This Bachelor Thesis is focused on the optimization of conditions for the use of a simple voltammetric DNA biosensor, based on a large-surface carbon film electrode (ls-CFE), for the detection of the DNA damage caused by oncological drugs. ls-CFE was used for its advantageous properties, such as its fast preparation, a simple mechanical renewal of the electrode surface, a good reproducibility of results, a simple chemical modification, and, last but not least, low preparation costs.

A content of ethanol in the solution, in which the biosensor was incubated together with the damaging agent, was the main optimization parameter investigated in this Thesis. The contents of ethanol in the range from 0 to 50 % (v/v) of ethanol in 0.1 mol/l phosphate buffer of pH 7.15 (PBS) were tested. After the incubation of the biosensor, the measurements were performed using cyclic voltammetry (CV) in the presence of the redox indicator $[Fe(CN)_6]^{4-/3-}$ in PBS. The optimum content of ethanol was found as 5 %.

Afterwards, the DNA biosensor, which preparation was optimized in a previous Bachelor Thesis, was used for the detection of the DNA damage caused by model cytostatic agent – Ellipticine (5,11-dimethyl-6H-pyrido[4,3-b]carbazol). Using the CV technique and the redox indicator $[Fe(CN)_6]^{4-/3-}$, the response of the biosensor to the DNA damage caused by the direct interaction with Ellipticine was measured in the dependence on an incubation time and a concentration of Ellipticine in the incubation solution. The obtained results confirmed that at the interaction of Ellipticine with DNA, Ellipticine is incorporated into the DNA structure, which induces its damage (dependent on both monitored variables) in the form of strand breaks of the DNA double-stranded structure.