Abstract:

Since in vitro studies have demonstrated that capillary endothelial cells are thermosensitive, experiments were performed to determine the (in vivo) heat sensitivity of blood capillaries and their endothelial cells. Angiogenesis discs were implanted subcutaneously in mice, and vascular growth was stimulated by slow release of epidermal growth factor placed in the center of each disc. After 5 days of growth the discs were subjected to radiofrequency-induced hyperthermia. Heat exposures were 41, 42, 43, and 44 degrees C for 30 min. Control discs were sham treated. Seven days after heating the discs were extracted and paraffin embedded. Centripetal (radial) vessel growth was measured in magnified medial planar sections. An inverse relationship was demonstrated between vessel growth and exposure temperature. The extent of the fibroblastic growth was also inversely proportional to temperature. Thus, at least in this system, the microvasculature shows dose-dependent damage by hyperthermia, consistent with preceding in vitro observations. This inhibition of angiogenesis may result from endothelial cell killing, interference with cell replication, inhibition of cell migration, or a combination of these mechanisms.