PTPMT1 Deficiency in the Mouse Bone Marrow Microenvironment

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PTPMT1 is a gene that codes for a mitochondrial phosphatase essential for mitochondrial function, making it crucial for the development of organisms. Several studies have shown a strong link between PTPMT1 and numerous health conditions, with one of the most severe being developmental arrest. Others find a correlation between PTPMT1 and hematopoietic stem cell differentiation. The purpose of this study is to determine how PTPMT1 affects the morphology of the mouse hematopoietic stem cell microenvironment or niche environment as studies on the niche environment are very few. The experiment conducted was an immunofluorescence staining of paraffin-embedded femur tissue slides from two infant mice. 5 samples were first genotyped using PCR with two being selected for staining: a wild type and a PTPMT1-deficient knockout. The samples were stained with 4 antibodies with CD150 marking hematopoietic stem cells. The resulting images show a much more disorganized structure in the knockout mouse bone marrow with a significant decrease in the area of fixed cells and hematopoietic stem cells. PTPMT1 deficiency appears to lead to a decrease in hematopoeitic stem cell differentiation and a significant change in the morphology of the bone marrow microenvironment, establishing a stronger link between the niche cells and the stem cells they maintain and supporting the slowed development found in previous studies. Thus, the niche cell environment could be proposed as a new target for therapies and a reliable signal of change in stem cells.

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