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Mixture Theory Study of Role of Growth Factor Gradients on Breast Cancer Chemotaxis SREYASHI CHAKRABORTY, MARY SCHUFF, Mechanical Engineering, Purdue University, USA, ELIZABETH VOIGT, Mechanical Engineering, Virginia Tech University, USA, ERIC NAUMAN, Mechanical Engineering, Purdue University, USA, MARISSA RYLANDER, Mechanical Engineering, Virginia Tech University, USA, PAVLOS VLACHOS, Mechanical Engineering, Purdue University, USA — The transport of chemotactic agents is strongly influenced by variation in interstitial flows in different types of tissue. The mixture theory model of the fluid and solute transport in the microvasculature of tissues accounts for transport in the vessel lumen, vessel wall and the interstitial space separately. In the present study we use this model to develop a three dimensional geometry of the tumor microenvironment platform incorporating a physiological concentration of growth factor protein through blood flow in an extracellular collagen matrix. We quantify chemotaxis in response to solute gradients of varying magnitude formed by diffusion of proteins into the surrounding collagen. The numerical analysis delineates the dependence of hydraulic permeability coefficient on solute concentration. The preliminary results show the existence of a linear concentration gradient in the central plane between the micro-channels and a strong nonlinear gradient at the remaining parts of the system.

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