18. THE WAYS TO IMPROVE DRUG STABILITY

Author: Cojocari Cristina; **Co-author:** Mazur Ecaterina

Scientific advisor: Uncu Livia, PhD, Associate Professor, Department of Pharmaceutical and Toxicological Chemistry, "*Nicolae Testemitanu*" State University of Medicine and Pharmacy, Chisinau, Republic of Moldova

Introduction. The stability of medicine represents capacity to maintain physical, chemical, biological and microbiological stability. It directly influences the effectiveness and safety of drugs.

Aim of study. To elucidate the possible way that can improve the drug stability.

Methods and materials. To accomplish the study there have been analyzed scientific articles, by accessing the MEDLINE databases, The Thomson Corporation and SciSearch, Cochrane Electronic Library.

Results. The pre-formulation studies are a crucial stage in the procedure of testing on drug substances available for absorption that would determine product safety and efficacy. In general, there are in fact five different types of stability: chemical, physical, microbiological, therapeutic, and toxicological. Excipient selection must be done carefully, because some excipients could interact with the substance, causing instability (phenobarbital with polyethylene glycols). Another way to improve drug stability is by selecting materials for packaging that guarantee protection from light, moisture, and oxygen. Proper container selection, especially utilizing dark glass or airtight containers (Vitamin B1, B6, B12, C, aminophylline), may avoid degradation caused by environmental factors. Lyophilization can be used to reduce water content and improve stability in some formulations. This is particularly helpful for biologics, such as proteins (interferon alpha – bifidobacterium, vaccines). Some pharmaceutical substances are sensitive to changes in pH (penicillin, adrenaline). Keeping the formulation's pH at the proper level can help prevent hydrolysis and degradation. Inert gases, such as nitrogen, can be used to displace oxygen in drug containers. Incorporating antioxidants into formulations can prevent oxidative degradation. Common antioxidants (sodium hydrosulfite, thiourea) play a crucial role in neutralizing reactive oxygen species that may otherwise lead to the degradation of drugs. Regularly monitor the stability of drug formulations through accelerated stability studies and real-time stability testing. This helps identify potential degradation pathways and allows for adjustments in formulation or packaging.

Conclusions. Stability analysis is the basis for all drug development and manufacturing. Implementing a combination of these strategies, tailored to the specific characteristics of each drug, is key to enhancing stability and prolonging the shelf life of pharmaceutical products.

Keywords. Stability, types of stability, drugs