PROJECT SUMMARY FOR POPULAR SCIENTIFIC USE

The last decade has been a time of extensive research on miRNAs and their influence on cell and tissue functions. miRNA are small modulatory molecules that regulate the majority of fundamental physiological processes, such as: cell proliferation and differentiation, immune and inflammatory response. Only a fraction of miRNAs identified so far have been characterized in terms of their biological role. A single miRNA can modulate the activity of hundreds of genes. Accordingly, qualitative miRNA profiling allows for identification of target genes while quantitative analyses measure the strength of the association.

The aim of this study is to identify the miRNA signature in vitreous humor of patients with proliferative diabetic retinopathy. We will use reverse transcription polymerase chain reaction (RT-PCR), considered to be the gold standard in such analyses, to acquire an expression profile of 372 different miRNAs in the vitreous samples. The results will be compared to those from control group and associated with clinical data.

miRNA profiling in pathological conditions allows for identification of target genes that are being silenced and expands our understanding of disease pathogenesis. Angiogenesis- and fibrosis – related miRNA are of particular interest in the context of diabetic retinopathy, as they may serve as potential therapeutic targets. Some miRNA have already been identified in animal models as possible targets for a miRNA-based therapy to prevent neovascularization in ischemic retina. There is a paucity of studies exploring in vivo miRNA expression in vitreous humor in humans and its associations with diabetic retinopathy.

In conclusion, this project will provide the most comprehensive analysis of miRNA profiling in vitreous humor of diabetic retinopathy patients so far. It will help design future experiments regarding miRNA-based therapy, as well as clinical studies evaluating the use of miRNA in monitoring vitreoproliferative complications in diabetic patients. This is of great importance, given the enormous socioeconomic costs of diabetes-related blindness.