

# **lek. dent. Przemysław Kosewski**

## **Comparison of the Wear of Restorative Materials on Natural Teeth and Dental Implants: An In Vitro Study**

**Doctoral dissertation for the degree of Doctor of Medical and Health Sciences in the discipline  
of medical sciences**

### **Abstract**

Biomechanical differences between natural teeth and dental implants, arising primarily from the presence of the periodontal ligament, affect both the transmission of occlusal loads and the behavior of prosthetic materials under functional conditions. In laboratory studies, these differences are sometimes overlooked, which may limit the validity of the interpretation of results concerning the wear of restorative materials.

The aim of this doctoral dissertation was to compare the wear of prosthetic materials in implant-supported restorations with that observed in a model reproducing the biomechanical behavior of a natural tooth. For this purpose, a standardized experimental model was developed to enable controlled simulation of the resilience characteristic of natural tooth support.

The dissertation was based on a series of two original studies. The first concerned the development of an original physical model reproducing the supporting properties of a natural tooth using CAD/CAM technology, together with a critical analysis of the methods previously used in this field. This study identified the key methodological limitations of earlier models, defined the research scenarios in which simulation of the periodontal ligament is of particular importance, and formulated recommendations regarding the reporting and standardization of laboratory studies employing such models.

The second study evaluated the influence of the type of support on the wear of lithium disilicate ceramic under simulated occlusal loading. It was demonstrated that crowns supported by rigid implant-based support underwent greater wear than reconstructions tested in a system reproducing the biomechanics of a natural tooth. These findings indicate

that the nature of the support significantly affects the wear behavior of prosthetic material under laboratory conditions.

The conducted studies indicate that the type of abutment supporting a prosthetic reconstruction may play an important role in the wear of prosthetic materials. Moreover, the developed laboratory model may serve as a research tool for laboratory analyses across a wide range of investigative scenarios in restorative dentistry.