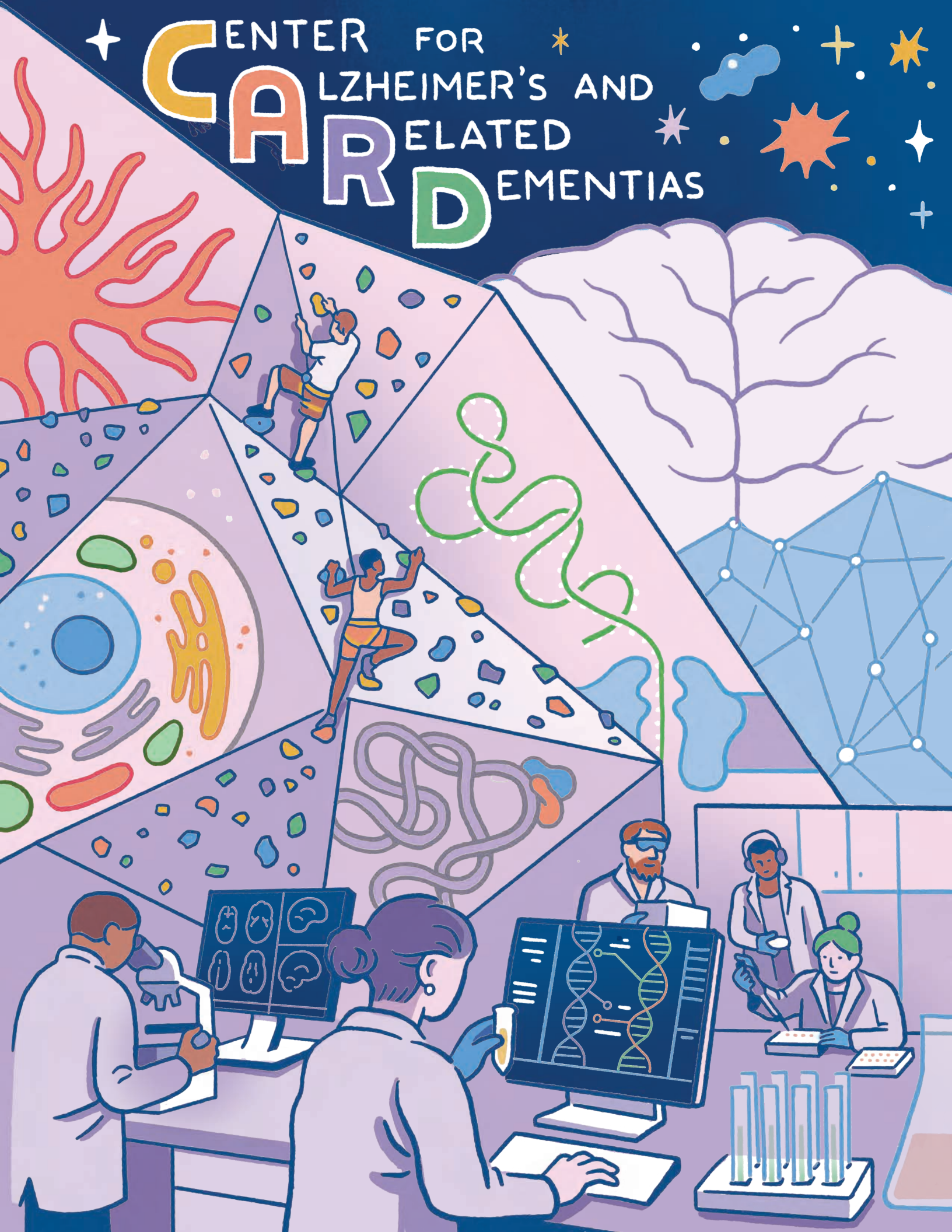
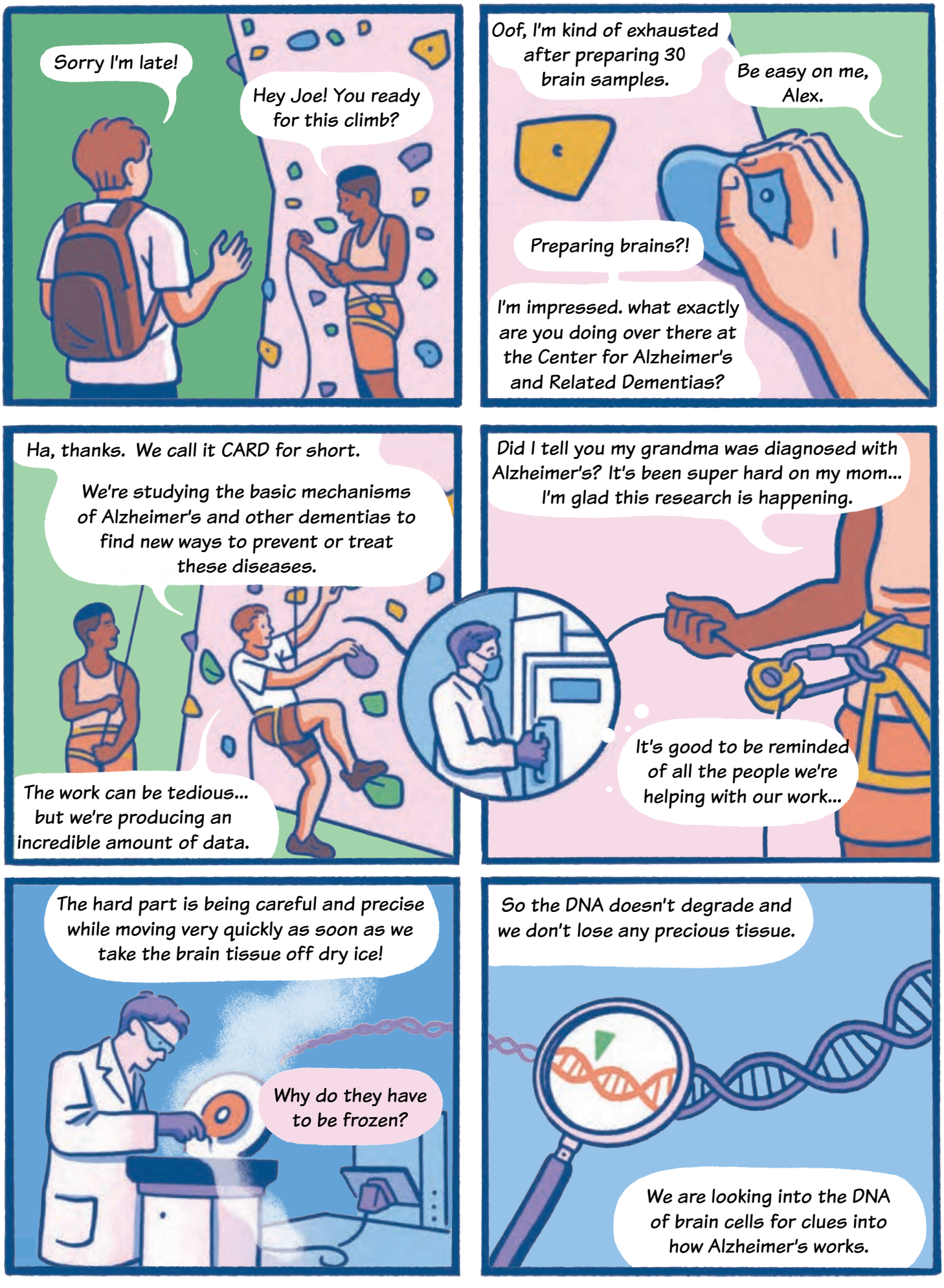

CENTER FOR
ALZHEIMER'S AND
RELATED
DEMENTIAS


Sorry I'm late!
Hey Joe! You ready for this climb?
Oof, I'm kind of exhausted after preparing 30 brain samples.
Be easy on me, Alex.
Preparing brains?!
I'm impressed. what exactly are you doing over there at the Center for Alzheimer's and Related Dementias?
Ha, thanks. We call it CARD for short.
We're studying the basic mechanisms of Alzheimer's and other dementias to find new ways to prevent or treat these diseases.
The work can be tedious... but we're producing an incredible amount of data.
Did I tell you my grandma was diagnosed with Alzheimer's? It's been super hard on my mom... I'm glad this research is happening.
It's good to be reminded of all the people we're helping with our work...
The hard part is being careful and precise while moving very quickly as soon as we take the brain tissue off dry ice!
Why do they have to be frozen?
So the DNA doesn't degrade and we don't lose any precious tissue.
We are looking into the DNA of brain cells for clues into how Alzheimer's works.

So all those brain samples come from people who decided to donate their bodies to science?

Yes! Their donations are essential.

DONOR REGISTRATION

But what can tiny pieces of brain tissue really tell us?

Well, we know the symptoms of Alzheimer's, but there's much to learn about its origins and progression.

Answering these fundamental questions can help others develop potential treatments.

I remember in high school we extracted DNA from strawberries. All that was left at the end was this weird white thick liquid.

Yes, that's one long strand of DNA all folded together! To be able to read it, we first need to unfold it.

1 Extract and purify the DNA from brain tissue

2 Shear the DNA:

Mechanical pressure fragments the DNA into shorter pieces.

3 Prep the DNA "Library":

Repairs damaged DNA strands, and attaches "tags" for sequencing.

TCAACGTAAG

4 Use long-read DNA sequencing:

Each strand is read one base at a time.

Basically each DNA strand travels through a tiny detector that gives different signals for each base.

It's like feeding a long rope through this gri-gri and inspecting it along the way!

Ok, so what does that tell you? why do you need so many samples?

Well, you know, sometimes people have changes in the sequence of their DNA that can increase their risk for certain diseases.

These changes can be random or passed down through families.

By comparing patients from different backgrounds, we hope to find the DNA changes that lead to Alzheimer's disease.

We're sequencing over 4,000 brain tissue samples sent from collaborators worldwide.

I see! So once you identify the key differences, is your job done?

It's really just beginning at that point...

Each brain sample turns into about a terabyte of data.

We have a team of data scientists who process the data and look for patterns in brains affected by Alzheimer's.

But even when we find changes in DNA, we have to figure out how they affect proteins and ultimately brain cell activity.

Then the research community can start the long process of developing new ways to treat and prevent disease.

So if Alzheimer's research were a climbing expedition, we are still mapping out the possible routes?

Exactly!
And I'm lucky enough to be on the frontier exploring new paths!

About CARD

The Center for Alzheimer's and Related Dementias (CARD), part of the National Institutes of Health's intramural research program, is an initiative of the National Institute on Aging and the National Institute of Neurological Disorders and Stroke. CARD supports basic, translational, and clinical research on Alzheimer's disease and related dementias through data-driven and collaborative approaches that emphasize robust, replicable findings and cooperative progress over individual success.

Our scientific themes include:

- Molecular pathogenesis anchored in genetics
- Disease subtyping, prediction, and progression
- De-risking of therapeutic targets
- Precision therapeutics

Want to work, collaborate or train with us? Learn about our opportunities for researchers and trainees at **card.nih.gov**.

National Institutes of Health
Center for Alzheimer's and Related Dementias