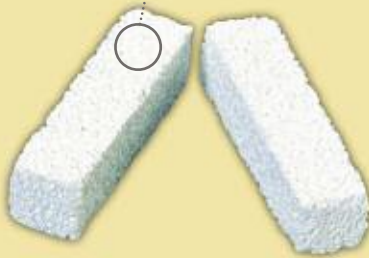


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## ■ FILLING OF BONE DEFECTS USING BIPHASIC MACROPOROUS CALCIUM PHOSPHATE CERAMIC. APROPOS OF 23 CASES.

**Gouin F, Delecrin J, et al.** *Rev Orthop Chir Appar Mot.* 1995;81(1): 59-65.

**PURPOSE OF THE STUDY:** The authors report their experience with the use of a biphasic macroporous calcium phosphate bone substitute.

**MATERIALS AND METHODS:** In 23 cases (22 patients), a biphasic macroporous calcium phosphate ceramic was used to fill a pathological bone defect. The ceramic used in this study was a macroporous (400 to 600  $\mu$ ) component consisting of 60 percent Hydroxyapatite and 40 percent Beta-tricalcium Phosphate. It was in the form of granules (2 to 3mm), sticks (20 x 5 x 5 or 10 x 5 x 5mm) or custom made blocks. In six cases, the ceramic was used alone. In 12 cases, the ceramic was used with autologous bone marrow, and in five cases, it was used with autologous cancellous bone grafts. In 14 cases, the bone defect was due to conservative treatment of a benign tumor. In three cases, it was due to aseptic post-traumatic nonunion, in three cases due to wide resection for malignant tumors of the pelvis, and in three cases following osteotomy. Post-operative assessment was made from clinical, radiographic and histological findings.

**RESULTS:** Two patients died six and eight months post-operatively and two were lost to follow-up at two and five months with both having good clinical and radiographic results when last seen. For the remaining 19 cases, the average follow-up was 20 months (from six to 62 months). No local, regional or general deleterious effects were noted. Radiologically the bone ceramic junction healed in all cases, except two, within three months. In these last two cases, healing required six and seven months. No radiolucent line appeared around the ceramic. No stress fractures occurred in the substitute. Histologically, three biopsies showed new bone formation throughout the ceramic with apposition of a well differentiated lamellar bone directly apposed to the ceramic.

**DISCUSSION:** Animal experimentations have proven the interest of similar ceramics: macroporosity enhances bone rehabilitation and the biphasic characteristics associate the advantages of slow resorption of hydroxyapatite and more easily resorbed betacalcium phosphate. No deleterious clinical, radiographical or histological effects were observed, confirming the biocompatibility of this substitute. Despite the poor mechanical properties of this macroporous ceramic before implantation, good clinical and radiographic results suggest improvement of these properties in the composite new formed bone-ceramic after implantation.

**CONCLUSION:** We believe that macroporous biphasic ceramic is a good substitute for use in bone defects when good primary mechanical stability and contact with the host bone are present. Further clinical and experimental studies are necessary to determine the limits of such a substitute in terms of volume and to control its mechanical properties following implantation.

## ■ MACROPOROUS CALCIUM PHOSPHATE CERAMIC: A PROSPECTIVE STUDY OF 106 CASES IN LUMBAR SPINAL FUSION

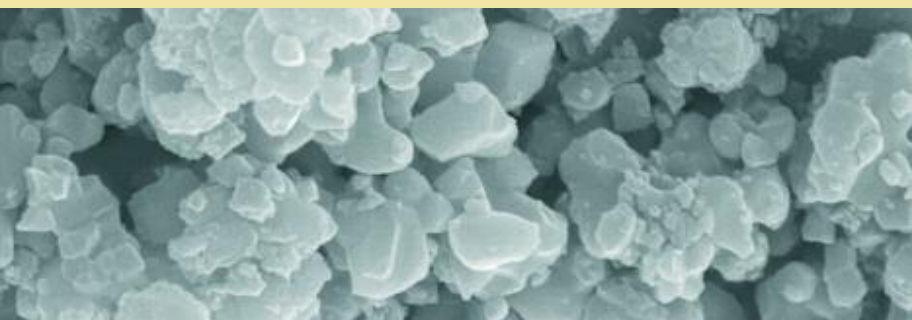
**Cavagna R, Daculsi G, et al.** *J Long Term Eff Med Implants.* 1999;9(4):403-12.

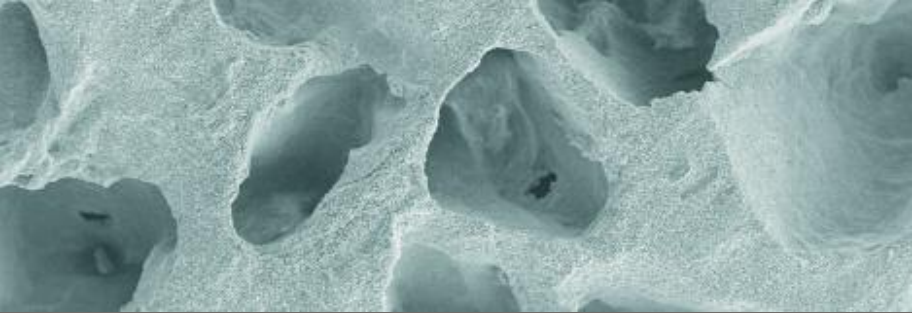
**ABSTRACT:** Macroporous biphasic calcium phosphate (OPTEMX, MBCP, Triosite) is well known for its safety, absence of allergenicity, and excellent bone-bonding capacity, and it has been widely used as a bone graft substitute in orthopaedic, ENT, and dental surgery. This study investigates the clinical performance of this synthetic porous ceramic in a series of 106 patients, mainly with degenerative spine aetiologies (95/106) and with a minimum follow-up of two years. All patients were treated with posterior correction involving the semi-rigid New Orleans instrumentation. Spinal fusion was always performed using MBCP granules mixed with autogenous bone chips and bone marrow obtained from the local spine. Fusion of the spine was confirmed for 100 patients, and six nonunions were observed (three resulting from primary spondylolisthesis). This study shows that MBCP provides suitable results in spinal fusion involving a semi-rigid instrumentation. Because the indication of degenerative spine is not very favorable to fusion, this technique appears to be a good alternative to autografts and could decrease patient morbidity resulting from iliac bone grafting.

## ■ MECHANICAL CHANGES IN MACROPOROUS CALCIUM PHOSPHATE CERAMICS AFTER IMPLANTATION IN BONE

**Trecant M, Delecrin J, et al.** *Clin Mater.* 1994;15:233-40.

**ABSTRACT:** The authors have developed an experimental device to assess the mechanical property changes of porous calcium phosphate ceramics after implantation in bone. Cylinders of a macroporous biphasic ceramic were implanted in the femurs of rabbits (6 x 6mm) and beagle dogs (6 x 9mm) for the compression test and in the tibiae of rabbits (5 x 5mm) to characterize the physicochemical changes. The compressive strength of the material before implantation was 2.6MPa and it increased after implantation ( $P < 0.001$ ). It doubled after one week in rabbit femurs (5.9 MPa) and was multiplied by 2.5 after three weeks in dog femurs (6.8 MPa). Infrared and histological analyses showed that physicochemical modifications had occurred at the same time as the increase in the compressive strength. New components had appeared in the ceramic after implantation: organic phases by bone ingrowth, particularly collagen matrix, biological apatites and water.





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