Summary

The lactation is very important period for a newborn baby and breast milk is the best source of proteins, fats, carbohydrates and microelements for the developing organism. During this time, maternal pharmacotherapy raised much speculation about the safety of pharmaceuticals' usage. The main question is how much of the active pharmaceutical ingredient is able to pass into the breast milk and what effect it will have on the baby. This is especially important in the treatment of chronic diseases, because then the child's exposure to the drug is prolonged, which may lead to side effects.

The penetration of xenobiotics into breast milk is mainly related to their physicochemical properties, such as: molar mass, degree of ionization under physiological conditions or lipophilicity; they are additionally determined by the pharmacokinetic properties of the compound, the first of which is binding to plasma proteins. The general conclusion that appears in the literature is the fact that compounds highly binding to plasma proteins penetrate to lactocytes to a lesser extent.

Due to ethical problems, studies on nursing women often use chemometric methods that safely can draw conclusions about the extent of drugs' penetration into milk. Methods based on QSPR, in which the relationship between the structure of a chemical compound and its properties are studied, show a special share.

This work includes statistical analyzes together with observations of the correlation between the parameters related to the physicochemical properties of a wide group of active substances and the literature values of M/P (milk-to-plasma ratio), which determine the level of penetration into milk. Several regression methods were used to create an universal model predicting the transfer of drugs of various structures into human milk, as well as several analyzes to determine the effect of individual parameters on this phenomenon. Due to the high importance of plasma protein binding, chromatographic data from experiments conducted in various environments were also used: thin layer chromatography (TLC) with plates impregnated with bovine serum albumin solutions and high performance liquid chromatography (HPLC) with columns with immobilized human albumin and the artificial membrane.

The results of chemometric studies confirmed the significant influence of several physicochemical and biological parameters, including the degree of ionization of the compound

in plasma and protein binding, on the penetration into breast milk. The obtained chromatographic parameters, especially those obtained in normal phase thin layer chromatography, were highly related to protein binding values available in the literature. Promising results were also obtained using retention parameters from $HPLC_{HSA}$. They were also used in the created predictive models. This suggests that the performed affinity chromatography, with the use of a simple method such as TLC, can be used to build pharmacokinetic models that will quickly predict the essential features of new active substances.