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Challenges of Modern Pharmacology

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Editorial

Pharmacology is a beautiful but very complex science. If the internal medicine is called the queen of medicine, pharmacology is certainly the most attractive sister, as the sense of clinical medicine is precise diagnosis and effective cure, usually impossible without the medicaments. Therefore, rational pharmacotherapy is one of the most important pillars of the process of elimination of a disease or reduction of its symptoms. There are several areas of pharmacology which deserve special attention: education, research and safety of pharmacotherapy.

Education: Education of the future medical doctors how to use the medicaments in a rational and safe way is a basement for effective pharmacotherapy. They also should have perfectly learned prescribing skills, but recent published data suggest that the prescribing competency of the young doctors in Europe is of a low level, and with many mistakes [1]. Clearly, it means that graduated medical students in many European countries have not collected appropriate knowledge to achieve prescribing competencies and suggests wrong education program and teaching methods. Hence, defining clear learning outcomes and using the new conceptual teaching methods as a problem-based discussion and patient simulation are necessary to improve medical student's education in this field in order to prescribe safely and effectively. First step in this direction has been already made in Europe by collection of the key outcomes for teaching of clinical pharmacology from teacher in a majority of European countries [1]. In my opinion, this effort should be continued in USA and Japan and finally results in preparing a universal syllabus how to teach pharmacology in an optimal way for a benefit of all patients around the world.

Research and development: Classical research in a field of pharmacology is usually oriented to the drug design methods and discovery of the completely new molecules. This is extremely expensive and not realistic way for the most of laboratories and pharmacologic departments. This area of research and development seems to be dominated by biological drugs, especially Monoclonal Antibodies (MAB). Actually, due to "bio-boom" i.e. explosion of the new MAB introduced to the pharmaceutical market, one should be concerned about safety of this strategy and overexploitation of immunological mechanisms of the human organism in treatment of different diseases. Therefore, looking for the new indications of already used drugs and modification in order to improve their efficacy and safety, i.e. Pharmacokinetic (PK) and Pharmacodynamics (PD) characteristics should be alternative way for better pharmacotherapy.

To tackle PK limitations, versatile strategies and novel alternative procedures have been undertaken. Successful approaches in this field have focused on improving binding affinity to the modified target and enhancing the transport to the intracellular compartment. Cell Penetrating Peptides (CPPs) are one of the possible methods for above mentioned purpose. For example, Transportant 10 (TP10), a representative of cationic CPPs, is a 21-residue chimeric and primary amphipathic construct comprising the N-terminal part of the neuropeptide galanin being linked to the full lengths wasp venom peptide mastoparan, has been already used several times with a different cargo to improve PK and PD [2].

Also, a mixed-lipid membrane model with isotropic pressure scaling is promising tool in evaluation of membrane trafficking of bioactive compounds giving highly realistic dynamic simulation of membrane mechanisms involved in drugs' transport, especially in neoplastic cells [3].

Pharmacovigillance and safety of pharmacotherapy: Reporting of Adverse Drug Reactions (ADR) is not attractive and popular part of medical doctor's job. However, awareness of a huge impact of systematic and regular reporting of ADR on general safety of pharmacotherapy is absolutely crucial among medical stuff responsible for health services. Therefore, we should pay special attention to pharmacovigillance, i.e., systematic collection and analysis of data based on the reports of ADR, as the only way for gradual improvement of safety of pharmacotherapy. In the light

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of "bio-boom" (see above) and appearance of biosimilar drugs (new category biologic drugs, a next generation produced by other company after finishing patent protection, but in the living cells, therefore, reference biologic drugs and biosimilar are not identical substances) is remarkable challenge for strict monitoring and reporting of ADR. This is due to lack of the good quality switch studies for safe exchange between reference and biosimilar drugs additionally complicated by forced busing of international names instead off trade names of biological drugs in many countries all over the world [4].

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