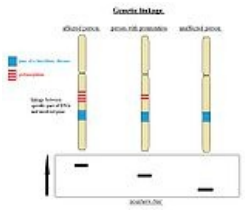
Genetic Linkage Analysis

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 polymophism 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**. Polymophisms are some kind of traces which we have inherited from our parents. So it is a good way how to find some connections throughover the generations. Including the hereditary diseases.

The Use of Linkage Analysis

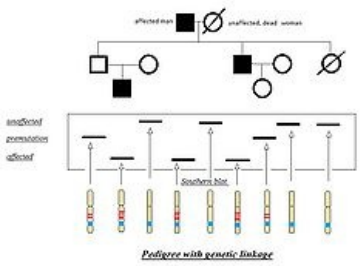


Genetic Linkage

The importance of linkage analysis increased with the development of PCR and Southern blot. We can discovered SNP - Single Nucleotide Polymophisms. 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 guite 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.



Pedigree

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

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- KUMAR, ABBAS, FAUSTO, MITCHELL,. *Robbins Basic Pathology.* 8th edition. 2007. ISBN 978-0-8089-2366-4.