

Determination of parameters in kinetic modelling in positron emission tomography (PET)

Master Project

Abstract The goal of this Master project is development of the optimization method for the solution of a parameter identification problem arising in PET for system of ordinary differential equations which presents the kinetic model for measurement of glucose transport and phosphorylation rate. We will use such-called three-compartment model

$$\begin{aligned}\frac{\partial C_1}{\partial t} &= K_1 C_0(t) - (k_2 + k_3)C_1 + k_4 C_2, \\ \frac{\partial I}{\partial t} &= k_3 C_1 - k_4 C_2, \\ C_1(0) &= C_{10}, C_2(0) = C_{20}.\end{aligned}$$

This mathematical model is taken from link [1]. The goal of the Master's project is to develop new algorithms for determination of different coefficients k_2, k_3 using measurements of time-dependent functions C_1, C_2 . Reconstruction algorithms should be formulated and numerically tested.

References

- [1] http://www.turkupetcentre.net/petanalysis/model_compartmental.html