

Viviana Gradinaru
2020 Vilcek Prize for
Creative Promise
in Biomedical Science

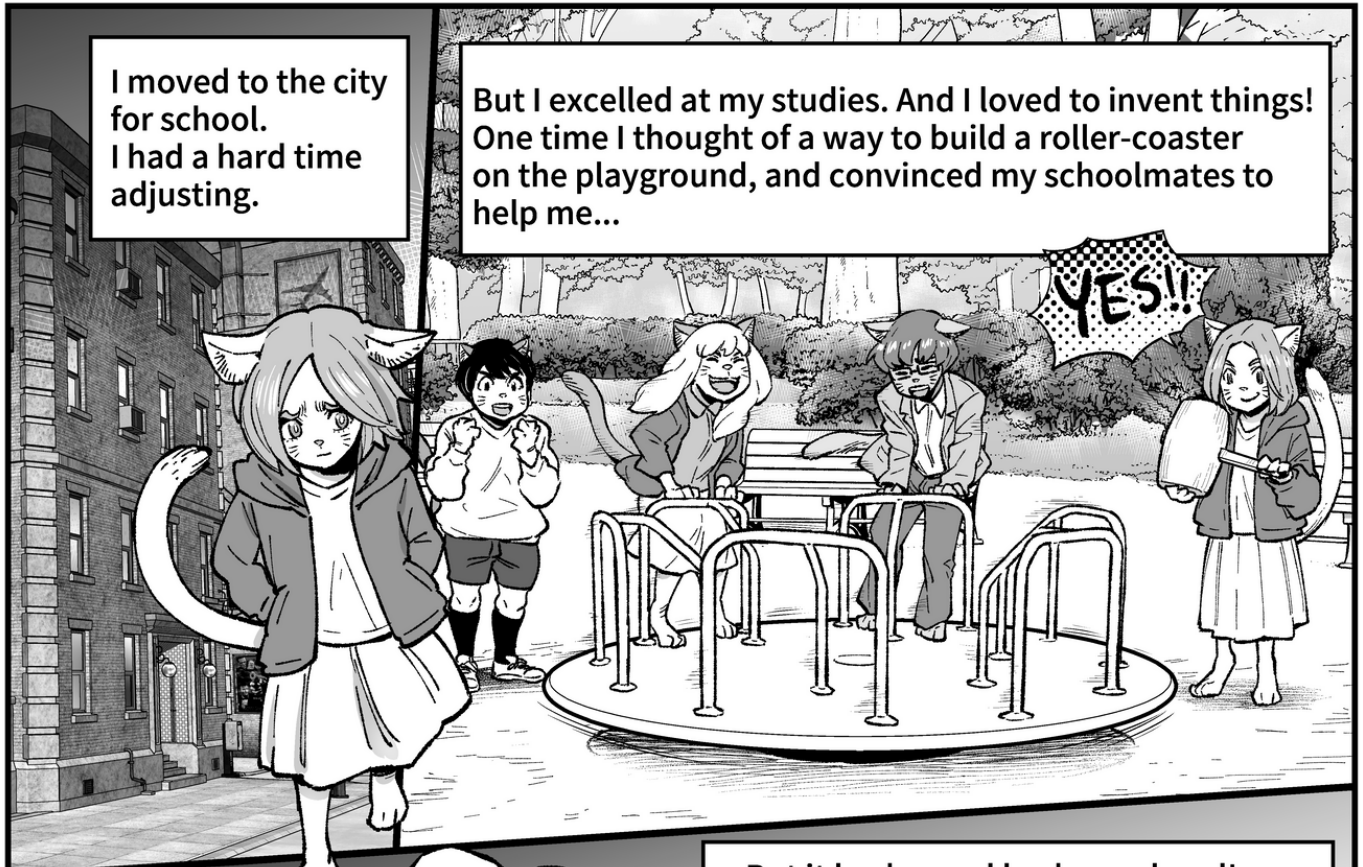
Hello! I'm Prof. Gradinaru, a neuroscientist. My work looks at how the human brain works - from microscopic structures to pathways that control how our bodies move and function.

I grew up on a farm in Romania. I came from humble beginnings, but the farm life taught me many things...

Like the wonder of how everything in nature is connected: both as a part of life and existence on earth, - and through the laws of physics!

I moved to the city for school. I had a hard time adjusting.

But I excelled at my studies. And I loved to invent things! One time I thought of a way to build a roller-coaster on the playground, and convinced my schoolmates to help me...



But it broke, and broke my hand! I learned the dangers of engineering, but it didn't deter me.

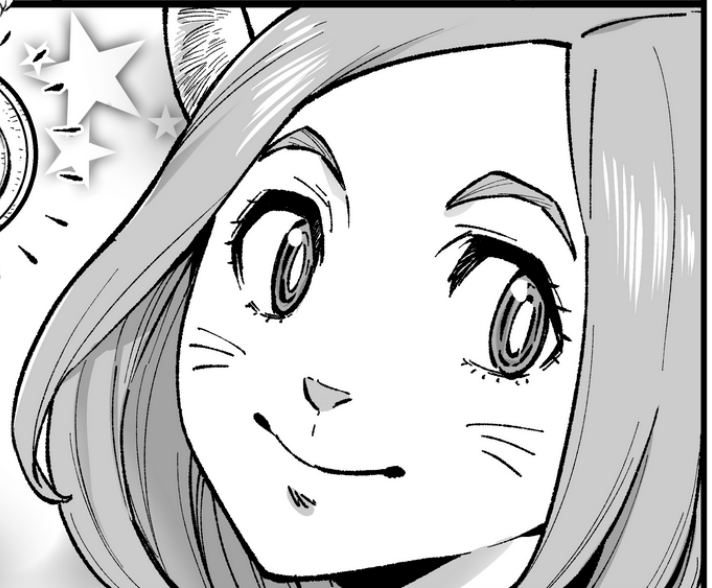
OUCH!

At the time, Romania was encouraging young women to pursue studies in physics.



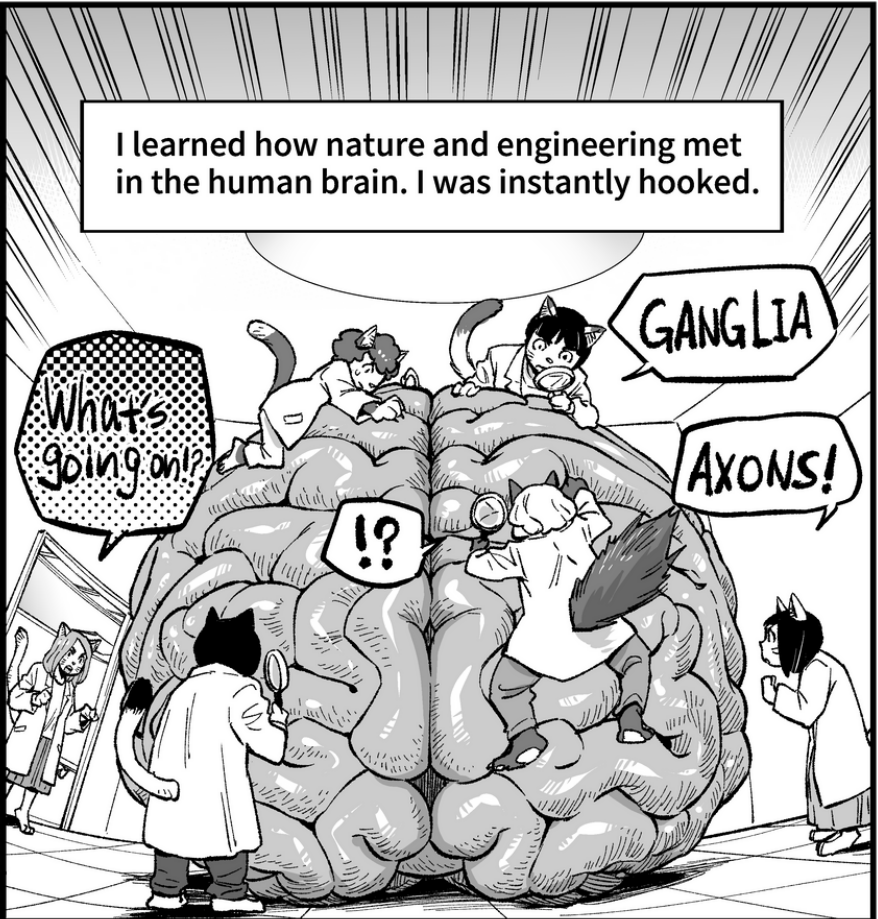
I was so lucky to earn a top-notch education in a field that I loved!

As I grew in my studies, I saw how much physics shaped the things I was curious about on the farm as a child - from the color of the sky, to the way animals and plants grow.

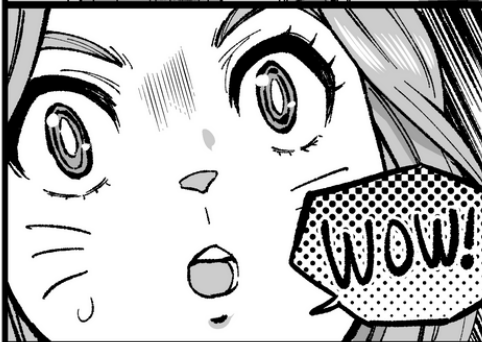




I encountered a whole new world at university...

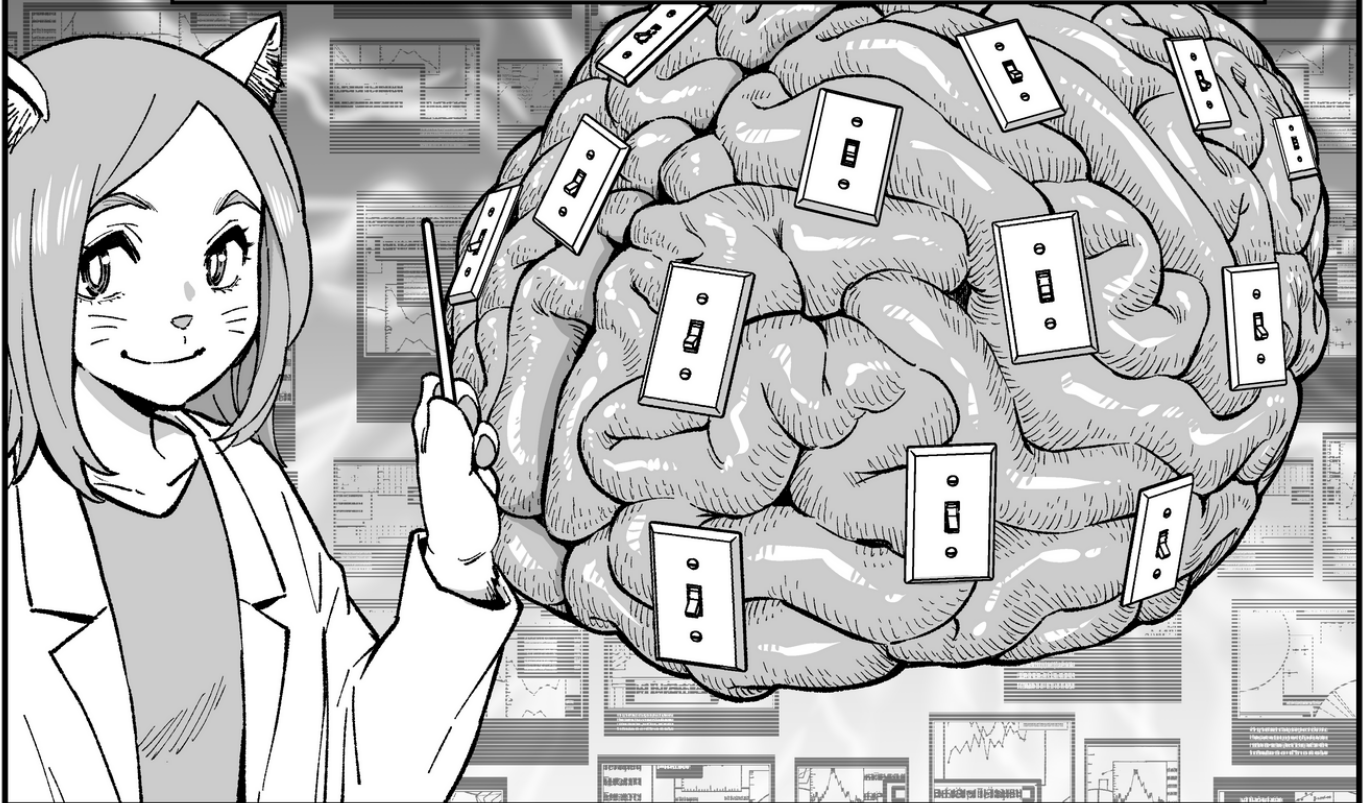


I learned how nature and engineering met in the human brain. I was instantly hooked.



Wow!

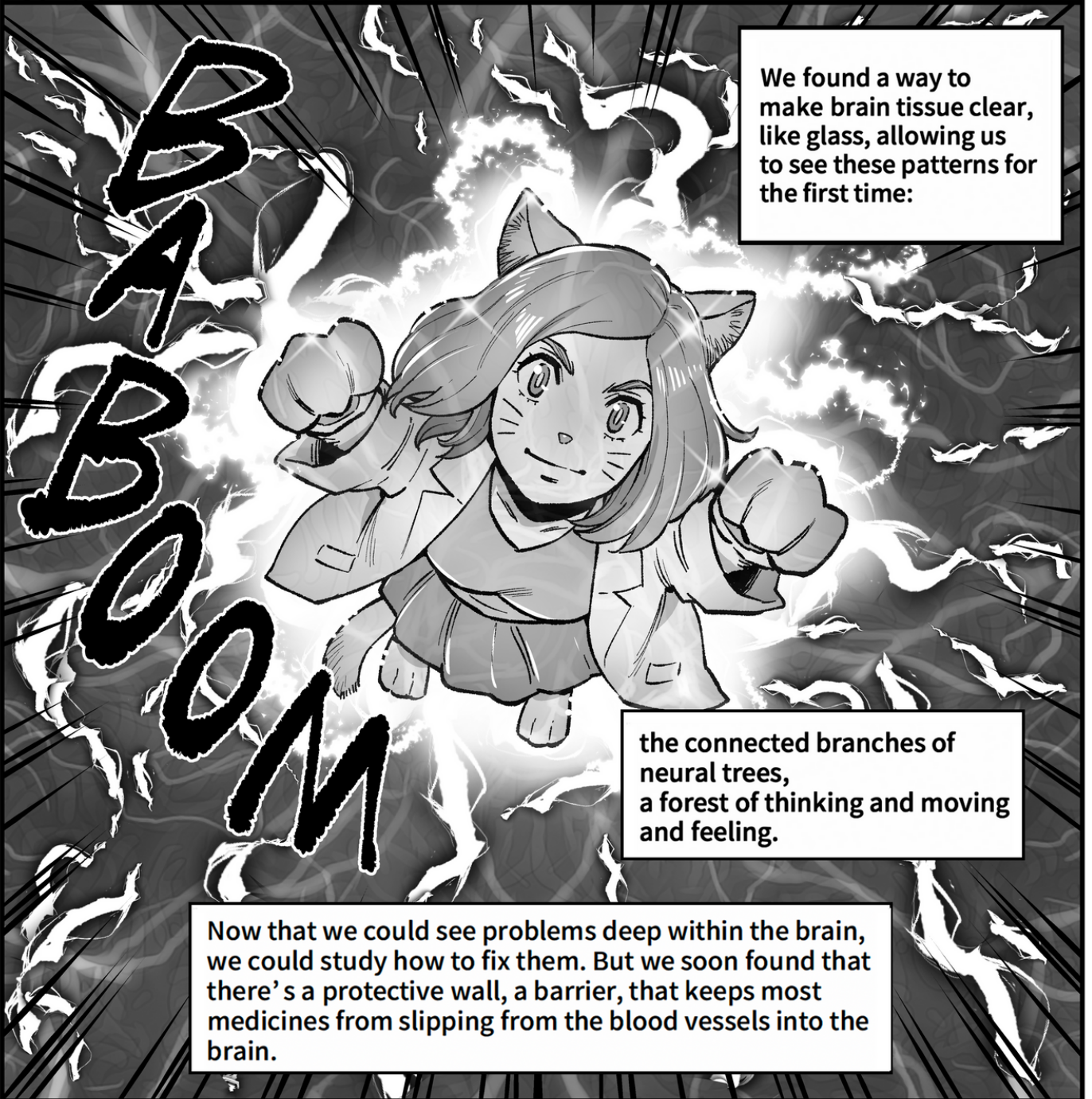
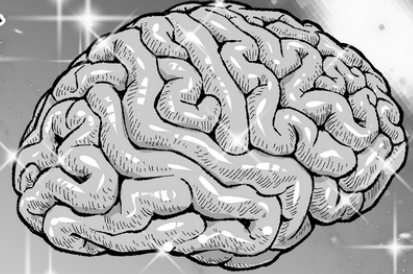
My research team and I helped create the field of optogenetics. With gene engineering, we figured out how to put switches on certain neurons in the brain so that they can either be activated or silenced by light.





Most activity happens deep within the brain. We needed to find a way to visualize how neurons in the brain connect.

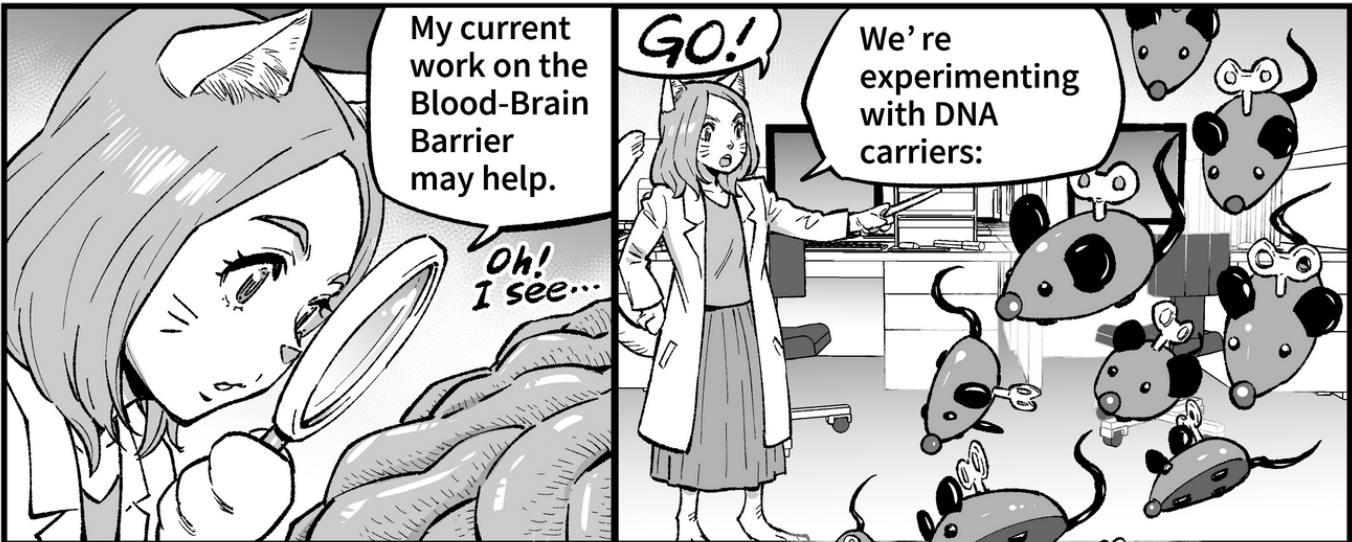
SCIENCE



We found a way to make brain tissue clear, like glass, allowing us to see these patterns for the first time:

the connected branches of neural trees, a forest of thinking and moving and feeling.

Now that we could see problems deep within the brain, we could study how to fix them. But we soon found that there's a protective wall, a barrier, that keeps most medicines from slipping from the blood vessels into the brain.

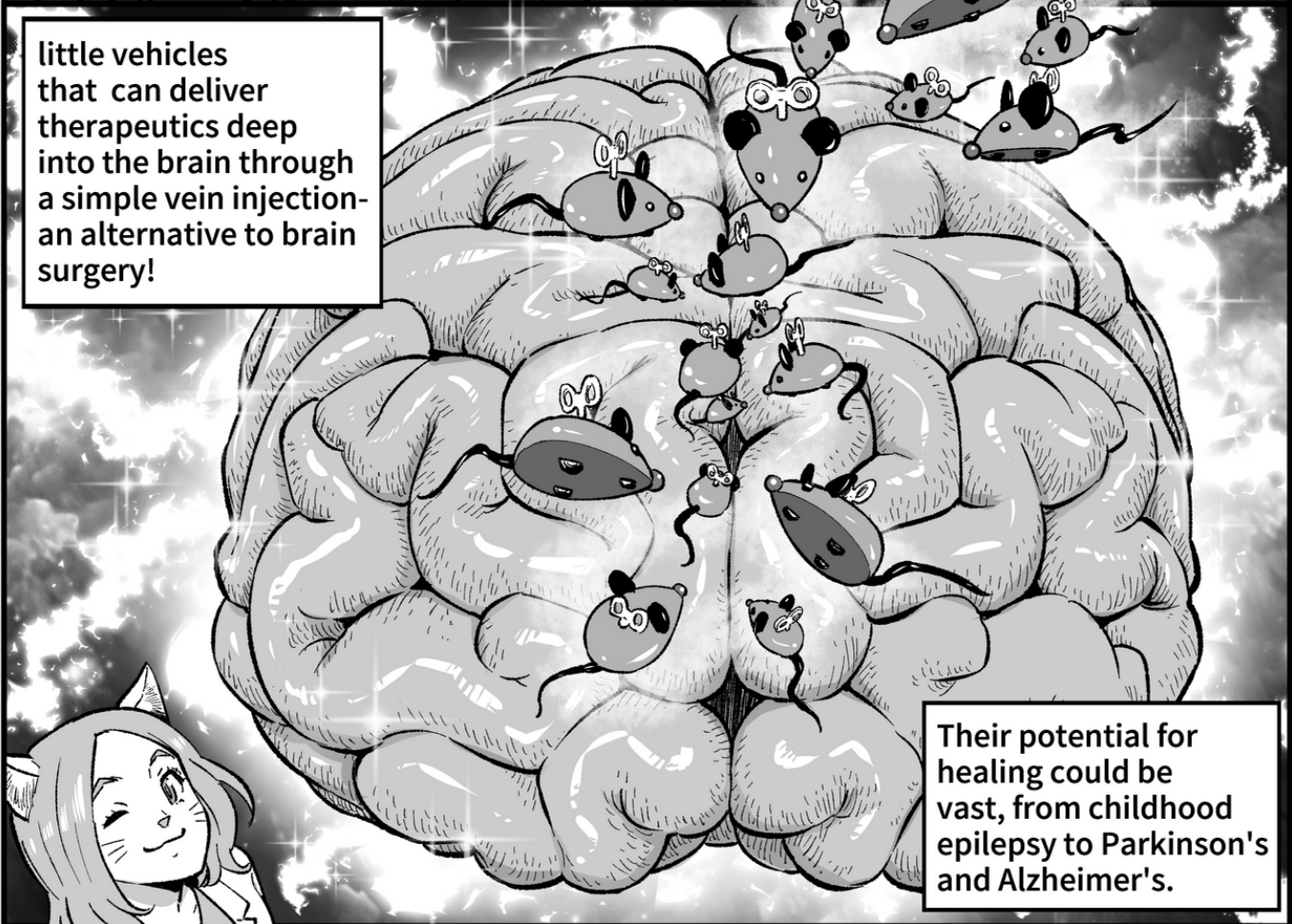


My current work on the Blood-Brain Barrier may help.

Oh! I see...

GO!

We're experimenting with DNA carriers:



little vehicles that can deliver therapeutics deep into the brain through a simple vein injection- an alternative to brain surgery!

Their potential for healing could be vast, from childhood epilepsy to Parkinson's and Alzheimer's.



I'm lucky to do research that fascinates me. I love seeing how each discovery brings us closer to improving medicine and health!