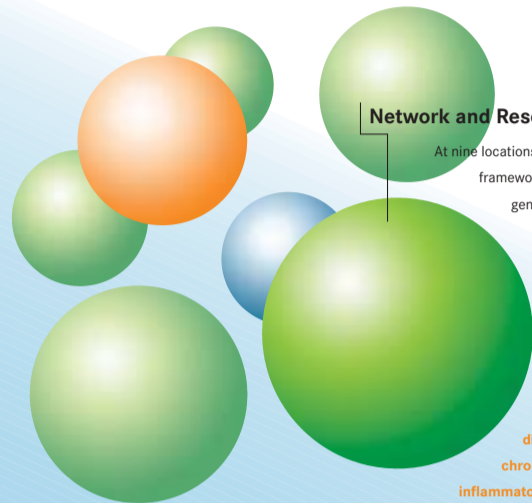


Genome Network Diseases Due to Environmental Factors



Network and Research

At nine locations within the NGFN framework researchers are tracing the genetic causes of environmental diseases. They are focusing on many **chronic disorders** that are triggered by **factors incidental to modern life and civilization**. The genome network investigates diseases such as **allergies, asthma, neurodermitis, chronic inflammatory bowel diseases** such as **Crohn's disease or ulcerative colitis, psoriasis, chronic bronchitis, general inflammatory diseases and periodontitis**.



"For Germany as a science and research location, disease-related genome research is indispensable. Here Germany has clearly pushed ahead of the U.S. or Great Britain due to the **close interaction** between clinics and cell biologists. Usually between the disciplines there are 'language difficulties', but these have been resolved because of the National Genome Research Network and the high pressure on **successful collaboration in Germany**."

Prof. Dr. Stefan Schreiber, Kiel



"Many environmental diseases have been on the increase in recent years. **Young people** like me are also **affected**. I really hope that further research will bear new results contributing to **better treatment** and **preventive measures** for chronic ailments."

Martin S., musician

» Example Crohn's Disease

Crohn's disease is a chronic inflammatory bowel disease which most commonly affects young adults. In Germany about **one in 200 adults** fall ill with the disease, and its incidence is clearly increasing. Men and women are equally affected. The disease occurs in episodes, and those afflicted suffer from painful diarrhea, severe abdominal pain, and fever. Moreover, patients experience serious weight loss, feel tired and fatigued, and have **very limited energy**. The causes of the inflammatory changes in the intestine are not known. However, it is clear that it is an **autoimmune disease which destroys the intestine**, meaning it is an over-

reaction of the immune system. At present, treatment consists of merely alleviating the severity of the symptoms, lengthening the intervals between the episodes, and avoiding operative intervention as long as possible. The disease is not curable. Crohn's disease tends to run in families, but it is not a simple hereditary disease which can be traced over generations. It is certain that **several genes** are involved and that **environmental factors** influence the development of the disease ●

» Combating Crohn's Disease with New Technologies

With the aid of genome research, scientists want to find out which genes are involved in the disease process. Therefore, in a **high-throughput method**, the genetic and physiological data of a large number of healthy and afflicted people were compared. The clinic of the University of Kiel alone **2.5 million genetic variants**, called SNPs, using a high-throughput method. These SNPs are sites in the genome with only one base difference between individuals. Often these variations have no effect, but they can also give rise to altered gene products ●

» Second Disease-Associated Gene Discovered

Thus the first two disease-associated genes for Crohn's disease were discovered: **CARD15 and DLG5**. Both CARD15 and DLG5 form an important barrier against penetrating bacteria. DLG5 is essential for the stable cohesion of the cells of the intestinal mucosa, which forms a protective barrier against pathogens and substances foreign to the body. In many people with the error in the DLG5 gene, a mutation of the CARD15 gene, which plays a central role in blocking bacteria in the intestine, is present at the same time. When health-influencing lifestyle factors such as changed nutrition habits are added, this can trigger the onset of the disease. In order to entirely understand complex,

environmentally influenced diseases such as Crohn's disease, the **course of the disease in many patients** must be followed up for years and analyzed. For this purpose genome research is cooperating with the large patient organizations and with the Competence Networks in Medicine, also funded by the German Federal Ministry of Education and Research, and is networking with long-term population studies ●●●

Coordination:
Prof. Dr. Stefan Schreiber
University of Kiel
s.schreiber@mucosa.de

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