Text transcript to video:

Nachhaltigkeit in Nervenzellen ... und im Labor
(Sustainability in neurons ... and in the laboratory)

Kristine Oevel // FMP Berlin-Buch

Research: Recycling of synaptic vesicles

In scientific experiments, we produce a lot of data.
But what can we learn from the data that initially appears not to fit our hypothesis?
Can we also preserve this data?

My name is Kristine Oevel and I am a PhD student in the Volker Haucke research group at the Leibniz Research Institute for Molecular Pharmacology at the Science Campus in Berlin Buch.
In our group, we focus on the communication between nerve cells, namely at the chemical synapses.

Part of this intercellular communication are tiny messenger molecules; the neurotransmitters.
They are stored in small sacs - called synaptic vesicles - and are released into the synaptic cleft, i.e. between the nerve cells, during excitation transmission. In the process, the membrane of the vesicle fuses with the cell membrane.
To ensure that the surface of the synapse does not become larger and larger and that the process can be repeated, the vesicles must be recycled and returned to form another synaptic vesicle.
The part of this recycling process from the invagination of the excess membrane to the strangulation of the vesicle is called endocytosis.

To be able to follow exactly how this recycling process proceeds, we incorporate a specific protein into the vesicle membrane.
This protein is pH-sensitive. It lights up when a laser hits it in a pH-neutral environment.
Since the interior of the vesicle is pH-acidic, we can therefore see very precisely - virtually live - under the fluorescence microscope when the vesicle fuses with the cell membrane.
When the fluorescence decreases again, endocytosis is complete.
If we now deactivate certain proteins in the cell, and the decrease in fluorescence slows down, we can assume that endocytosis has also slowed down and that these proteins are involved in the process.

Just as neurons recycle proteins and membranes, we as researchers can recycle both materials and data in our work.
In my day-to-day work, I am in the lab a lot and I see every day the extent to which we consume plastic materials, for example, when we can grow our cells in a sterile environment.
In addition, our laboratory work consumes a lot of energy to run many necessary devices, almost as much as a village of about 80 households.
So, some group members and I got together and thought about concrete steps to make our lab work more sustainable.

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At first, some of our group members were skeptical about our suggestions, but everyone quickly realized that sustainable work doesn't have to be difficult and can be easily integrated into everyday work:
For example, we changed our cryogenic refrigerators from -80°C to -70°C, which is sufficient to preserve our samples and saves a lot of energy at the same time....
And all these small optimization steps have led to our laboratory - the Haucke group - being the first laboratory in Germany to be certified as a sustainable laboratory by "my Green Lab."
This award is also of interest to other laboratories, so that we are now frequently contacted to share our experience.

In science, however, communication also takes place via publications in scientific journals.
Many people are not aware that we usually publish only part of our experimental data.
The data from an experiment that show no effect or do not correspond to the original hypothesis are often referred to as "null results or negative data."

The data sets then disappear in the lab's own data jungle on servers and in lab books, often forgotten after a few years or are no longer traceable.

However, these negative data can be very valuable. They make us think or rethink, sharpen our hypotheses or tempt us to form new hypotheses. Their publication can therefore also help other researchers.

Therefore, an open science system in which all data are published would be a big step towards a sustainable research community.
If we as a research community had more access to negative data, we could better identify problems together and choose the right experimental approaches more quickly.

Sustainability starts with practical work in the lab, but it must also play a role in our knowledge transfer.
I am convinced that - if we conduct sustainable research - our actions will also inspire others.

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