ABSTRACT

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Title of diploma thesis: Comparison of new amphiphilic anionic photosensitizers based on phthalocyanines with their hydrophilic analogues.

Currently, one of the most common causes of death in our population is cancer. There are a number of treatment modalities how to treat tumours, but none of them is ideal, and a large number of people are still dying of cancer. For this reason, intensive research and studies are ongoing, focusing on cancer treatment options.

In recent years, photodynamic therapy has been increasingly used to treat both cancerous and non-malignant diseases. It is a modern method that has minimal side effects, is highly selective and minimally invasive. Its principle is a photochemical reaction, which proceeds when a combination of three basic components occurs – light, oxygen and photosensitizer. Separately, these components are nontoxic, but when the photosensitizer is exposed to oxygen, toxic reactive oxygen species are produced, whose subsequently cause destruction of the tumour tissue.

A photosensitizer is a compound that is able to absorb radiation of a certain wavelength and then convert it into energy, which afterwards leads to tumour destruction. Nowadays, many compounds are used as photosensitizers. Some of them are approved and used in clinical practice.

The aim of this work was to compare two novel phthalocyanine-based photosensitizers. All experiments were performed *in vitro* on the human cervical cancer cell line HeLa. Phototoxicity, intrinsic toxicity ("dark toxicity") and subcellular localization of studied compounds were determined. In addition, experiments on cellular uptake and morphological changes induced by photodynamic action were also performed. According to the results, the effectiveness of the two compounds was compared. Both amphiphilic anionic compounds and hydrophilic analogues are very well soluble in aqueous solutions. The amphiphilic derivatives

might be better for use in PDT thanks to the partially lipophilic character providing higher accumulation of the Pcs in the cells.

From the obtained results, it is clear, that both studied photosensitisers are effective, and their inherent toxicity is very low. The compound P44 was more efficient – EC_{50} = 0,287 ± 0,078 uM in SCM and EC_{50} in SFM was 0,003 ± 0,001 uM. Significant morphological changes accompanying cell death have been observed.