In English

The thesis deals with research of novel antimicrobial peptides (AMP) Halictines (HAL-1, GMWSKILGHLIR-NH$_2$ a HAL-2, GKWMSSLKHLK-NH$_2$) and their structural analogs isolated from the venom of the wild bee *Halictus sexcinctus*. The structure and antimicrobial activity of these peptides had been described earlier [1]. The goal of this diploma thesis is to find peptide which is strongly toxic only for cancer cells and nontoxic for normal cells. Using of the fluorescent marked peptides we aimed to acquire the information about mechanism of action of the studied peptides on the cells.

Using the MTT test (determination of valuation IC$_{50}$), the toxicity of HAL-1 and HAL-2 and their analogs against 2 normal cell lines (Human umbilical vein endothelial cells, HUVEC, and normal rat intestinal cells, IEC) and against 2 cancer cell lines (cancer cells of suppository uterine, HeLa-S3 and cancer cells of human colorectal carcinoma, CRC SW 480) was determined.

First we tested antimicrobial peptides with antimicrobial activity and low hemolytic activity. For verification the toxicity of less active analogs was also determined. We found out that the HeLa-S3 cells are the most sensitive to these peptides. The most toxic peptides (HAL-1/9, HAL-1/18, HAL-2/2) kill 50% of cells in the concentration 2.5 – 10 µM. To obtain the same effect against the other cell lines, the 5-10 times higher concentration of peptides was needed. The most effective peptides have also high antibacterial efficiency against HeLa-S3 cells as had been already described [1]. However the cells of colorectal carcinoma as well as HUVEC cells and IEC cells are comparably sensitive or more precisely insensitive to the tested peptides.

Using the fluorescent microscopy we have also found that only low quantities of peptides penetrate the cell in the concentration lower than IC$_{50}$. On the other hand, in the concentrations higher or equal to IC$_{50}$ the peptides penetrate the cell very fast and kill the cell. The highest fluorescence was found around the nucleus of the cells and in the structures whose position corresponds to mitochondria. This phenomenon should however be proved by further investigation.

The results suggest that drugs that are based on antimicrobial peptides might to be developed.

**The key words:** antimicrobial peptides, analogs of antimicrobial peptides, cell lines, cytotoxicity, fluorescent microscopy