Molecular Genetics for the Pediatric Ophthalmologist

Recent discoveries in the field of genetics affect the everyday practice of pediatric ophthalmology. In this issue of the *Journal of Pediatric Ophthalmology and Strabismus*, Bollinger and Traboulsi review both basic genetics and the principles of molecular genetics that provide pediatric ophthalmologists with a foundation for diagnosing and treating their patients. Not so long ago, clinicians relied completely on family pedigree and ocular findings to make a diagnosis. Recognizing iris transillumination in a patient with X-linked ocular albinism comes to mind. While these basics remain the cornerstone of diagnosing genetic disorders, exciting new information is now available. The complete human genome was mapped in 2001 and more than 30,000 genes have been identified. In the future, it may be possible to provide diagnoses based solely on genetic methodology. One example of recently developed technology for use in genetic analysis is the Leber congenital amaurosis microarray. With this technology, all known mutations (ie, more than 30 mutations on 7 genes) for a given disease such as Leber congenital amaurosis are represented on a single glass slide. One DNA sample can be applied to the slide for screening.

The authors point out that there are two main strategies for gene therapy. The first involves the use of a virus vector to replace an existing mutant gene. This is used in loss of function mutations such as the mutations of RPE65 in Leber congenital amaurosis. Human gene therapy trials of virus-mediated transfer of the RPE65 gene in children with this mutation have begun in London. The second strategy for gene therapy becomes important in many cases of autosomal dominant eye disease. In these conditions, the protein product of the mutant gene disrupts the function of the normal gene product. The deleterious expression of the mutant gene can be prevented by using complementary RNA that pairs with the mutant RNA and prevents translation into mutant protein. Basic knowledge of the genotype and phenotype of a particular inherited eye disease is a critical step in the process of diagnosing genetic conditions and offering hope for treatment. It is only a matter of time before treatments will be available for many common diseases.

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Editor