



Zebrafish





Does the myocardium possibly operate differently than research has assumed for years? Human geneticist Michelle Collins wants to find out by X-raying fish hearts

There are four rooms in total, each one containing 14 to 20 shelves, each shelf holds 50 tanks and each tank contains roughly 20 creatures. They eat, grow and pass the time – there’s not a lot more on their to-do lists. Thus, the ones in the largest of the four rooms appear to be quite curious, rushing to the front of the glass pane when Michelle Collins enters the room to present the object of her research: zebrafish.

For Michelle Collins, you could say the fish are the fundament of her fundamental research. Using their hearts, the Canadian with long, dark brown hair at the Max Planck Institute for Heart and Lung Research in Bad Nauheim endeavours to gain fundamental insights into the myocardium. Or more precisely: which processes are important when it

The blood flows in here, and is pumped out there, she explains, pointing to the relevant places on the monitor. “If the fish is given a substance, the heart pumps more slowly and irregularly.” That can be seen in a second video. And what are those small, round things being pushed through the fish heart? Could they possibly be blood cells? “Yes! Exactly!” exclaims Collins, her voice getting higher and her eyes larger. “And you can see it with nothing but a microscope. You just look right through it!”

First research project as high school student

It is this enthusiasm that probably explains how it came about that at 35, Collins has spent more time doing research than not. While still in high

Calcium is also stored there and it can reach the heart cell through certain channels. “Most of what we know about calcium regulation in the heart is based on the reticulum,” says Collins. “We want to know if the calcium stores in the endolysosome also play a role in the heart beat.” Perhaps it cooperates with the reticulum? Perhaps it simply contributes to calcium homeostasis. “We already have some data that leads us to this hypothesis,” says Collins, “but our plan is to study it more thoroughly.”



contracts and expands and therefore pumps blood through our arteries and veins. What does not seem to be a very complex process might under certain circumstances actually proceed differently than research has assumed for decades.



Zebrafish – an excellent model

Two things make zebrafish excellent for investigating this. First, they have a heart that is very similar to the human heart, albeit with a more simple construction of just one vestibule and a chamber. Other than that, it functions almost identically and pumps blood through the creature's body. More interesting, however, is the second characteristic, which is that young

school in the Canadian city of London, a teacher recognizes her interest. He introduces her to the local university, where Collins works on her own research projects alongside classes during her last two years at high school. Nothing ground-breaking, she says, but she gets acquainted with lab work at an early age. And she likes it. And so she studies genetics, obtains her doctorate from McGill University in Montreal where she does research with hens, then turns her attention to the development of the heart in embryos, and arrives in Bad Nauheim in 2014, where she concerns herself with zebrafish.

What the move was like? Collins came from Montreal, the second largest city in Canada with a population of 1.8 million, to Bad Nauheim, the 27th largest city in the state of Hessian with a population of 32,000. Collins laughs. "It was a bit of a culture shock. Montreal is this very vibrant, big city. Everything is open, day and night, lots of people everywhere. I mean..." She pauses and seems to realise that it might be better to talk about Bad Nauheim's attractions instead of the contrasts. And she continues: "When I got here, it was the first week in



Toward this end, Collins will take a number of zebrafish out of their aquariums over the next two years. How many fish she needs for her research? Collins hesitates briefly. She has learned that it's something of an issue in Germany: conducting research on and with animals. "That's another thing that's makes Germany different from Canada," she says. "The German system really teaches you to reduce the number of animals you use."

*By Jan Schwenkenbecher
Photos by Katrin Binner*

zebrafish are transparent up to a certain age. Michelle Collins simply places them under a microscope – it doesn't even have to have particularly high resolution – and she can look directly inside them.

She shows me what this looks like over cappuccinos in the spa park before taking a tour through the zebrafish room. At the Biergarten behind the old Max-Planck Institute she takes out her laptop and places it next to her cup. She starts a video in which something grey and pulsing appears. "That's a zebrafish heart with a normal heartbeat," Collins explains.

August and I thought this place seemed magical." Collins' laboratory borders on the park, and the lake lies just little ways beyond it. Still, some adjustments were necessary, since after all not everything is open round the clock, such as grocery stores. So now she leaves her office in the evening before nine o'clock, and makes sure to buy the groceries she needs for Sunday on Saturday.

Where calcium comes from

She still ought to have enough time left to find out if what the textbooks say about how the myocardium contracts is really correct. Most textbooks state, namely, that calcium ions are important in this respect and that they reach the interior of the cell from the sarcoplasmic reticulum – a component of heart cells. Collins wants to investigate whether most of the calcium really comes from there. Or whether another component of the heart cell plays an important role: the endolysosome.

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