

Mostafa Romih
Joël Delécrin
Dominique Heymann
Norbert Passuti

The vertebral interbody grafting site's low concentration in osteogenic progenitors can greatly benefit from addition of iliac crest bone marrow

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Abstract The ability of bone substitutes to promote bone fusion is contingent upon the presence of osteoinductive factors in the bone environment at the fusion site. Osteoblast progenitor cells are among these environmental osteoinductive factors, and one of the most abundant and available sources of osteoblastic cells is the bone marrow. As far as biological conditions are concerned, the vertebral interbody space appears as a favorable site for fusion, as it is surrounded by spongy bone, theoretically rich in osteogenic cells. This site may, however, not be as rich in osteogenic precursor cells especially at the time of grafting, because decortication of the vertebral end plates during the grafting process may modify cell content of the surrounding spongy bone. We tested this hypothesis by comparing the abundance of human osteogenic precursor cells in bone marrow

derived from the iliac crest, the vertebral body, and the decorticated intervertebral body space. The number of potential osteoblast progenitors in each site was estimated by counting the alkaline phosphatase-expressing colony-forming units (CFU-AP). The results, however, demonstrate that the vertebral interbody space is actually poorer in osteoprogenitor cells than the iliac crest ($P < 0.001$) and vertebral body ($P < 0.01$), especially at the time of graft implantation. In light of our results, we advocate addition of iliac crest bone marrow aspirate to increase the success rate of vertebral interbody fusion.

Keywords Bone substitutes · Calcium phosphate ceramics · Osteogenic precursor cells · Spinal fusion

M. Romih · J. Delécrin (✉) · N. Passuti
Department of Orthopaedic Surgery,
Hôtel Dieu, University Hospital of Nantes,
44093 Nantes, France
E-mail: Joel.delecrin@chu-nantes.fr

D. Heymann
Laboratoire de physiopathologie de la
Résorption Osseuse, Faculté de Médecine,
University Hospital of Nantes,
44035 Nantes, France

D. Heymann
Service d'Orthopédie, Hôtel Dieu, CHU de
Nantes, 44093 Nantes Cedex 1, France