Text transcript to video:

Wer gute Ideen haben will, muss viele Ideen haben
(If you want to have good ideas, you must have many ideas)

Dr. Anja Konietzny // Humboldt-Universität zu Berlin

Research: intracellular protein transport by motor proteins

Since the beginning of the COVID-19 pandemic, the media have reported almost daily on the scientific discovery process. Thus, many people have perhaps realized for the first time that scientific results arenot always unambiguous and that data are interpreted differently and discussed controversially. But then, how can we trust "science" at all?

My name is Anja Konietzny, I work as a postdoc in the research group "Neuronal Protein Transport" of Prof. Marina Mikhaylova, who leads two research groups: one at the Humboldt University in Berlin and another at the Center for Molecular Neurobiology in Hamburg.

Our research focuses on how individual brain cells or neurons control the localization andtransport of organelles and proteins from one location in the cell to another.
To address this question, we look at the "skeleton of the cell" i.e. the cytoskeleton.
These structures are like tiny roads for molecules that reach to the very tip of the cell and are used for the "transport of goods". There are so-called motor proteins that move along the cytoskeletal roads, transporting other cellular components.

In our group we study the interaction of cytoskeleton and motor proteins to understand when, why and where the different cellular building blocks, i.e. proteins and organelles, are transported.
To do this, we use many different methods but most importantly for us are our microscopes: to study "neuronal proteintransport" in real time, we observe living brain cells from rats and mice under the microscope, and can selectively mark almost any organelle or protein we are interested in selectively label with a fluorescent label.
This allows us to see how transport occurs under different conditions.

More generally, research deals with scientific questions that are still unanswered. It is important to formulate the respective research question as precisely as possible in order to then formulate a hypothesis based on existing prior knowledge.
Thus, a hypothesis is a reasoned and testable assumption of what the answer to the question at hand might be. To classify results correctly,one must know both the potential and the weaknesses of the used methods also in order to recognize when it is not possible to find a meaningful conclusion.
When I am faced witha new research question, I first search research databases to get an overview of known similar problems and derive a hypothesis.
I think it's important to emphasize that this is 100% a "team effort" not only do I seek input from my colleagues on a daily basis, but I also build on the research of generations of people before us. So when I formulate a hypothesis,I don't reinvent the wheel every time.

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In the process of my research career, I had to realize
that in fact the vast majority of experiments
do not directly confirm the underlying hypothesis.
So when my hypothesis is falsified, I know how it doesn't work.

Or, and thishappens frequently, the results are ambiguous, leaving room for interpretation.
At first, I was very frustrated by this. But I have since realized that this is the only way to move forward.

There is this famous quote from Nobel Prize winner Linus Pauling:
"If you want to have good ideas you must have many ideas. Most of them will be wrong,
and what you have to learn is which ones to throw away."
If you want to have good ideas you must have many ideas.
And that's absolutely true

Very few experiments are perfect, every single experimental setup, every single assay has its pitfalls and limitations.
But we approach the problemsfrom many different angles with many different starting points and thus try to cover all possible gaps.
Can we achieve a 100% accurate and forever valid statement?
No!
But we come closer to it step by step.
Natural science does not produce „truth". But it is the best approximation available to us.
Even if this approximation is an ongoing process that will never stop.

I think that as long as we are aware of the limits of scientific knowledge, it is still our most reliable basis for making decisions on complex and socially relevant issues.

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