(P 276) New Hydrophilic, Partially Degradable and Bioactive Cements (HDBC) to Improve Interface with Bone

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Acrylic bone cements aim to fix prosthesis to bone during hip arthroplasty. The commercial acrylic bone cements perform their function, however at the long term they fail due to aseptic loosening of two interfaces: prosthesis-cement and cement bone. To minimize these problems, the bone growth should be promoted on the surface and inside of the partially degradable bone cement.

In our work five different formulations were developed containing in the powder a biodegradable component such as modified corn starch with acrylic segments (methacrylated starch) as well cellulose acetate blended with corn starch (SCA). These components reacted with acrylic monomers (methylmethacrylate (MMA) and 2-hydroxyethyl methacrylate (HEMA)) to produce hydrophilic partially degradable bone cements by radical polymerization. Diverse molar ratios MMA/HEMA as well the amount of initiator/activator were employed in such cements.

The residual monomer content was studied by 1H NMR in these new formulations allowing the selection of the two with less amount of residual monomer for later degradation studies. Higher concentration of reducing sugars was found (0.42 mg/mL) in samples immersed in PBS supplemented with α-amylase counteracting with samples without enzyme (0.01 mg/mL) suggesting that enzymatic degradation had occurred. This result was confirmed by percentage of weight loss as well as morphologic analyses.

Our study revealed that bone cements performed with methacrylated starch seem to be promising due to less content of released monomer and good degradability properties, promoting at later stages bone growth by cellular adhesion and improvement of the interface with bone.