Parkinson disease (PD) is one of the most common neurodegenerative disorder, caused by both genetical and environmental factors. Among the most common manifestation of PD are sleep problems, which affect quality of life and daytime functioning. Several lines of evidence suggest that one cause of sleep problems in patients with PD is circadian disfunction.

Circadian disfunction is proven to accelerate the neurodegenerative process and light treatment has been shown to improve sleep in PD patients, probably by restoration of circadian function. However, the cellular mechanisms linking the circadian clock to neurodegeneration is still poorly understood. Biological clock is self-sustained but entrainable by environmental conditions, like light or temperature. The most important protein involved in clock synchronization by light is cryptochrome (CRY), which is blue light photoreceptor. After light exposure it changes conformation and forms complexes with other proteins, and targets them to degradation. Our preliminary data showed that CRY may bind also some of mitochondrial proteins in light-dependent manner.

One of the main civilization threats of the modern world is artificial light and light pollutions. Additional exposure to light during the night causes clock disruption. Moreover, computers and tablets, which are used mostly during the late evenings, emit blue light which is the wavelength most affecting clock mechanism. These factors may affect biological clock mechanism and in effect cause sleep disorders and enhance neurodegeneration.

In this project we plan to use a *Drosophila* model of PD, which exhibits sleep disruptions similar to ones observed in humans, to explore the molecular mechanisms by which circadian light input can influence the etiology and progression of this neurodegenerative disease. We will focus on the effect of light and circadian entrainment of cell metabolism, with particular attention on mitochondrial dysfunction, one of the factors significantly contributing to PD pathogenesis. The aim of this project is to show that clock disruption due to light pollutions affects cell metabolism in the eye of older people, and in effect causes retina degeneration. In PD patients retina degeneration can causes chronic neuroinflammation, blood-brain barrier leaking and in effect, accelerate PD development in the brain.