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Entwicklung eines Computermodells zur Beschreibung des Myoglobinverlaufs im Blut nach Akuten Myokardinfarkten mit und ohne Lysetherapie und zum Verständnis des Einflusses der Nierenfunktion auf diesen Verlauf.

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Key words: Myoglobin – AMI – Infarction Size - Mathematical Model

Abstract

A network consisting of compartments and fluxes representing a system of first order ordinary differential equations is developed as a model describing phenomena happening during and after acute myocardial infarction (AMI) from the sight of the clinical chemistry. One important compartment is the serum myoglobin concentration (MYO).

This system is implemented by using the program ModelMaker® as a computer model on a personal computer and could be handled comfortably.

The parameters of the model are varied by an optimising procedure in such a way that the differential equations solution function describing the course of MYO fits optimally (least squares method) the field of observed MYO values.

The model describes comprehensibly serum Myoglobin at rhabdomyolysis, kidney insufficiency without AMI, uncomplicated AMI, re-AMI, AMI under kidney insufficiency or blood volume changes, and successful opening of coronary occlusions after AMI.

A robust individual estimation of the myoglobin amount set free from the myocardium representing the quantity of necrotized myocardium ("infarction size") even during complicated AMI is given.

The computer model demonstrates the great potential of use in the clinical chemistry, could be used for teaching or as a tool for further investigations.

As an example the excretion of myoglobin into the urine is plausibly analysed and modelled. In a future scientific work simultaneous observation of urine and serum myoglobin during AMI or rhabdomyolysis could contribute to finding of individual parameter values describing tubular myoglobin resorption in the kidneys and urine excretion of myoglobin.