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Titel des Beitrags: Secretion of angiogenic proteins by human multipotent mesenchymal stromal cells and their clinical potential in the treatment of avascular osteonecrosis.

Abstract: Osteonecrosis is a frequent complication after treatment for childhood leukemia and other steroid-based therapies. The success rate of core decompression surgery is limited. Therefore, we evaluated relevant biological characteristics of human multipotent mesenchymal stromal cells (MSCs) in vitro. MSCs cultured under low-oxygen tensions showed decreased proliferation and differentiation into bone. However, these MSCs secreted significant amounts of vascular endothelial-derived factor in the presence of interferon-gamma. These in vitro results with potential effects on neovascularization and bone regeneration as well as findings in animal models prompted us to treat five patients with steroid-induced osteonecrosis of the femur by core decompression surgery and instillation of expanded autologous MSCs. Within 3 weeks of culture, sufficient numbers of MSCs were generated using animal protein-free culture conditions. No chromosomal aberrations were detected by matrix-based comparative genomic hybridization. Application of MSCs during core decompression was feasible and safe. Median follow-up is 16 months and the patients in this pilot study reported clinical improvement. Formation of mineralized bone in the osteonecrotic cavity was proven by computed tomography. Taken
together, MSCs display biological properties that may add to the efficiency of surgical treatment in osteonecrosis and should be evaluated in larger patient cohorts.