Text transcript to video:

Science is international

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Research: molecular analysis of intracellular logistics

As academic researchers, we not only get to experience many different lab environments, but we also sometimes live in different countries across continents.
The suitcase is always ready to be packed, whether it is a new science adventure in a different lab or an international conference.
Science is international. But what does that mean?

My name is Francesca Bottanelli. I was born in Italy and studied biotechnology in Milan. Being the first person in my family to go to university, I did not have a clear path in mind. I just followed my passion for research. After my Masters, the next natural step was to do a PhD and for that I moved to the University of Leeds in England. After I graduated, I moved across the pond to Yale University in the U.S. for a post postdoctoral position. And now here I am in Germany as a professor of biochemistry at Freie Universität Berlin.
So my scientific career has been more of a step-by-step process, rather than a pre-determined path.
Here in Berlin I am the leader of a research group of about 10 people. We are an international team with members coming from Bulgaria, Nicaragua, Spain, Italy, USA and of course Germany.

Our research focuses on the transport of proteins within cells, especially we study the Golgi apparatus which is considered the post office of the cell.
The Golgi receives protein packets from the endoplasmic reticulum, which is where all the protein the cells are made.
Within the Golgi, these packets are repacked and sorted for various post-Golgi destinations.
Identification molecules think about it as the cellular "postal code“ are also incorporated on the packages, which define their destination in the cell.

We want to be able to study the sorting at „Golgi-post-office" in details and in real time.
To do this, we use cancer cell models that we can easily grow and genetically modify in the lab.
Because these cells grow in a single layer on a cell culture dish, we can then follow cellular processes using a super-resolution STED fluorescence microscope.

In order for us to see them, our proteins of interest needs to fluoresce. To achieve this, we need an enzyme (called Halo or SNAP tag) to ensure that a bright fluorescent dye can be chemically coupled to the protein.
When we hit the dye with a laser, it emits fluorescence, allowing us to determine its localization

inside the cell with very high precision. We can even watch it moving around in and out of the Golgi in real time!

Thanks to the CRISPR/Cas molecular biology tools, we can now attach these SNAP and Halo enzymes on the cells own proteins, so that proteins of interests are produced by the cells as fusions with the enzymes, allowing their visualization.
These techniques make it possible to visualize transport pathways of proteins within the cell in real time. In this way, we are constantly discovering new exciting, previously unexplored mechanisms.

During my time in different labs and countries, I was lucky to get to know many different methods and to have worked with many different people from all over the word.
For example, I implemented this elaborate way of labeling target proteins and making them visible during my time in the US.

Scientific discovery benefits from inputs from people with different perspectives and backgrounds. Now I brought my knowledge and experience to Berlin, where my lab is applying it to explore new exciting cellular pathways.
As scientists, we continuously meet many new colleagues at international conferences. This has led to scientific collaborations with various institutes and working groups. Collaborations with other labs across the globe allows us to incorporate new techniques and expertise in our research, which are not available here in Berlin.
Although we all speak different native languages, we all understand each other through the common language of science.
All these experiences abroad have had a strong impact on me
and have allowed me to grow personally and scientifically.

I love being a scientist, not only because research is creative and exciting and I am lucky to have a wonderful lab, but also because science is international!

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