The Amplifying Effects of Alcohol on Tumor Angiogenesis: A Mathematical Model

Ruth Kelly, Abilene Christian
Andrew Matteson, Texas A&M University
Joshua Meisner, Texas A&M University
Zinan Li, Texas A&M University

Abstract:

Vascular endothelial growth factor, angiopoietin-1, and -2 regulate angiogenesis as presented by Plank et. al. in their model using the principle of reinforced random walks. Using a variation of this model, we solve numerically a system of reaction diffusion PDEs to investigate the effects of alcohol consumption on angiogenesis. Recent research has suggested a positive correlation between ethanol levels and vascular endothelial growth factor. Our model serves to display an increase in the quality of vasculature about a tumor and a moderate drop in time required to complete angiogenesis as blood alcohol is increased from 0 to .08. This mechanism, if confirmed experimentally, would account for a portion of the increased occurence of clinical cases of cancer associated with moderate alcohol consumption.