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SECTION 15.
PSYCHOLOGY AND PSYCHIATRY

SECTION 16.
MEDICAL SCIENCES AND PUBLIC HEALTH

SECTION 17.
PHARMACY AND PHARMACOTHERAPY

SECTION 18.
PHYSICAL CULTURE, SPORTS AND PHYSICAL THERAPY

SECTION 19.
ARCHITECTURE AND CONSTRUCTION

SECTION 20.
GEOGRAPHY AND GEOLOGY

SECTION 17.
PHARMACY AND PHARMACOTHERAPY

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INNOVATIVE ASPECTS AND PHARMACEUTICAL TECHNOLOGIES IN THE DEVELOPMENT OF SOLID DISPERSION SYSTEMS

At the current stage, the analysis of innovative approaches to the creation and commercialization of solid dispersion systems and the assessment of prospects for the domestic pharmaceutical industry are gaining relevance.

In industrial pharmacy, more than 30 drugs are known using solid dispersion systems to improve the solubility of active pharmaceutical ingredients (APIs) based on the addition of pharmaceutically acceptable polymers, which are available on the market and are approved by the US Food and Drug Administration (FDA).

In addition to increasing the dissolution of the active substance, the use of solid dispersion systems allows solving a number of other applied problems in the creation of medicinal products:

– release modification;
– increase in chemical and physical stability;
– provision of necessary pharmaco-technological properties;
– elimination of undesirable properties (side reactions, unpleasant organoleptic properties);
– the possibility of bypassing patent restrictions on formulation, particle size or polymorphic modifications to create generic medicines [1].

Solid dispersed systems are defined as systems consisting of a hydrophobic or sparingly soluble API dispersed in a hydrophilic carrier medium. The role of the carrier is usually performed by pharmaceutically acceptable water-soluble or hydrophilic polymers (polyethylene glycol, polyvinylpyrrolidone, cellulose derivatives, and others). Optionally, surfactants can be included as new components in these systems [1; 2].

Modern pharmaceutical technologies, on the basis of which solid dispersed systems can be obtained – hot melt extrusion, joint dissolution and solvent removal, solvent removal by spraying (spray drying), obtaining systems in a fluidized bed (fluid bed), obtaining systems by the method of high shear granulation, high-energy mixing (KinetiSol®) [3-5].

In pharmaceutical production, Spray drying is a method of obtaining solid dispersion systems – spray drying is used for the production of amorphous solid dispersions by uniformly dispersing active pharmaceutical ingredients in a polymer matrix.

This state will transfer the active compounds (drug) to a higher energy state, which in turn affects bioavailability because it facilitates the diffusion of API molecules in the patient's body.

Given the significant scientific complexity and complexity from the point of view of technological, physico-chemical and regulatory aspects of implementation, the lion's share of commercialized solid dispersion systems is represented by the leading companies of the pharmaceutical market – Pfizer, Merck, Janssen, Bayer, Novartis, which definitely confirms the prospects for the development of this direction.

References:

1. Yaremenko V.V., Ishchenko O.V. Commercialized solid dispersion systems as the basis of a successful strategy for improving the biopharmaceutical properties of active pharmaceutical ingredients. Collection of materials of X Scientific and practical conference with international participation "Science, Innovations and Modern Pharmaceutical Production". Kyiv: Farmak JSC, October 27, 2022, pp. 81-83.
2. Kharchenko A., Yu. Lisovyi V.M., Bessarabov V.I., Kuzmina G.I., Goy A.M., Yaremenko V.V., Kovalevska O.I. Centrifugal formation of polymer fibers for potential use as carriers of active pharmaceutical ingredients. Scientific and technical progress and optimization of technological processes of drug creation: materials of the IX scientific and practical conference with international participation, Ternopil, September 22-23, 2022. Ternopil: TNMU "Ukrmedknyga", 2022, pp.74-75.
3. Campbell, Heather R., Alsharif, Fahd M., Marsak, Patrick J., Lodder, Robert A. (2020). Development of a new pharmaceutical composition of D-tagatose for spray drying. Journal of Pharmaceutical Innovations: 1–13. DOI: 10.1007/s12247-020-09507-4 .
4. Poozesh, Sadegh, Lu, Kuhn, Marsak, Patrick J. (2018). On particle formation in spray drying for biopharmaceutical applications: investigation of a new model using computational fluid dynamics. International Journal of Heat and Mass Transfer. 122: 863–876. DOI: 10.1016/j.ijheatmasstransfer.2018.02.043
5. Ting, Jeffrey M., Porter, William W., Mecca, Jody M., Bates, Frank S., Reineke, Teresa M. (2018). Advances in Polymer Design for Enhanced Solubility and Oral Drug Delivery. Chemistry of bioconjugates. 29 (4): 939–952. DOI: 10.1021/acs.bioconjchem.7b00646. ISSN 1043-1802. PMID 29319295.