Bone mass and microarchitecture of irradiated and bone marrow-transplanted mice: influences of the donor strain

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Résumé en anglais	Summary Total body irradiation and bone marrow transplantation induced dramatic trabecular bone loss and cortical thickening in mice. Transplanted cells were engrafted in bone marrow, along trabeculae, and in periosteal and endosteal envelopes. None of the osteocytes were of donor origin. Bone microarchitecture of transplanted mice changed to tend toward the donor phenotype. Introduction Osteopenia and osteoporosis are complications of bone marrow transplants (BMT) attributed to related chemotherapy. However, the specific influence of total body irradiation (TBI) is unknown. Methods We investigated the effects of TBI and BMT on bone mass and microarchitecture by micro-CT. Eighteen C57Bl/6 (B6) mice receiving lethal TBI had a BMT with marrow cells from green fluorescent protein--transgenic-C57Bl/6 (GFP) mice. Transplanted (TGFPB6), B6, and GFP mice were euthanized 1, 3, and 6 months after BMT or at a related age. Results TGFPB6 presented a dramatic bone loss compared with B6 and did not restore their trabecular bone mass over time, despite a cortical thickening 6 months after BMT. Serum testosterone levels were not significantly reduced after BMT. During aging, GFP mice have less trabeculae, thicker cortices, but a narrower femoral shaft than B6 mice. From 3 months after BMT, cortical characteristics of TGFPB6 mice differed statistically from B6 mice and were identical to those of GFP mice. GFP+ cells were located along trabecular surfaces and in periosteal and endosteal envelopes, but none of the osteocytes expressed GFP. Conclusion Our findings suggest that engrafted cells did not restore the irradiation-induced trabecular bone loss, but reconstituted a marrow microenvironment and bone remodeling similar to those of the donor. The effects of irradiation and graft on bone remodeling differed between cortical and trabecular bone.
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