CORRESPONDENCE

The potential role of immune environment in dental patients treated with PMMA-based dental interim prosthetic materials

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Dear Editor,

I recently had the opportunity to read the article with immense interest, which provided a valuable insight into "In silico assessment of biocompatibility and toxicity: molecular docking and dynamics simulation of PMMA-based dental materials for interim prosthetic restorations" [1]. The authors used the advanced computational simulation technology to explore the biocompatibility and toxicity of PMMA-based dental materials. I wholeheartedly commend the authors' novel ideas and professional design. First, the authors have selected a set of receptors related to dental compatibility and obtained final 3D conformations through energyminimized method. Next, molecular docking has been applied for the assessment of the interaction between PMMA and receptors on static level and molecular dynamic simulation has been used to evaluate the stability of binding composites on dynamic level. Finally, the authors have utilized silico tools to predict the latent toxicity of PMMA on artificial tissue. I would like to give some complementary comments on this study.

In 1937, Walter Wright first introduced poly(methyl methacrylate) (PMMA) as dental base material. Since then, PMMA had been the most popular material in denture fabrication. PMMA can be applied in

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crowns, and artificial teeth. PMMA is usually available in the form of a powder-liquid system. The optimal dental material is characterized by safety, biocompatibility, and non-toxicity [2, 3]. Though previous studies have explored the properties of dental materials, these studies lacked discussion and investigation on molecular level. Few studies used silico approaches in dental material field but this study not only verifies the biocompatibility of PMMA-based dental materials but also sheds light on dental material field. Nevertheless, there are some limitations to this study. Although authors constructed receptor proteins using PDB and AlphaFold database, these receptor proteins seemed to focus on dental and bone homeostasis marker genes. As we all know, immune environment plays a vital role in organs. A study revealed that immune cell function will be affected by human macrophages, dendritic cells, and T cells in the presence of PMMA [4]. Whether the immune function of dental patients will be interrupted by exposure to temporary dental material seemed not to be explored in this study. It seems that marker genes of immune cell can be filtered in PDB database and the combined ability of these marker genes and PMMA can be revealed. On the other hand, the results of computerized simulation trials are not fully equal to results in vivo due to the existence of individual differences. More clinical trials are required to elucidate

orthodontic retainers, relining dentures, temporary

In general, this study not only pointed out the future direction of prosthetic dentistry, but also laid the foundation of subsequent research on this topic.





this conclusion in the future.



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Abbreviations

PMMAPolymethyl methacrylate methacrylic acidPDBProtein Data Bank

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Author contributions

Jiayi Chen made all contributions.

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Availability of data and materials

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Consent for publication

Not applicable.

Competing interests

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References

- Saini RS, Binduhayyim RIH, Gurumurthy V, Alshadidi AAF, Bavabeedu SS, Vyas R, et al. In silico assessment of biocompatibility and toxicity: molecular docking and dynamics simulation of PMMA-based dental materials for interim prosthetic restorations. J Mater Sci Mater Med. 2024;35:28.
- Zafar MS. Prosthodontic applications of polymethyl methacrylate (PMMA): an update. Polymers. 2020;12:2299.
- 3. Alqutaibi AY, Baik A, Almuzaini SA, et al. Polymeric denture base materials: a review. Polymers. 2023;15:3258.
- Wolff CM, Singer D, Schmidt A, Bekeschus S. Immune and inflammatory responses of human macrophages, dendritic cells, and T-cells in presence of micro- and nanoplastic of different types and sizes. J Hazard Mater. 2023;459: 132194.

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