

# Genetic Linkage Analysis

**Genetic linkage analysis** is one of the DNA indirect diagnosis method. It is used, when we are not sure which gene is involved or if the disease is *polygenic*. How we can then localize the place of our interest? The main role play **pedigree** (also called "*family tree*"). All members of family, which is suspected to have any genetic disease, have to be examined. The affected one can have some **specific part of DNA in common**. This part is usually trasmitted throught the generations. The healthy relatives should not have this DNA segment. In this case we can attend that the part of DNA is connected with the involved gene.

## Suspected Part of DNA

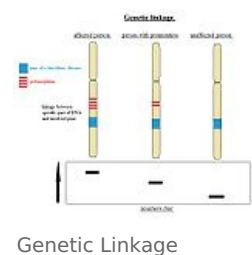
Segments of the analysis is called **marker loci**. Normally we used **DNA polymorphisms** as these markers. DNA polymorphism is a part of DNA which is typical for each person and can help us to recognize different genomes. Its occurrence is *1:1000* base pair. Lower probability is then called **mutation**. Polymorphisms are some kind of traces which we have inherited from our parents. So it is a good way how to find some connections throughtover the generations. Including the hereditary diseases.

## The Use of Linkage Analysis

The importance of linkage analysis increased with the development of PCR and Southern blot. We can discovered SNP - Single Nucleotide Polymorphisms. The first hereditary disease, which have been discovered by linkage analysis was **cystic fibrosis (CF)**. It was in the 90's of last century. The procedure was quite difficult:

1. Large number of affected families was examined.
2. Thanks to RFLP the gene of CF was located on *chromosome 7*.
3. Suspected surrounding parts of DNA were determined.
4. Small part of this suspected DNA was **cloned** (about 500bp).
5. The part of CF gene was isolated from sweat glands of a patient — the sample of cDNA from the DNA library was used.
6. Compared with the part of 500bp sample of DNA, the gene of CF was identified.

Nowadays we believe that this method of "reverse genetics" can help us to recognize more and more cause of the genetic diseases. We just have to know, which part of the DNA is connected to the involved genes. The examination of families and their relationships has the important role.



Genetic Linkage

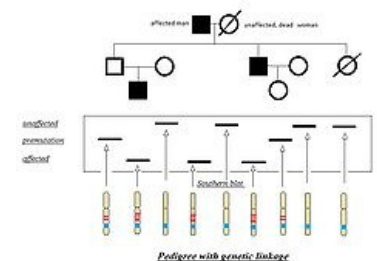
## Links

### Related articles

- Genetic Linkage
- Genetic Polymorphisms
- Crossing-over
- Genotype Variation, Mutations and Recombination
- DNA Diagnostic Direct Methods
- DNA Diagnostic Indirect Methods
- Protein Polymorphism

### Bibliography

- MURRAY,, et al. *Harperova biochemie*. 4th edition. 2002. ISBN 80-7319-013-3.
- KUMAR, ABBAS, FAUSTO, MITCHELL,. *Robbins Basic Pathology*. 8th edition. 2007. ISBN 978-0-8089-2366-4.



Pedigree