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Isolation of highly potent expanded human placental stromal cells (hPSC) and their application for regenerative medicine and treatment of acute lethal radiation syndrome

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We have developed highly efficient protocols for the isolation and expansion of vast numbers of potent stromal cell (hPSC) populations from selected layers of full term human placentas. The isolated hPSC could be expanded to high cell numbers, to be stored for further use. IM delivered hPSC were well tolerated as allogeneic or trans-species implants and resided with minimal rejection in the implanted muscle for many weeks before their full clearance. IM administration of hPSC in a mouse model of lethal acute radiation syndrome (ARS) following irradiation by ~8Gy dramatically elevated the survival of the mice form as low as ~25-30% to ~100% with enhancement of regeneration of the hematopoietic system. The hPSC activation by host systemic stress signals resulted in the secretion of a wide range of human-derived cytokines and growth factors into the circulation with boosting of bone marrow and spleen derived hematopoietic progenitor cells. This shed light on the mechanism of action of the potent hPSC. Our results suggest that these cells could be used as an effective allogeneic cell therapy for severely depleted hematopoietic system aside from mitigating ARS. IM treatment with hPSC also showed very promising preliminary results with other disease models, such as inflammatory bowel disease (IBD) and progressive phases of the EAE model of multiple sclerosis (MS). These results suggest that the hPSC may be highly effective as allogeneic cell treatment of different degenerative and autoimmune diseases by boosting regenerative processes, modulating inflammation and stimulating stem cells proliferation in damaged tissues.

Biography

Raphael Gorodetsky is the Head of the Laboratory of Biotechnology and Radiobiology at the Sharett Institute at Hadassah Medical Center. He studies various aspects of biotechnology, including radiobiology and tissue regeneration, development of new fibrin related bio-matrices and cell adhesion properties of a new family of cell penetrating peptides homologous to sequences on the C-termini of fibrinogen. His current focus is on cell based therapies with isolated potent secreting cells, such as isolated placental derived stromal cells for regenerative medicine and their trophic effect for mitigation of lethal high dose ionizing radiation syndrome inducing bone marrow regeneration and for treating other degenerative conditions.

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