# ABSTRACT

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| Candidate: | Bc. Monika Steklá |
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| Title of diploma thesis: | Study of the effectiveness of the original amphiphilic (aza)phthalocyanines bearing permanent positive charge |


The neoplastic diseases are nowadays one of the most common reason of death in developed countries. That is the reason why is a great attention dedicated to the development of new methods for the treatment these diseases. One of such modern methods is the photodynamic therapy. This is a very selective, minimally invasive method with a minimum of side effects. The principle of this type of therapy is application of separately inactive compound, called photosensitizer, followed by exposure to light with suitable wavelength in the presence of molecular oxygen. Therefore, the photodynamic therapy needs three basic components: the photosensitizer, light and oxygen. Each of those components are non-toxic, when they occur separately. However, their combination lead to the inception of the photochemical reaction in which are generated reactive oxygen species, especially singlet oxygen. These very reactive molecules damage target cells, which subsequently die *via* apoptosis or necrosis.

As has been said, the main part of the photodynamic therapy is the photosensitiser, which is the compound which can absorb the light with specific wavelength and convert it to useful energy. Nowadays exist a few of these compounds introduced to the clinical practice. The objective of this study is the evaluation of the effectiveness of the novel photosensitizers from the group of phthalocyanines and azaphthalocyanines *in vitro*. Evaluated compounds were studied on malignant human cervical cell line HeLa. Cytotoxicity after the exposure to activating light as well as dark toxicity were evaluated. Subcellular localization of tested compounds after accumulation in cells using fluorescence microscopy, cellular uptake and morphological changes after photoactivation were determined.

The results of this study show that all tested compounds are very effective photosensitisers with low intrinsic toxicity causing significant morphological changes after activation of photosensitisers by red light. Uptake of compounds to the cells initially proceeded quickly, gradually slowing down and reaching the plateau phase in the case of compounds P39 and P40. The best efficacy was shown with the compound P40 ($EC_{50}$ = 17.8 ± 3.7 nM).