

Public Abstract

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Title:Functional differences between pericytes and vascular smooth muscle cells during vascular morphogenesis

Blood vessel formation is critical for development, wound healing, and many other processes in the body. During blood vessel growth, a tube is formed from endothelial cells. This tube is then stabilized through the recruitment of support cells known as mural cells. Abnormalities in mural cell recruitment are, in part, responsible for several disease states including diabetic retinopathy, preeclampsia, and tumor growth. Understanding the role that mural cells play in tube stability and maturation could help to progress treatments for such diseases. There are two known types of mural cells: the pericytes and vascular smooth muscle cells. Although these two cell types are thought to be functionally similar, this research shows that there are critical differences between them that could propel future research on treatments for vascular abnormalities. Studies were carried out in cell culture, which allowed for the study of the mural cells both individually in response to added growth factors or in combination with endothelial cells. It was found that a molecule known as platelet-derived growth factor BB (PDGF-BB) was able to stimulate pericyte invasion through a 3D matrix, but had no influence on vascular smooth muscle cell invasion. This invasive behavior was found to enhance EC monolayers and also sustain EC tubes sprouting from these monolayers. The lack of vascular smooth muscle cell invasion observed in these experiments prevented the stabilization and maturation of endothelial tubes and monolayers observed with the pericytes. These findings suggest that the two mural cell types have functional differences. Understanding these differences is crucial to further research on treatments for diseases associated with mural cell recruitment abnormalities.