Mixture Theory and applications to understand hydrodynamics and mass transfer inside deformable porous media

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A brief review on hydrodynamic governing equations for flow through porous media that is non-deformable will be given. An application of nutrient transport through a biological porous pellet will be discussed. The possibility of starvation zones will be explained. The talk would then introduce mixture theory and the corresponding governing equations modelling deformable porous media. These hydrodynamic equations will be used to model flow through an isolated tumour (in vitro). The motivation comes from the situation of fluid and macromolecular transport inside a soft tumor tissue. This study has a close relevance with transport of therapeutic agents into solid tumors in presence of few transport barriers which reduce the efficiency of therapeutic agents. The talk will emphasize on criterion for formation of necrosis (dead zone) inside the tumour. One of the models approximates the tumour behaviour by assuming that the permeability is varying quadratically with distance. The talk will end with some insights on use of mixture theory to deformable porous media like modelling charged colloidal particles etc.