

Year: 2023

Type of Awards (Young/Elite/Clinical)

Name of Principal Investigator: Lunguo Xia

Affiliated Institution: Shanghai 9th People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine

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

Dr. Lunguo Xia currently serves as Chief Physician and Master's Supervisor, and is the Deputy Director of the Orthodontics Department at Shanghai 9th People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine. Dr. Lunguo Xia is primarily dedicated to the growth/regeneration and orthodontic-related basic and clinical research of dentofacial deformities with jawbone underdevelopment/deficiency. His work focuses on addressing clinical challenges faced by patients with dentofacial deformities, improving clinical diagnosis and treatment levels, and promoting the development of clinical practice.

In the past five years, Dr. Lunguo Xia has published 29 SCI papers as the first or corresponding author. He has been granted 26 patents, including 5 invention patents, with 5 patents already transferred. The licensing transfers and supporting research and development funds for these patents total 12.8 million yuan. He has also obtained one Class II medical device certificate in China, one FDA 510(k) clearance in the United States, and one CIBG registration in the European Union. Dr. Xia's research has significantly contributed to improving clinical diagnosis and treatment levels and promoting public health.

Dr. Lunguo Xia has been selected for the Ministry of Education's "Changjiang Scholars Program" for young scholars (2023), Shanghai Young Science and Technology Star Program (2019), Shanghai Municipal Health Commission Outstanding Youth Program (2017), Shanghai Young Talent Sailing Program (2014), and the Excellent Doctoral Dissertation of Shanghai (2014; Advisor: Academician Zhiyuan Zhang). These honors and recognitions highlight Dr. Xia's outstanding achievements in academia and clinical practice.

Dr. LunGuo Xia's future research will continue to focus on developing new bioactive materials and treatment strategies to achieve faster and more effective bone repair and integration, while promoting the clinical translation of these research outcomes to improve patients' quality of life.



Brief Summary of the Project:

Abstract

Orthodontic treatment, known for correcting malocclusion and improving facial aesthetics, faces challenges when patients also have periodontitis—a chronic inflammatory condition that can exacerbate alveolar bone damage and tooth structure issues. Periodontitis, linked to both oral and systemic health issues, often involves an imbalance between pro-inflammatory (M1) and anti-inflammatory (M2) macrophages. Addressing this imbalance is crucial for effective treatment. This study explores using Au@CeO₂ nanozymes loaded with the

antioxidant dimethyl fumarate (Au@CeO₂-DMF) to restore mitochondrial function, reduce oxidative stress, and shift macrophages from M1 to M2 phenotype. This approach combines enzymatic therapy with controlled drug release and photothermal therapy (PTT), aiming to improve orthodontic outcomes for patients with periodontitis.