Laboratory model enables researchers to explore the mouth's response to oral disease

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Researchers have created a three-dimensional model of the oral mucosa

that can be used in studies to test its response to a range of bacterial and other infections. They report their results in the *Journal of Tissue Engineering*.

The model, created by experts in dentistry and immunology at the University of Plymouth, is formed from a collagen hydrogel containing cell types commonly found in the human body.

In a series of tests, the researchers analyzed the model's response to a range of pathogens including Candida albicans and Staphylococcus aureus.

They found it behaved similarly to responses observed in other studies involving real patients, indicating it could be implemented for the wider study of oral infection.

Specifically, they plan to use it to assess how the oral mucosa—the tissue similar to skin which lines the inside of the mouth, including the inside of cheeks and lips—might respond to long-term denture wear.

With epithelium not limited to the oral cavity, the researchers also believe such models may also have a potential research role for illnesses of the digestive system, such as Crohn's disease.

Dr. Vehid Salih, Associate Professor in Oral & Dental Health Research, led the study and worked with Dr. Andrew Foey, Associate Professor of Immunology, and former Ph.D. student Dr. Samantha Gould.

"Developing three-dimensional tissue models is a critical element of our dental research. They offer a degree of versatility that mimics the in vivo physiology of a specific tissue, as well as a reproducible and controllable

process that we can use to investigate particular pathologies and diseases.

"The results we have seen from this particular model suggest it is a recreation of the oral cavity that we can use for a wide range of dental research. That includes the testing of oral healthcare products or modeling oral cancer invasion, periodontal disease and denture stomatitis. The model could also be developed further to offer the potential of determining the wider immune response to infection through the incorporation of multiple immune-cell types," said Salih.

The model developed through this study is already being expanded through a project using lab-created models to explore the long-term physical impacts of wearing dentures.

Recent surveys have suggested that as many as 15% of those visiting dental practices in England have either partial or complete dentures, with that number expected to increase significantly over the coming years.

However, while dentures are individually molded and fitted, there has been little research into how wearing them affects the lining of patients' mouths.

The new project, led by Professor Simon Whawell, will allow researchers to carry out detailed and repeated analyses of how tissue responds to the repeated physical pressure associated with functional dentures.

More information: Samantha J Gould et al, An organotypic oral mucosal infection model to study host-pathogen interactions, *Journal of Tissue Engineering* (2023). DOI: 10.1177/20417314231197310

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