Abstract

Introduction: Inherited retinal diseases (IRDs) are one of the most common causes of incurable blindness in children and young adults. In the Czech Republic, prior to the start of our work, these disorders had not been the subject of a systematic research. The aim of the study was to identify, clinically characterize and molecular genetically analyse Czech patients with monogenic IRDs and based on the knowledge gained subsequently implement preventive and therapeutic measures to clinical practice.

Material and methods: We have performed a comprehensive clinical examination, genealogical analysis and molecular genetic investigation in patients with IRDs and their family members. Detailed ocular examination included spectral domain optical coherence tomography, high-resolution fundus photography and autofluorescence imaging. DNA was isolated from venous blood samples or buccal cells. Causal variants were searched for using Sanger and massively parallel sequencing, and their pathogenicity was evaluated in the context of previously published data, bioinformatical analysis and segregation in available family members.

Results: In total, 103 individuals from 76 Czech families diagnosed with IRDs were characterized and their data published. Specifically, we have described clinical and molecular genetic findings in patients with retinitis pigmentosa, Usher syndrome, Danon disease, Stargardt disease, early-onset severe retinal dystrophies, congenital disorder of glycosylation type Iq, and achromatopsia. The most significant was characterization of ocular findings in the largest single-center cohort of patients suffering from Danon disease.

Conclusions: Our research helped to elucidate factors involved in the etiopathogenesis of various retinal dystrophies and highlighted the need for detailed genotype-phenotype correlations, which is important for early diagnosis, development of effective screening procedure, improvement of clinical counseling and care, implementation of preventive measures and selection of patients for targeted therapies. The project has raised awareness of IRDs among both professionals and the general public.

Key words: inherited retinal diseases, ophthalmology, preventive measures, gene therapy