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# Comparison of fracture site callus with iliac crest bone marrow as the source of plastic-adherent cells

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Abstrak

Latar belakang: Sumsum tulang merah merupakan sumber utama sel punca mesenkim walaupun penggunaannya menimbulkan morbiditas situs donor. Pengambilan sel punca dari sumsum tulang menyebabkan nyeri dan seringkali sukar dilakukan sehingga membutuhkan sumber alternatif. Karena penyembuhan tulang sekunder terjadi melalui pembentukan kalus hasil proliferasi dan diferensiasi sel punca, kalus mungkin menjadi sumber alternatif pengambilan sel punca mesenkim. Penelitian ini membandingkan jumlah plastic-adherent cells dari kalus dan sumsum tulang setelah dua minggu kultur sel.
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Metode: Enam belas kelinci Selandia Baru dilakukan prosedur  frakturisasi diafisis tulang femur. Lalu, seluruh kelinci dirawat. Selanjutnya, dua minggu pasca-frakturisasi, 3 mL aspirasi sumsum tulang krista iliaka dan ekstraksi kalus situs fraktur pada delapan kelinci dilakukan kultur (kelompok I). Delapan kelinci lainnya dilakukan hal yang sama pada empat minggu pasca-frakturisasi (kelompok II). Seluruh kultur diamati setelah satu dan dua minggu. Setelah empat minggu, kultur dipanen. Jumlah sel dihitung dengan hemositometer Neubauer. Kemudian, perbandingan jumlah sel dianalisis menggunakan uji t tidak berpasangan.
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Hasil: Pada kelompok I terdapat jumlah sel sebanyak 2,6 ± 0,1 x 104 untuk kultur aspirat sumsum tulang krista iliaka dan 2,5 ± 0,1 x 104 untuk kultur ekstraksi kalus situs fraktur. Tidak terdapat perbedaan bermakna secara statistik antara keduanya (p = 0,34). Sedangkan pada kelompok II didapatkan hasil sebesar 2,7 ± 0,1 x 104 sel dan 2,1 ± 0,1 x 104 sel secara berurutan dan terdapat perbedaan yang bermakna secara statistik antara keduanya (p < 0,001).
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Kesimpulan: Situs kalus fraktur dua minggu pasca-frakturisasi memiliki potensi sebagai situs donor untuk isolasi dan ekspansi plastic-adherent cells.
<hr><i>Background: Red marrow has been described as the main source of mesenchymal stem cells although its aspiration and isolation from bone marrow was reported to have significant donor site morbidity. Since secondary bone healing occurs through formation of callus as the result of proliferation and differentiation of mesenchymal stem cells, callus may become alternative source for mesenchymal stem cells. In this study, we compared the number of plastic-adherent cells from fracture site callus and bone marrow of iliac crest after two and four weeks of culture.
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Methods: Sixteen New Zealand rabbits were fracturized at the femoral shaft. Then, these rabbits were taken care. After two weeks of fracturization, 3 mL iliac crest bone marrow aspiration and callus extraction of eight rabbits were cultured (group I). The other eight rabbits were treated equally after four weeks of fracturization (group II). Simultaneously, the cultures were observed after one and two weeks. Four weeks

later, they were harvested. Cells were counted using Neubauer hemocytometer. The average number of cells between the sources and groups were statistically analyzed using the unpaired t-test.
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Results: In group I, there were 2.6 ± 0.1 x 104 cells in the culture of iliac crest bone marrow aspirate and 2.5 ± 0.1 x 104 cells in culture of callus extract from fracture site ($p = 0.34$). In group II, there were 2.7 ± 0.1 x 104 cells and 2.1 ± 0.1 x 104 cells, respectively ($p < 0.001$).
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Conclusion: Fracture site callus at the second week post-fracturization may be potential as source of plastic-adherent cells compared with iliac crest bone marrow.</i>