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Cellular response to unfavorable factors, such as starvation, oxidative stress or presence of toxic compounds is precisely regulated. In stress conditions programmed cell death, called apoptosis is likely to occur. The project focuses on the inhibition of this process by two proteins FGF1 and FGF2 belonging to family of fibroblast growth factors. FGF1 and FGF2 affect many different types of cells, but only those which have on their surface highly specific receptors. Interaction between FGFs and their receptors leads to cell division, accelerates wound and fracture healing, induces development of new blood vessels and regeneration of nervous cells. Entirely unusual property of both growth factors is their ability to cross cellular membranes and to enter the cell. Despite many years of research the function of this process has not been yet described.

Our preliminary data indicate a completely novel intracellular function of FGF1 and FGF2. We suggest that upon entering the cell both proteins provide cell protection against apoptosis. Therefore, we hypothesize the existence of two independent anti-apoptotic pathways activated by FGF1 and FGF2, one based on their interaction with the receptor and another related to their intracellular localization. The project includes a wide, multidisciplinary variety of experimental approaches such as genetic engineering, spectroscopic techniques, protein-protein interaction measurements and advanced methods of cell biology and microscopy.

Within the project we will thoroughly characterize two anti-apoptotic routes activated by FGF1 and FGF2 and decode their molecular basis. Moreover, we will elucidate consequences of anti-apoptotic activity of FGF1 and FGF2, which might have clinical implications, including induction of resistance to chemotherapy in cancer cells.