Commutativity, time-reflection, and impulse-behavior of pharmacokinetic reactions

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Abstract

Pharmacokinetics opens up concepts and examination methods of the general reaction-kinetics for matters of medicine, specifically those of pharmacology. The reaction-kinetics – originally developed for the specific problem of physical chemistry – is nowadays no longer bound to a certain discipline. It has, moreover, already turned into a multivalent instrument of the treatment of diverse and complicated problems of processes, so that it appears not only in natural sciences as for example in chemistry, physics and biology, but also in other areas like, e.g., in meteorology, population-statistics, and even in social history.

In continuation of former works of the authors in other fields of physics, it is shown that the matrix-calculation can be applied profitably also to problems in the pharmacology. That refers above all to the concepts of **commutativity** and non-commutativity as well as to the impulse-behavior by giving different pharmacological drugs.

The main focus of the present work is put on the analytic representation of reaction systems and reaction processes. An adequate analytical formulation and treatment of kinetic reaction processes is given by the matrix-calculation, which implies the extremely important **non-commutativity** of multiplication of matrices. The reaction process is pursued in positive time-progression and in negative direction of time by **time-reflection**. The relevant differential equation systems are formulated as *vector-transformations* of the *“concentration-vector”* in the multidimensional *“reaction-space”*.

The reaction-matrix is considered also for temporally variable transition coefficients. With the reference to such phenomena like the propagating and spreading of concentration impulses in the reaction medium, also oscillating reactions are represented as effects brought about by intermittently given pharmacological drugs, showing a characteristic **impulse-behavior**. Thus, biorhythms, periodical seasons of the year and the day, with averaging, resonance, and aftereffect, can be described analytically and – using special computer programs for the solution of nonlinear systems of differential equations – could be calculated numerically.

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