



Although small, the samples collected play a very big role in our research. They contain unique properties that we hope will yield valuable insights into predicting Alzheimer's disease. Once the samples have been prepared, we can begin using them for a wide variety of different tests. Areas of focus include **genomics, proteomics, glycomics, and metabolomics**. You can learn more below about these areas of focus and how they are important to Alzheimer's research.

Making a Little Go a Long Way

We collect several different samples during a study visit. Two of the most important samples, blood and cerebral spinal fluid, contain vital information to our health and provide a platform for many different types of testing. To maximize their use, each sample has a set process for how it will be broken down for various tests as well as storage for future testing.

- 1 The lumbar puncture is performed to access cerebral spinal fluid (CSF). We only collect 20mL, just more than 1 tablespoon, but that small sample goes a long way for testing. It generally takes only about an hour for your body to naturally replenish the amount of fluid taken. The fluid is collected into two tubes. Once collected, it's put on dry ice until processing.
- 2 Once the samples are received by technicians, they are thawed so they can be divided. The smaller portions of the main sample is known as an aliquot.
- 3 Half of the CSF sample is separated in to 24 smaller aliquots. We will use these aliquots for initial testing.
- 4 Half of the CSF sample is kept whole and stored at -80C. When needed, it can be thawed and aliquotted for testing.
- 5 The blood draw is one of several samples collected during an Emory Healthy Brian Study visit. We collect 100mL of blood, which is about 1/5 of what's taken when donating blood. Once collected, the samples are kept at room temperature for processing.
- 6 8 cell preparation tubes (CPT) are filled from the blood sample. These tubes contain a chemical designed to separate certain cells from the whole blood.
- 7 Once the blood has mixed with the CPT reagent, the tubes are placed in a centrifuge and spun for 25 minutes. This will cause the blood to separate leaving the desired peripheral blood mononuclear cells (PBMC). These cells play an important role in our immune system and are often studied in research.
- 8 One PAXgene tube is filled with blood. This tube contains a chemical that helps with testing the DNA in the blood.
- 9 Two EDTA tubes are filled with blood. These tubes contain a chemical that helps separate plasma and buffy coat (white blood cells and platelets) from the rest of the blood.
- 10 The tubes are put in a centrifuge for 10 minutes to separate the plasma and buffy coat from the blood sample, which are divided up into smaller samples for storage and testing.

Genomics

Unlike genetics, the study of individual genes, genomics is the study of genomes. A genome is the complete set of DNA within an organism. These DNA sets direct the production of proteins, which ultimately make up organs and tissues as well as carry signals between cells. By studying differences in DNA sets, we hope to identify predictors for Alzheimer's disease.

Proteomics

Proteomics is the large-scale study of proteins. Proteomes, a combination of the words protein and genome, are the whole set of proteins produced or modified by an organism. We study proteins because of their importance to the body. Not only do proteins do most of the work in our cells, they are also involved with other functions like DNA replication and moving molecules from one part of the body to another. Amyloid plaques have long been associated with Alzheimer's disease and are formed when collections of proteins fold into shapes that allow them to stick together. When these collections of proteins start sticking together, they build up and are thought to play a role in neurological diseases.

Glycomics

Simply put, glycomics is the study of sugars in an organism and despite often having a bad reputation, sugars are necessary to stay alive. They act as an energy source for muscles, brain, and nervous system. Since sugars affect numerous systems within our bodies, it is important to examine their role in cognitive decline.

Metabolomics

Metabolism, the chemical processes that occur within living organisms, produces metabolites during or at the end of the process. Metabolomics is the study of chemical processes involving metabolites. The unique chemical fingerprints left behind by various cellular processes can be studied to better understand the condition of that system or organism. Through metabolomics we hope to better understand the complexities of how Alzheimer's disease forms.