Text transcript to video:

Gemeinsam denkt es sich besser
(Thinking together is better)

Prof. Dr. Stephan Sigrist // Freie Universität Berlin

Research: Aging and learning processes at the molecular level

In order to get a little closer to the question of aging scientifically, it takes many heads with clever ideas and, of course, many hands.
Science is not for loners!

My name is Stephan Sigrist. I am a biochemist and professor of neurogenetics at the Free University of Berlin.

In my research group, we are investigating the extent to which proteins at the synapse level influence the formation of new memories. This is important in order to understand corresponding defects in memory formation in old age and perhaps to do something about them.
At first, it may seem a bit surprising why we are working with the fruit fly Drosophila and not with mice, which are obviously more related to humans. However, a large part of the molecular genetic and biochemical apparatus of flies and humans is evolutionarily very old and thus comparable. So later on, we can verify the results in mice and then transfer them to humans.

Of course, experimenting with the fly also has decisive advantages. We know exactly where the fly stores memories in the nervous system. Since the Drosophila genome is completely sequenced, we can deliberately switch individual synapses and protein structures on and off using genetic methods. This allows us to bridge the gap between the molecular, almost atomic world, to the behavior of an animal.

In addition, the fruit fly ages in a much shorter time than mice or humans. Accordingly, when it comes to the aging of the nervous system, we can get answers more quickly with the fly. We can also look for substances that can, for example, stop this process even a little bit.
One method we use to see changes at the level of synapses is STED microscopy, which offers much higher resolution than previous fluorescence microscopy. After all, light waves also have a defined wavelength and this is almost larger than the proteins we want to look at.
Here we see the brain of a fly, and here we have fluorescence-marked central proteins in individual synapses. This means that light particles are absorbed and re-emitted by these labeled structures.

This high-resolution light microscopy shows structures that tell us stories. They show us whether the synapses are in the process of forming new memories or not.

Text transcript to video:

Gemeinsam denkt es sich besser
(Thinking together is better)

Prof. Dr. Stephan Sigrist // Freie Universität Berlin

Research: Aging and learning processes at the molecular level

But whether we can understand our brain using our brain itself is a question that I don't think anyone can answer convincingly at the moment.

It is of course nice when people work for you and the pace of discovering new things is much faster than when you only work with your own hands. That's why it's important that I take a third of my working time to be there when data is being collected or analyzed. Together we can then see whether our ideas fit or not.

The interaction of young, fresh minds with those of older colleagues - like me - leads to an interesting interplay between the "non-prejudiced" and the experienced. In this respect, I believe in the approach to mixing scientists, with different levels of experience, in the way it actually happens here.

But of course there are also problems and conflicts, and things often don't develop the way you think. That is inevitable in science. That is actually an inevitable part of good science. So, you also have to improvise continuously and rearrange things. You have to teach people not to despair right away; their frustration tolerance has to be high.

And when things are going well, when both sides are satisfied, when good publications are produced with a still somehow justifiable effort, when interesting science is being done, then I think there is nothing that is more satisfying.

Project website: **bcp.fu-berlin.de/nos**