Mathematical Models for Drug Diffusion Through the Compartments of Blood and Tissue Medium

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Abstract : This paper is an attempt to establish the mathematical models to understand the distribution of drug administration in the human body through oral and intravenous routes. Three models were formulated based on diffusion process using Fick's principle and the law of mass action. The rate constants governing the law of mass action were used on the basis of the drug efficacy at different interfaces. The Laplace transform and eigenvalue methods were used to obtain the solution of the ordinary differential equations concerning the rate of change of concentration in different compartments viz. blood and tissue medium. The drug concentration in the different compartments has been computed using numerical parameters. The results illustrate the variation of drug concentration with respect to time using MATLAB software. It has been observed from the results that the drug concentration decreases in the first compartment and gradually increases in other subsequent compartments.

Keywords : Laplace transform, diffusion, eigenvalue method, mathematical model
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