

4th International Conference on Tissue Science and Regenerative Medicine

July 27-29, 2015 Rome, Italy

Bioceramic filler nature influence on acrylic cements properties after immersion in biological fluid

Celine Aubrun
University d'Artois, France

Cements are used in bone surgery to fill gaps issue from pathology or traumatology. We classically distinguish calcium phosphate cements with hydraulic setting and acrylic cements with polymeric setting mainly formulated with polymethylmethacrylate (PMMA) and possibly include biocompatible inorganic filler. We studied cement based on 2-hydroxyethylmethacrylate (HEMA), natural polysaccharides and bioceramic filler (tricalcium phosphate or hemihydrated calcium sulphate, TCP and plaster respectively) developed for its advantages: Hydrophilicity, biodegradability and mechanical characteristics. It aims filling bone defects with analgesic and support functions. The main interest substituting HEMA to PMMA is due to an *in situ* quick water-uptake when contact with biological fluids. Induced swelling ensures gap total filling by preventing formation of fibrous tissue. However a deterioration of mechanical properties occurs. Our study so aimed improving formulation of cement in order to limit mechanical properties loss while maintaining its water-uptake ability. Two bioceramic fillers were compared. Studied curing parameters were temperature increase and setting time. Mechanical properties and water-uptake were measured initially and after 21 days in simulated body fluid (SBF). The highest temperature ranges from 50°C to 80°C and setting time from 1 minute 30 seconds to 4 minute 30 seconds. We found that plaster significantly improved mechanical properties. After 21 days in SBF cement Young modulus was 13.6 MPa for plaster and 1.4 MPa for TCP (initially 470 MPa and 362 MPa respectively) while maintaining equivalent water-uptake (32%). These results open the way to a cement formulation allowing curing parameters and *in situ* behavior improvement so that we can consider its use as bone substitute.

Biography

Celine Aubrun is a physics and chemistry graduated Teacher. She is preparing a PhD in Mechanical Engineering at the Equipe Biomateriaux Artois of the Laboratoire genie civil et geoenvironment (Universited'Artois). She specialized in biomaterials in the field of bone acrylic cements.

celine.aubrun@univ-artois.fr

Notes: