



Mojca Jež, born on 11th March 1985 in Ljubljana, finished high school Gimnazija Bežigrad in 2004 and enrolled newly established academic study programme in Biotechnology at Biotechnical Faculty, University of Ljubljana. She soon discovered her interest in medical biotechnology, especially in use of stem cells for the treatment of different medical conditions. During the fourth year of study she started with her research for her graduation thesis under the supervision of Miomir Knežević, Ph.D., Asist. Prof. and Primož Rožman, MD, Asist. Prof. on Blood Transfusion Centre. She graduated in 2008 immediately after finishing fourth year. She was also awarded Presern's Award for her graduation thesis. The same year she continued her study at University of Ljubljana, postgraduate study programme in Biomedicine and she started working as young researcher at Blood transfusion centre. In her PhD research she is continuing her research about stem cells – this includes isolation, characterization and biology of embryonic-like stem cells from adult bone marrow. Embryonic-like stem cells hold a great promise because in the future they could be expanded and differentiated in different tissues and then used for treatment of various medical conditions.

Graduation thesis:

Identification of stem cells with embryonic character in the adult human bone marrow

Mojca Jež

Biotechnical faculty, University of Ljubljana

Supervisor: Miomir Knežević, Ph.D., Asist. Prof.

Blood transfusion center of Slovenia

Co-supervisor: Primož Rožman, MD, Asist. Prof.

Blood transfusion center of Slovenia

Many different stem cell types can be found in adult human bone marrow. Recent research in this field indicates that a subpopulation of very small cells with embryonic character can be found among stem cells in bone marrow. These cells are very rare and very hard to isolate and to characterize. The purpose of this graduation thesis was to prove their existence in adult human bone marrow and to demonstrate their embryonic character, especially their ability to produce early germinal cells. After collection of bone marrow samples from healthy donors, isolation of mononuclear cells was performed using density gradient centrifugation. After centrifugation we got different layers of cells and all of them showed the same expression profile for embryonic markers (positive for Oct-4A, Oct-4B, Sox2, Nanog and c-kit) which indicates that early stem cells populate all layers. Isolated mononuclear cells were cultured in three different media with addition of growth factors (bFGF and TGF β) and follicular fluid. The morphology was precisely monitored during cultivation. After 20 days of culture the total RNA was isolated and expression of germinal markers (c-kit, SCP3, VASA, ZP2 and ZP3) was confirmed. In the culture where follicular fluid was added, we noticed the development of very large round cells (diameter 80 μ m). Using RT-PCR we also demonstrated that these cultures were positive for c-kit, VASA and SCP3. Our results verify that a subpopulation of stem cells with embryonic characteristics exists in adult human bone marrow. In the future these cells could be expanded in vitro and then used in regenerative medicine.