Parkinson's disease is multifactorial in most families; it is likely caused by an interplay of both genetic and environmental factors. A number of genes have been identified as risk factors for Parkinson's disease, with many others likely unknown. This fact sheet outlines basic information about the LRRK2 gene as well as risk to individuals and their relatives. If you have a LRRK2 variant and/or are concerned about your risk, speaking with a genetic counselor can be helpful.

**LRRK2 Variants**

Individuals with LRRK2 gene variants have a higher risk of developing Parkinson's disease than the general population, and this risk may vary depending on the type of variant. Risk of Parkinson's disease increases with age. However, many people with a LRRK2 variant do not develop Parkinson's disease; this is called incomplete penetrance. It is likely other risk factors are needed for an individual to develop Parkinson's disease in addition to a LRRK2 gene variant.

LRRK2 variants are inherited in an autosomal dominant fashion (see figure). This means that a person only needs to inherit one LRRK2 gene variant to have an increased risk of Parkinson's disease. This also means that both males and females can pass on and inherit the variant. Each child of a person with a LRRK2 variant has a 50% (or 1 in 2) chance to inherit the variant. Similarly, this individual has a 50% (or 1 in 2) chance to not inherit the variant from their parent.

Several variants have been reported in the LRRK2 gene that can contribute to Parkinson's disease risk. One important variant is the LRRK2 G2019S variant. Approximately 1-2% of individuals with Parkinson's disease have the LRRK2 G2019S variant. However, among some ethnic groups the frequency may be higher. For example, in groups who are of Eastern European (Ashkenazi) Jewish descent, approximately 15% of individuals with Parkinson's disease have this variant. LRRK2 variants can be found in people of nearly any ancestry and genetic testing can determine if a person carries a particular LRRK2 variant.

**Research Opportunities**

Many research studies are interested in enrolling people with LRRK2 variants. This is true whether or not that person or anyone else in their family has Parkinson's disease. Some studies are trying to understand more about the causes of Parkinson's disease. Other studies are working to develop new treatments. Trials of new medications for people with Parkinson's disease and LRRK2 variants are ongoing.

Various research projects at the Indiana University School of Medicine include genetic testing and genetic counseling for Parkinson's disease. These projects enroll volunteers with
and without Parkinson's disease. To learn more, contact our team at pdnexus@iu.edu or 888-830-6299.

References

For additional information about Parkinson's disease genetics and research visit PDNexus.org

Authors: Schulze J, Miller A, Cook L, Verbrugge J, Rumbaugh M, Heathers L.
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