahead, I am committed to exploring the synergy between digital technology and orthodontic practice, leveraging AI to streamline diagnostic workflows and optimize treatment planning. Through embracing emerging technologies, I aspire to shape the future of orthodontics and enhance patient outcomes.

**Brief Summary of the Project:**

Magnetic Resonance Imaging (MRI) stands as the paramount modality for the evaluation of temporomandibular joint (TMJ) disorders, particularly in assessing disc perforations. The current diagnostic paradigm for TMJ disc perforations heavily relies on the expertise of radiologists interpreting the images, leading to potential variability and suboptimal precision in diagnostic outcomes. Deep learning, with its capacity to leverage large volumes of high-quality labeled data, holds promise in enhancing diagnostic precision and efficiency.

Our study endeavor aims to systematically curate and annotate a comprehensive dataset of TMJ MRI samples. Following this, we intend to employ active learning strategies to judiciously select the most valuable samples that can significantly contribute to the model training process. This approach is anticipated to culminate in the development of a robust dataset, albeit small in size, yet rich in quality and representativeness. Subsequently, our focus will shift towards the design and validation of a deep learning model, meticulously tailored for scenarios characterized by limited sample availability. This model will be

rigorously tested and validated to ensure its efficacy in accurately identifying TMJ disc perforations.

The overall objective of this study is to develop and standardize an artificial intelligence-driven framework for TMJ MRI interpretation. By doing so, we aspire to streamline the diagnostic workflow, reduce the time and complexity associated with TMJ disorder diagnosis, and ultimately furnish clinicians with a reliable tool to aid in the pre-treatment evaluation of TMJ conditions. This endeavor aligns with the broader goal of integrating advanced computational methodologies in medical imaging, thereby augmenting the clinical decision-making process and enhancing patient care outcomes.