

Century-old brains may hold future of treatment for mentally ill, pathologist says

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This is George Sandusky, D.V.M., Ph.D., senior research professor of pathology and laboratory science at the Indiana University School of Medicine, with brain samples on display at the Indiana Medical History Museum in Indianapolis.
Credit: Indiana University School of Medicine

Visitors to the Indiana Medical History Museum in Indianapolis may find the 19th-century brains on display a strange reminder of the building's past as an insane asylum, but a recent breakthrough using these samples by a pathologist from the Indiana University School of Medicine could spell the future of detecting mental illness.

George Sandusky, D.V.M., Ph.D., senior research professor of pathology

and laboratory science at the IU School of Medicine, is working to extract DNA from brains preserved more than 100 years ago and displayed in jars at the museum. The goal is to improve diagnosis and treatment for psychological illnesses such as bipolar disorder, schizophrenia and post-traumatic stress disorder using a simple [blood test](#).

"This work could make an impact on [patient care](#) — a huge impact," said Dr. Sandusky. "It's going to help diagnose patients with mental disorders quicker and faster."

Using brain donors from traditional sources to advance this goal only brings in about 12 new subjects per year. The museum collection, which includes over 400 specimens, could speed the arrival of new diagnoses and treatments for the mentally ill by decades, he added.

The brain samples under investigation come from turn-of-the-century patients who suffered from mental disorders at Central State Hospital, an asylum established in the mid-1800s to house the state's mentally ill. The museum is located in the former pathology building at Central State on the near west side of Indianapolis.

John Pless, M.D., Culbertson Professor Emeritus of Pathology at the IU School of Medicine and former chair of the museum board of trustees, first proposed the brains might be able to help advance modern medicine. Dr. Sandusky, who also serves on the museum board, was originally trying to simply determine whether the aging specimens contained viable genetic information. All tissues used in this research received ethical and legal approval from an internal review board at the state and at the university.

The key breakthrough in the project arrived last summer after Dr. Sandusky and two undergraduate student researchers, Erin Niland and

Audrey McGuire, discovered that functional DNA could be isolated and extracted from the museum's [brain](#) samples, despite their extreme age and the preservation techniques used by 19th-century doctors.

"They preserved the brains with the best science of their time," said Dr. Sandusky. "The preservation techniques from the era were almost as good as ours from the 1970s, 1980s, 1990s and 2000s. I was shocked by the quality."

Earlier tests conducted in 2010 yielded unusable results, but new technology — as well as experienced lab workers and cutting-edge test methods — ultimately "cracked the code." The lab facilities used to achieve this breakthrough are managed by the Indiana Clinical and Translational Sciences Institute.

The results support work by Alexander Niculescu, M.D., Ph.D., associate professor of psychiatry at the IU School of Medicine, who is seeking to advance personalized medicine in the treatment of [mental illness](#) using biomarkers for bipolar disorder, [schizophrenia](#) and PTSD. A biomarker is a specific region on a gene that suggests susceptibility to a certain illness. They are an increasingly common tool in the fight against cancer and other diseases, but no reliable test exists for psychiatric disorders.

Dr. Niculescu, however, is making significant advances in pinpointing potential biomarkers for mental illness through research conducted at the Richard L. Roudebush VA Medical Center in Indianapolis. The samples from the Indiana Medical History Museum are being tested for the same telltale signs.

The goal is to use data from both studies to assist future physicians in creating a personal genetic profile for people suffering from psychiatric illnesses to ensure they are diagnosed quickly and accurately. The search

for identifiable biomarkers will pioneer new, innovative treatments in clinical practice by eliminating the current system of diagnosis, which requires significant trial and error.

"If you come in with a psychiatric illness today, you can't really separate different mental disorders," Dr. Sandusky said. "You have to try several drugs before finding one that even works — and that may take months."

Provided by Indiana University School of Medicine

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