


The World's Largest Brain Bank

A man in a white lab coat is looking down at a large, clear plastic tray filled with numerous thin, yellowish slices of human brain tissue. The tray is resting on a white surface. In the background, there are rows of white storage bins or racks, suggesting a laboratory or storage facility. The lighting is bright, and the overall scene is clinical and scientific.

Harvard University's brain bank is a busy place these days. The rising interest in neuroscience and genetics around the globe has fuelled demand for fresh human brains to study. The Harvard Brain and Tissue Resource Center, as it is formally called, is the largest repository of brains in the world. Its home in Belmont, Massachusetts, houses nearly 3,000 brains.



The brain bank takes in about 300 brains a year, mostly donated by people with Alzheimer's, Huntington's, Parkinson's, and other neurological disorders along with schizophrenia and manic depression. The bank also takes in normal brains for comparison purposes. It sends out around 5,000 to 6,000 tissue samples a year to researchers all over the globe, including Europe. It's a busy place.

For many years, research on brain tissue was out of vogue. Earlier in the century, researchers used brain tissue to study the anatomical differences between normal brains and those with neurodegenerative diseases or mental illness. But that could only tell them so much and for a long time many researchers felt there was no more to learn from brain tissue. Instead, they turned their attention to new imaging technology like functional Magnetic Resonance

Imaging that helped them peer inside living brains:

"Twenty years ago this was the no-man's-land of neuroscience," says Dr. Francine Benes, director of the Center. But that has changed with the rise of genetic sequencing and gene expression profiling. "It's really caught on.

Now it's the molecular biological tests that are the most informative."

Today researchers are blending the disciplines by using imaging technology to pinpoint circuits in the brain which they can then study using gene chips and other techniques. This is particularly true for researchers interested in mental illness like schizophrenia and manic depression because there is little anatomical difference between healthy brains and those with these mental illnesses. Instead, researchers think the problem lies in how the brain is

wired:

"We need to get inside the cells and look around and see what's going on," says Benes, whose own laboratory next door to the brain bank concentrates on these questions.

Research findings

As well as aiding research into mental illness, issue from Harvard's brain bank has helped researchers develop the gene test for Huntington's disease and a treatment for Parkinson's disease. Its also helped them discover things about healthy brains.

Benes has found evidence in her brain tissue research that in middle age, healthy people actually add myelin - an insulating sheet - to some of their nerves. This speeds up the transmission of impulses down the nerve fibre.

Some researchers are starting to think that this could account for why many people grow calmer in their 40's and 50's: "It's not all decline with age," says Benes. "It's a happy thing."

How does the brain bank actually work?

Brains are donated, after death, across the United States. Anyone over 18 can donate but not all brains qualify - those with a history of substance abuse, brain trauma, certain infectious diseases or those who have been on a respirator for more than 24 hours are disqualified.

Brain donation is not compatible with organ donation because organ donors must be kept on a respirator until their organs are removed.

Donated brains are put on ice and transported by courier to the brain bank.

All of this must happen within 24 hours or the brain will deteriorate too much to be useful to researchers. Once the brain is delivered to the brain bank, it is assigned a

number to protect the confidentiality of the donor.

One day recently the fresh, pink and slightly squishy brain of a healthy 65-year old man arrived. (NOTE TO EDITORS: this is the brain in the pictures). George Tejada, assistant director for tissue processing, rushed to put on protective gear and went to work. First he weighed the brain, photographed it, then placed it on a cutting board and carefully used a long kitchen knife to slice the brain in half. He immediately put one half into a plastic paint bucket of formalin to fix it - a process that takes about 15 days. Later, it will be sliced into many small pieces to accommodate the requests of scientists. These are stored on metal shelves in numbered plastic containers. Meanwhile, working under a sign that read "Mortui vivos docent" - "The dead teach the





of this structure, about a centimetre square, and send it out to the scientist at no charge.

Brain shortage

This preserved brain will be stored for many years to come until there's not enough left to send out. Over the years, it could be sent to hundreds of researchers around the world.

Unfortunately, donations haven't kept up with demand and there's a

living", Tejada slowly cut the other half of the brain into 32-cm slices. He then used a scalpel to carefully separate out the brain structures that might be of use to researchers. He placed these smaller pieces on Teflon-coated plates inside expanded-foam containers, then immersed them in liquid nitrogen, sending up a chilly fog that spread throughout the room. The slices instantly hardened and lightened. This flash-freezing preserves all the structures indefinitely.

Later, they will be gathered up into numbered plastic bags and stored in freezers at -70 Centigrade to preserve them.

The information on this brain, including medical records and a complete pathological report, will be entered into a database that brain researchers have access to. This allows them to request specific parts of specific brains based on their research needs. For example, a Parkinson's researcher might be interested in part of the mid-brain called the substantia nigra - responsible for movement - because that region has been implicated in the disease. When a request comes in, brain bank technicians will cut a small piece

shortage of brains, especially those needed for research into mental illness. The brain bank needs about 50 more brains a year from people with schizophrenia and manic depression to meet the demand from researchers around the world.

Families of the mentally ill are often suspicious of the medical establishment and fear that their relatives will be exploited, says Benes:

"We have to convince people this is important for their loved ones in terms of learning what's wrong and trying to find medical treatments."

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Written by Karen Rafinski
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FULL PICTURE SET

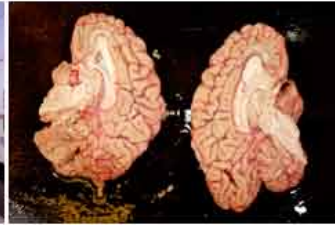
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