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EVALUATION OF MECHANICAL PROPERTIES OF BONE CEMENT WITH PMMA-BASED SPHERICAL ALUMINOSILICATES

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Bone injuries, especially those resulting from osteoporosis, have shown an upward trend over the years. Current health statistics clearly indicate that as the population ages, the percentage of bone fractures increases. Bone cement is used to fuse or replace damaged bone fragments. In the case of injuries that cause irreparable damage to joints (such as the hip or knee), it is necessary to use an endoprosthesis to replace the damaged bone fragment. Such implants require, in the case of low-density (osteoporotic) bone, or conditions that do not allow the use of another implant solution, the use of bone cement. Its purpose is to provide additional reinforcement of the implant-bone connection, thereby increasing patient safety during implant use. Bone cement is a combination of a bulk material (filler) and a liquid substance (monomer). Current bone cements do not fully meet these requirements for mechanical properties. Current work on improving this feature of bone cement is aimed at modifying the chemical and phase composition by introducing ceramic structures with bone-like properties. One such solution is spherical aluminosilicates. The proposed modification with spherical aluminosilicates on a PMMA (poly(methyl) methacrylate) matrix, aims to provide adequate mechanical properties compared to bone. The use of spherical aluminosilicates as a filler, will allow to obtain a composite material with a much lower density, but also with greater stiffness, stability, which will translate into a reduction in the proportion of polymer matrix in bone cement. The material used requires further research.