

# The clinical use of enriched bone marrow stem cells combined with porous beta-tricalcium phosphate in posterior spinal fusion.

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## Author information

### Abstract

Cytherapy for bone regeneration has not been widely used clinically. A new method based on enriched bone-marrow-derived mesenchymal stem cells (MSCs) combined with porous beta-tricalcium phosphate (beta-TCP) was used for posterior spinal fusion in 41 patients. The aim of the present study was to assess the clinical feasibility of peri-operative bone marrow stem cell enrichment and their combination with tricalcium phosphate. About 252 ml marrow per patient was harvested from bilateral iliac crest, the enriched MSCs were produced by a cell processor peri-operatively, then combined with porous beta-TCP granules by a negative pressure and a short-time incubation in the meantime of conventional operation, which were finally implanted back into the patient. About 45 ml enriched MSC suspension was collected, and 78 $\pm$ 16% of MSCs were recovered. By enrichment technique, the number of colony-forming units which expressed alkaline phosphatase (CFUs-ALP+, to estimate the prevalence of MSCs) was increased 4.3 times; the increasing folds of bone marrow nucleated cells (NCs) and MSCs had a positive correlation. The natural log (ln) of MSC number declined with age, and also, the MSC number of younger subjects (< or =40 years) was more than that of older ones (>40 years), but none for NCs. The number of NCs and MSCs was not different significantly between men and women. However, the patients with thoracolumbar fracture (TLF) had significantly more MSCs than those with degenerative disc disease (DDD), but not for NCs. On the other hand, enriched MSCs could adhere to the wall of porous beta-TCP within 2h combination, and proliferate well during culture in vitro. After 34.5 months, 95.1% cases had good spinal fusion results. None of the samples before grafting was positive in bacterial culture. Only four patients had a little exudation or moderate swelling in their wounds, and recovered with conservative treatment.