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MATHEMATICAL STUDY OF PULMONARY AND INTRAVENOUS ADMINISTRATION OF OXYGEN IN BIOLOGICAL TISSUES UNDER HYPOXIA CONDITIONS

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Abstract: Mathematical modelling of oxygen transport in biological tissues played a great role and provides optimal results for advanced biomedical and biophysical research. Conventionally, oxygen is administered to hypoxic patients through pulmonary route. A mathematical model has been proposed to establish an alternative route for oxygen supply, whereby oxygen is administered directly into the target tissue bypassing the lung compartment. Our study aims at evaluating the feasibility of the novel approach using compartment modelling. The model is represented by a system of first order ordinary differential equations and their solution by Cramer's rule and Laplace transform method. The concentration profiles of oxygen through pulmonary and intravenous routes were estimated in the arterial blood and tissue compartments at different flow rates; and with respect to initial oxygen concentration in the lung compartment and in the injected solution. Our results are in agreement with those arrived at by Lin Gui and Jing Liu (2006) [4]. The method offers a promising alternative to the conventional approach for clinical rescue of hypoxic patients, more so in emergency situations.

Keywords and Phrases: Compartment model, Hypoxia, Laplace transform, Pulmonary Administration, Intravenous Administration.

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