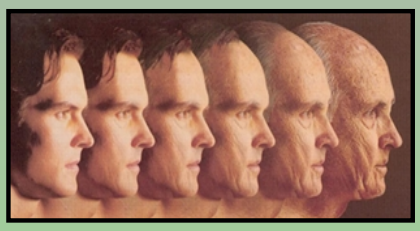
Leibniz Institute for Age Research
Fritz Lipmann Institute (FLI)

Due to demographic changes our society faces huge challenges with respect to healthcare and provision for old age. Consequently there is a compelling need to intensify research on the processes of ageing and age-related diseases, ideally by concentrating the respective expertise in one place. The Leibniz Institute for Age Research - Fritz Lipmann Institute e.V. (FLI, former IMB - Institute for Molecular Biotechnology) meets this challenge: The FLI is the first research institute in Germany devoted entirely to biomedical age research. More than 260 employees and guests, mainly biologists, biochemists, physicists and physicians, conduct biomedical research in 20 research groups to study the molecular mechanisms of ageing and age-related diseases.

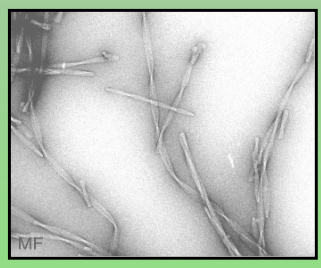


Healthy ageing - an important objective for the individual and for society

Ageing is a complex process - genetic factors, environmental factors and also individual life styles determine whether the individual will be able to lead a long and healthy life. It has not been discovered yet how these factors interact. Not the mere prolongation of lifespan seems highly desirable, but ageing without considerable mental and physical impairment. Our objective is to disrupt the fatal link between ageing and disease.

Focus on age-related diseases - Neurodegeneration, organ failure and cancer

Several research groups at FLI study age-related diseases, for instance the processes of the development of Alzheimer's and Parkinson's disease. Extra-cellular and intra-cellular protein deposits of neuronal cells caused by misfolded proteins (amyloids) play a pivotal role in the development of these diseases. Amyloids are generated in the aged brain, yet also in other body tissues, and can be found in conjunction with Diabetes or chronic inflammatory diseases (Rheumatoid Arthritis). The aim of several FLI research groups is to find out how and why Amyloid structures are generated and to develop new therapeutic approaches in order to inhibit amyloid formation.



Senescence - Cellular mechanisms

Using cultivated mammalian cells, FLI scientists study mechanisms influencing cellular ageing. High stress levels (e.g. through endogenous or exogenous damage to the DNA; or through oxygen radicals) or mutations in certain genes could cause instability of the genome. This genomic instability is in turn frequently associated with or even responsible for accelerated senescence, accompanied e.g. by truncated telomeres. Rare genetic human diseases (like e.g. Progeria) illustrate this concept.

Unravelling Ageing Genes - Studying short-lived fish species

Using *Nothobranchius furzeri* as a model organism, FLI scientists are looking for genes determining life span. Whether this fish from central Africa lives in ponds in its natural habitat or in an aquarium - it does not live longer than three months. Its life span is apparently determined by its genes. FLI's research groups try to unravel the secret of this genetic programme.

The genotype of *N.furzeri*, comprised of a billion nucleotides, which is one third of the human genome, is hardly explored. To genetically enhance its life span, crossbreeding experiments with a longer-lived sub-species are planned in the lab. In an alternative approach, mutations shall be triggered in *N.furzeri*. Following sequence analyses in both cases, comparison of the sequenced fish genomes should unravel specific ageing genes.

E. Fritz, January 2007

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