



## OP 1. FORMULATION AND TECHNOLOGY OF TARGETED DELIVERY AND MODIFIED-RELEASE SYSTEMS

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While using conventional dosage forms, it is hard to avoid change (fluctuation, non-constancy) of the concentration of the active pharmaceutical ingredient (API) in biological fluids. At this time, it is possible to: overdose or conversely, have insufficient effectiveness of the drug; consumption of the medicinal substance in excess amount during use.

After delivering the API into the body, it is actually distributed evenly in all tissues. As a result, only an insignificant part of the active substance 0.001 - 0.01% is provided to the area of damage. The rest of the drug in the best case is wasted, or in the worst case, it causes a toxic effect [1].

Conventional dosage forms are not characterized by selectivity of release and action, so, the drug does not act like an arrow at a specific target, the action of the drug is like a rain. This is what determines the need for new approaches in the field of development of dosage forms

The study aimed to compose the formulations and develop technologies for targeted delivery and modified release dosage forms containing some natural and synthetic active pharmaceutical ingredients.

In order to facilitate the process of taking the tincture of Valerian and Motherwort, to avoid problems with swallowing, as well as negative effects of alcohol, we have developed orodispersible plates, which are solid dosage forms, are applied to the mucous membrane, adsorbed on it, quickly dissolved by saliva and absorbed.

Currently, there are several Aloe formulations on the pharmaceutical market. Studies conducted on various gastric ulcer models in experimental animals have established that the Aloe substance has a pronounced gastroprotective and anti-ulcer effect [5].

Based on biopharmaceutical studies, the composition of Aloe-containing gastro-retentive floating tablets for targeted delivery has been established, and a production technology was developed..

Nowadays the main cause of gastroduodenal diseases is considered to be *Helicobacter pylori* - a bacteria that invades the gastrointestinal (GI) tract and causes ulceric damage in the upper part of the stomach lining or small intestine, which in turn can lead to the development of gastric cancer [2,4].

The so-called "gold standard" of *H.pylori* eradication is triple therapy, which combines two antibiotics (amoxicillin/levofloxacin or clarithromycin/metronidazole) and a proton pump inhibitor (omeprazole/lansoprazole/pantoprazole/rabeprazole). The above medicines are serially manufactured and available in solid dosage forms: tablets and capsules [2,4].

Innovative drug delivery systems such as floating, high and low density, mucoadhesive/bioadhesive, swelling and magnetic systems, ion-exchange resins and nanosystems have been provided to date. Although these systems represent a promising concept for API delivery, they still have a number of drawbacks [2,4].

Foams are of particular interest for targeted API administration in the stomach mucosa as they are light-weight, and, contrary to solid dosage forms, do not precipitate. Instead, they expand in volume and enlarge contact surface, completely covering and penetrating the mucosal membrane [3].



On the basis of "gold standard" ingredients of *H. pylori* eradication, the targeted delivery, modified solid dosage forms - in the form of gastro-retentive, dissolvable and foam forming tablets have been composed.

Vascular hyperplasia of the skin, the so-called hemangioma is the most common congenital and neonatal skin vascular lesion in children. Using ointments, it is possible to deliver the active pharmaceutical ingredient directly to the damaged area, to create its high concentration in the skin, tissues, biological fluids and organs, as well as to avoid negative effects of the primary metabolism of the liver, enzyme system, pH on the API. From this point of view, the local delivery of biologically active natural compounds for the treatment of benign tumors of the skin and subcutaneous blood vessels is relevant.

On the basis of biopharmaceutical studies, formulations of ointments containing growth-regulating thermostable protein complex, salicylic acid and rutin are provided and technologies are developed, their relative diffusion processes and bioavailability in *in vitro* and *ex vivo* tests are investigated.

Bacterial and viral infections of the respiratory system are currently among the most severe challenges. Taking this into account, we have developed a composition of inhalation powder containing Eucalyptus and Thyme essential oil. Particle sizes were determined using a laser diffractometer. It is established that inhalation powders consist of respirable fractions of optimal sizes.

*In vitro* test studies have established that the delivered inhalation powders are distributed over the entire lung area, which is especially important in the treatment of diseases caused by bacterial and viral infections of the respiratory system.

#### References

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