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**Laboratory and Pre-Clinical Tests of Denture Materials – Basics and Actual Results**

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Apart from conventional techniques, the use of modern CAD/CAM dental technologies allows the subtractive and additive production of dental prostheses. Both denture base and denture teeth can be manufactured in combination or individually with subsequent assembly. In contrast to traditional analogous processes, digitized denture fabrication demands distinct technologies and materials. However, new materials and processes still have to prove their suitability.

Although *in vivo* studies are the method of choice for assessing the effectiveness of dental prostheses or the usability of new materials, they feature the disadvantages of high investment costs and expenditure. In contrast, mechanical laboratory tests (e.g. bending test, hardness test) can be employed to compare different materials and contribute to the understanding of the general performance of a novel material. As these tests provide limited information about the expected clinical performance of a material, meaningful *in vitro* tests may be employed, which allow the premature estimation of the principal clinical performance of dental materials under simulated *in vivo* conditions. These dynamic methods may represent stresses occurring in the oral cavity such as chewing forces or thermal stress. For these tests on a prosthesis, a correlation between the *in vitro* performance and *in vivo* data of clinically successful systems already on the market seems to be essential. Complex interactions can only be investigated in simulation tests (e.g. chewing simulation) – even the latter do also have limitations due to the high degree of individuality of the restorations. Against this background, the current lecture provides an overview of mechanical test methods of dental prostheses and provides current research results on their properties.