**Stroke Treatment**

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In stroke, the blood supply to a region of the brain is cut off and thus the neurons cease to receive oxygen and they die when the oxygen concentration falls below some level. A proposed treatment is to deliver a drug, which puts the neurons in a state where they don't consume oxygen and don't die. The drug must diffuse into the blood-deprived region from peripheral vessels that remain patent. This makes a race between the drug diffusing into the affected region and the neurons in that region consuming too much of the remaining oxygen, which itself diffuses from the same peripheral vessels.

In a preliminary model, we have solved for the time-dependence of the concentration of the drug as a function of radius in an idealised isotropic homogeneous medium, and for the steady-state concentration of oxygen. But the time-dependence of the oxygen concentration requires numerical computation.
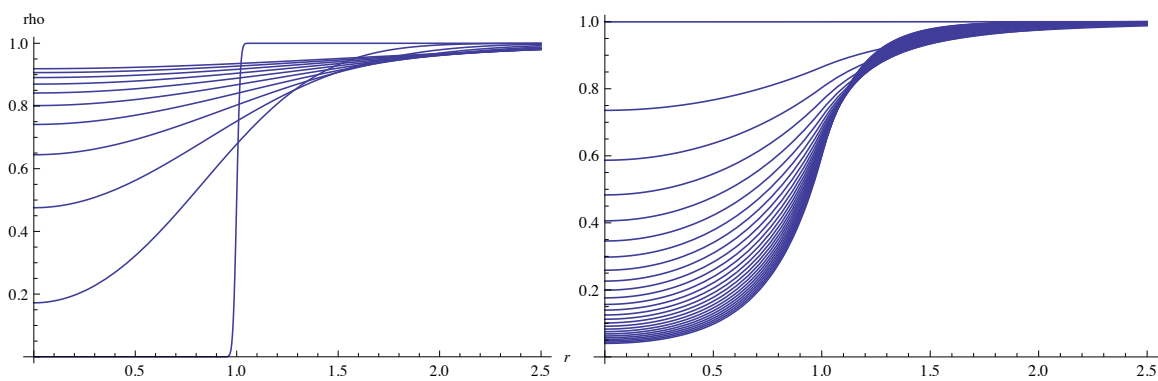
(a) drug concentration as function of radius at a sequence of times; (b) final state oxygen concentration as function of radius for a sequence of parameter values

The first step of the project consists in numerical computation of the oxygen concentration, as a function of time and parameters. Next is an evaluation of the volume of the region that can be saved by the drug, as a function of parameters such as the radius of the stroke region (which was scaled to 1 in the above figures), depending on assumptions about how much of the drug is required for how much oxygen. Various modifications to the model can be considered.

Although continuing to a PhD on this project is not envisaged, if you make great progress the possibility could open up. In particular, if you get University Hospitals Coventry & Warwickshire interested then there could be a great opportunity and we would be interested in pursuing this.

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