Mechanisms of disease: Basic concepts

In order to determine the use of medicines for the treatment of diseases, four concepts are important:

Symptoms

These are the signs that the patient experiences as not being normal (e.g. pain, bleeding, a lump felt somewhere, sweating a lot, dizziness, hearing problems, etc.). The patient then presents these to the doctor. The doctor looks at these symptoms and tries to link them to a disease or a syndrome (where a collection of symptoms appear together) in order to reach a diagnosis.

Diagnosis

A diagnosis is formed on the basis of:

- the patient’s disease history and symptoms presented
- physical examination
- blood samples
- viewing of internal structures of the body with X-ray, Computer Tomography (CT), and Magnetic Resonance (MR) scans.

Mechanisms

Centuries of research have decoded many of the mechanisms of disease that lead to the symptoms and thereby to diagnosis. These symptoms can be observed by:

- the naked eye
- physical and electrical measurements (e.g. of blood pressure, muscle strength, urine flow, size of a tumour,

heart activity, etc.)
- physicochemical measurements on blood samples or tissue samples (‘biopsies’).

Targets

Identifying the mechanism of the disease helps us to understand what has gone wrong. It is important to then understand exactly which molecules (often proteins) are involved – this forms the ‘target’ for the primary action of a medicine. When medicines act on the target, they change the molecular processes, which in turn change the physiological processes. This therefore may correct the imbalance that has led to the symptoms of the disease. For many conditions, no effective treatment exists. Some existing treatments only focus on managing the symptoms of the condition. For these conditions, essential research and development continues to work towards meeting unmet medical needs.

Knowing the mechanisms behind the observed symptoms of a disease is crucial to be able to initiate the **research for a treatment or medication.**

What does the right treatment mean? It simply means re-establishing the correct balance in body function. This balance or equilibrium is also called ‘homeostasis’. This describes the balance that exists among all the components of the body. An adequate homeostasis means that you are healthy and feeling vital (e.g. being full of energy when you wake up in the morning) and you will not sense anything wrong with your body (i.e. nothing aches or shows problems).