Nico just participated in a research study to find biomarkers for schizophrenia, bipolar disorder and related mental health disorders. Biomarkers are biological characteristics of the body that can be measured to indicate a health condition. Some examples of a biomarker are protein or a hormone found in the blood, body tissue, or other body fluid, or brain activity patterns. Identifying and understanding biomarkers can lead to more accurate diagnoses and lead to new treatment options. Finding biomarkers for mental health conditions is especially challenging as we cannot access or take samples from the brain as easily as for example breast tissue. Nico feels that by participating in the research study to discover new biomarkers, he is helping scientists learn more about mental health conditions. Perhaps this knowledge can lead to more accurate diagnoses and more effective treatments. Before participating, Nico had a few questions about the procedure so he took some time to watch videos about how the proteins are produced and why researchers believe these biomarkers are connected to schizophrenia and bipolar disorder. He also met with the study doctors to talk about the research study. He was especially interested in meeting the neurologist, the doctor performing the lumbar puncture, to discuss the procedure and have his questions answered. The doctor explained the potential risks and side effects and made sure Nico was comfortable participating. Nico also talked to his family, healthcare provider, and local support group to make sure he felt good and had support for participating in this research study. While participating in the study, Nico completed questionnaires about his clinical history and symptoms. He then participated in a computer exercise. Nico also completed an MRI or magnetic resonance imaging of his brain. Finally, the study team collected a sample of Nico's blood and his cerebrospinal fluid or CSF. This was necessary as scientists cannot sample proteins directly from the brain. CSF is a fluid that is made in the brain and surrounds the brain and the spinal cord. Proteins made in the brain can travel within the CSF and down into the spinal cord. Just as blood tests are used to measure biomarkers that are circulating in the blood and can diagnose liver, heart, and other diseases, CSF tests can be used to measure biomarkers made by the brain, with the hope that one day brain diseases can just as accurately be diagnosed. If a blood test can tell us about the function of so many organs, why can't it tell us more about the brain? Why is the collection of CSF needed? The collection of CSF, in addition to blood, is necessary due to the blood-brain-barrier. The blood-brain-barrier is a layer of tightly packed cells that line the blood vessels in the brain and act like a filter, creating a security system for the brain. It stops some contents of the blood like certain bacteria and some medical components from passing from the blood into the brain. It also stops some components like larger proteins from passing from the brain into the blood. Collecting CSF allows scientists to find biomarkers beyond what is

passed into the bloodstream. The procedure for collecting a sample of CSF is called a lumbar puncture. During the lumbar puncture procedure the lower back is numbed and an experienced doctor inserts a thin needle below the end of the spinal cord, into the space between two of the lower bones of the spine. A very small amount of fluid is removed. The body produces additional CSF within a few hours to replace the fluid that was taken out. After the lumbar puncture, Nico rested for 30 minutes at the clinic before going home. He was also provided with instructions for how to contact the clinic if he had any questions. And the research team followed up with him for a couple of days after the lumbar puncture to make sure he was feeling well. The collected CSF was then sent to a laboratory and the proteins and molecules within the fluid were measured. Researchers can measure CSF proteins from many different individuals in a research study to look for trends that might be related to symptoms or a diagnosis of a brain related disease.