Restoring Angiogenesis through the Manipulation of Cellular Glutathione Content in a Diabetic Microenvironment

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Glutathione (GSH) is a naturally found antioxidant in the body that reduces oxidative stress and assists in preserving tissue homeostasis. It has been shown that GSH levels are lower in diabetic cells than in normal cells of non-diabetic patients. However, its precise role in angiogenesis has not been determined. Using murine endothelial cells, the effect of altering GSH levels on cell proliferation and migration was studied since both are essential for angiogenesis. The proliferation assay was carried out using a BrdU proliferation assay with or without a treatment of vascular endothelial growth factor–E (VEGF-E); stimulates angiogenesis, and with or without a varying concentration of DL-buthionine - (S, R) - sulfoximine (BSO); decreases GSH levels. The migration assay received the same treatment as the proliferation assay and was analyzed with respect to time. GSH measurements were made by performing a high performance liquid chromatography (HPLC) assay. As expected, the GSH values were found to decrease as BSO was added and proliferation was decreased. An interesting and unexpected result was an increase in migration rate. This study lays the groundwork for therapeutic intervention restoring physiological functionality of diabetic endothelial cells.