

## **Abstract**

Biological processes in the cell are affected by DNA topology, *i. e.* by DNA structure and shape. An important topological parameter is the level of supercoiling – additional twisting of DNA is relieved by positive (twisting in the same direction as the helix turns) or negative (twisting in the opposite direction) supercoils. In this Thesis I review the role of supercoiling in gene expression regulation. I describe how supercoiling is involved in homeostatic mechanisms that control the transcriptional output from some genes. Environmental changes such as shifts in temperature, oxidative stress, extreme pH and antibiotics and other inhibitors affect the level of DNA supercoiling. DNA supercoiling then affects the expression of enzymes, which influence DNA topology, as well as some other genes/proteins. In summary, this Thesis describes how changes in the environment influence bacterial DNA topology and gene expression with a brief mention of this type of regulation in eukaryotes.