

# The Methusaleh Project

## Searching for the genetic foundations of healthy ageing

It is one of the major mysteries of modern times: Why does life end for every organism? Be it worm, fly, fish or man: all biological systems age, they invariably degenerate as by a ruthless dictum of evolution. Based in Kiel, Germany, the molecular biologists of the *Research Group for Healthy Ageing* investigate the ageing mechanisms of the human body using the latest state-of-the-art methods and equipment. They are beginning to unravel the puzzle of healthy ageing.

In his novel "Utopia", the 16th century scholar and statesman Sir Thomas More described ageing as a disease. He was convinced it prevents man from "finding paradise on earth". Nearly 500 years later, the German humourist Vicco von Bülow alias Lorient arrives at a very similar conclusion: "Ageing is an unbearable imposition!" the grandmaster of subtle satire stated succinctly just before his 80th birthday.

Man has always been aware of being mortal and is still fighting against his inescapable decay &ndash; with great vigour and little success.

## Cell degeneration

Powdered rhinoceros horn in the Middle Ages, extracts of dog or guinea pig testicles 200 years ago, or the allegedly life-prolonging daily glass of red wine today - nothing can stop the process of degeneration that seizes all life forms eventually. Cells as the central components of every organism are gradually dying since the body's cell repair programme grinds to a slow halt with increasing age. Over decades, cells have constantly been renewed before this repair routine shuts down.

## 122 years, 5 months and 14 days

To unveil the secret of ageing, the complex mechanisms of metabolism, cell repair and genetic networks need to be decoded: "It is considered proven that the lifespan of all animals including man is ruled by genes," stated "Die Zeit" pointedly. But what exactly in the approximately 30,000 genes or three billion components of every individual genetic molecule of Jeanne Calment's cells was it that made the Frenchwoman who died in 1997 the oldest human being with more than 122 years?

## The archive of active seniors

In Kiel, thousands walking in Calment's footsteps are participating in the research group's project. These long-lived individuals, people who are more than 98 years old, donate blood from which the scientists extract the respective individual DNA. This genetic material is archived in the popgen database, the largest biobank in Germany.

The scientists around molecular biologist Stefan Schreiber analyse the highly complex genome and examine

the specific functions of the tiniest molecules. Using so-called "high throughput" technology, the researchers investigate the participants' genetic material for genes which they think are relevant to longevity. In any case, those genes control crucial processes such as our metabolism or genetic repair mechanisms within our cells.

## **Towards healthy ageing and a new perspective in medical science**

Almut Nebel, chief scientist of the ageing project, defines the researchers' aim: "To understand the phenotype of healthy ageing." If they succeed, medical science could assume a new perspective: towards prevention of ill health and preservation of good health into old age. One day, Jonathan Swift's mocking statement "Every man desires to live long, but no man wishes to be old" could indeed be invalid. © The Research Group for Healthy Ageing 2007