This diploma thesis is oriented to analysis of physiological effect of synthetic estrogen ethinylestradiol (EE), which represents the main component of steroid-based substance used in hormonal contraception. From wide range of physiologically important protein molecules, which might be effected by this steroid, thesis focuses to the study of the sodium plus potassium activated, magnesium dependent adenosinetriphosphatase (Na+, K+ - ATPase), which is selectively inhibited by cardiac glycosides such as ouabain (g strophantine). Na+, K+ - ATPase represents an important plasma membrane bound enzyme, which catalyzes the active transport of sodium and potassium across plasma membrane. In the first part of this work, Na+, K+ - ATPase was determined by binding of radioactively labeled selective inhibitor of this enzyme [3H]ouabain, used for this purpose. In the second part of this work, plasma membrane fluidity was analyzed by steady-state fluorescence anisotropy of DPH.

The effect of EE on [3H]ouabain binding was studied first under in vitro conditions by using human embryonic kidney cells (HEK293) which were cultivated for 24 hours in the presence of EE in tissue culture medium. Second, the effect of EE was also studied under in vivo conditions, by subcutaneous application of EE to the female rats of Wistar strain (10 days). Results of studies performed in HEK293 cells indicated an increase of specific [3H]ouabain binding in isolated plasma membranes, which were prepared by flotation of postnuclear supernatant fraction in sucrose density gradient. Results of analysis of [3H]ouabain binding to postnuclear fraction prepared from rat cortex, left heart ventricle, liver and renal cortex can not be unequivocally summarized at present time because of rather low-affinity [3H]ouabain binding sites detected in the rat tissues. Na+, K+ - ATPase activity in rat tissues exhibits rather low-affinity towards this inhibitor in comparison with other species, guinea-pig for instance.