



## The biocomputer – the future of computing?

**Biologists and engineers are collaborating within nanoscience for more powerful and energy efficient computers.**

The amount of data in the world is increasing explosively. Storing, processing and analysing large amounts of information is crucial for the sustainable development of our civilisation. Not least within the life sciences. Investments in public healthcare are expensive and depend on reliable data analysis.

However, with the increasing amount of data and the need for faster and more complex calculations, such as encryption and optimisation, common computers are no longer sufficient. Today's electronic computers can only do one thing at a time. The more complex the problem, the longer it takes and the more energy is required for the computers to complete the analyses. Ultimately, this isn't sustainable.

In experiments, nanoresearchers at NanoLund have successfully shown that proteins can replace electrons in a completely new type of computer. Biocomputers could become a fast, smart and energy-efficient complement to today's electronic, transistor-based computers.

Our current digital computers carry out calculations sequentially, i.e. they solve one problem at a time. To find fundamentally new ideas for application in tomorrow's computer engineering, engineers are collaborating with biologists.

Molecular motors are large molecules that carry out mechanical tasks in living cells. One example is myosin, which is present in our muscle cells. Outside the cell, the researchers have discovered that myosin can be used to move protein threads along artificial paths that control the threads' movements in a biocomputer. Through billions of years of evolution, myosin has developed to require very little energy.

Researchers have created labyrinths of nanometer-sized channels with special traffic rules for protein threads. The solution to the labyrinth problem corresponds to the answer to a mathematical question, and many molecules can make their way through the labyrinth at the same time.

This enables the biocomputer to investigate many problems simultaneously and therefore carry out complex analyses faster while using much less energy than an electronic computer. The biocomputer is a telling and concrete example of how traditional scientific disciplines coincide in nanoscience.

To continue to develop this promising, environmentally friendly and sustainable alternative to today's digital computers, the researchers need a new laboratory in an innovative environment that stimulates experiments and industrial applications. Nanolab Science Village offers precisely such an environment.

Imagine this being possible thanks to you!

### CONTACT

**Pia Siljeklint**

Head of Development Office, Lund University

*E-mail:* [pia.siljeklint@fsi.lu.se](mailto:pia.siljeklint@fsi.lu.se)

*Phone:* +46 46 222 34 39

*Cell Phone:* +46 70 640 48 09