Comparison of Downstream Cell Survival Responses in HUVECs and HLECs During VEGF Signaling

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Angiogenesis and lymphangiogenesis are vital processes that allow the formation of new blood and lymph vessels from existing blood or lymph vessels. Formation of these vessels is essential to bring oxygen and nutrients to the body as well as maintaining tissue fluid balance. New blood or lymph vessel growth occurs in response to Vascular Endothelial Growth Factor (VEGF) signaling to vascular endothelial cells. The VEGF signal molecules bind to cell surface receptors and elicit a variety of responses including cell proliferation, migration and survival. Much is known about cell proliferation via VEGF signaling, but relatively little is known about cell survival, particularly if response cells are stressed. In this study Human Umbilical Vascular Endothelial Cells (HUVECs) and Human Lymphatic Endothelial Cells (HLECs) were stressed with tunicamycin while supplemented with various VEGF signals to examine how cell survival pathways might respond during VEGF signaling. Crystal violet proliferation assays were used to examine survival of cells and Western blot analyses were used to measure levels of downstream response proteins involved in survival pathways. HUVECs and HLECs under normal conditions showed enhanced growth with VEGF-A, VEGF-C, or A and C combined signaling. VEGF-A signaling does elicit a survival response countering tunicamycin stress at low and high stress levels, which was enhanced when VEGF-A and VEGF-C were added together. However, VEGF-C alone did not rescue cell growth in either cell line for a high stress condition. Our results strongly suggest that VEGF-C survival signaling pathways are independent of the VEGF-A survival signaling pathways.