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Research as an Effort to solve Medical Problems

Whenever exogenous disease determinants have been uncovered, preventive and curative interventions have been successful in clinical medicine. However, for several groups of diseases such as cancer and autoimmune diseases exogenous factors could not clearly be established. It was therefore assumed that the cause had to be endogenous. Furthermore it was assumed that insight in normal biological functions would unravel the cause of endogenously determined diseases. These two assumptions have resulted in a logarithmic expansion of biomedical research. This development started in the sixties. After three decades of intensive investigations and astronomical expenses the question can be raised whether more effective strategies can be conceived to study the etiology and the pathogenesis of disease.

By dissecting the organism to a subcellular and molecular level, information on the function of the intact organism and the pathophysiology of disease can no longer be taken into account. In order to be useful in the understanding and management of disease, progress made at molecular level has to be integrated into concepts at a higher level, i.e. the function of the intact organism. However, summation of all information acquired at a subcellular level does not result in a comprehensive concept about the integrated functioning of the body. Due to the high degree of complexity of the organism, cause and effect relationships in the intact organism are less predictable than at a molecular level. The insight in pathophysiological processes is mainly based on empirical observations and stochastic analysis. As a consequence the amount of information required to support correctness of notions at higher levels of complexity increases exponentially as a result of increments in the degrees of freedom.

Progress made in clinical epidemiology has offered new approaches to study diseases with a multifactorial pathogenesis. This approach will enable clinicians to judge the relative weight of individual disease determinants.

Physicians have developed 'disease models' in order to make judgements and to be able to act. It is the task of the clinical sciences to determine whether information acquired at lower or higher levels of complexity supports or contradicts the concept of a disease model. It is evident that all medical sciences are considered to participate in this integrative task.