

## Profile

### Fernando Cendes: targeting epilepsy by improving neuroimaging



Coordinating the epilepsy surgery programme at such a busy university hospital as the University of Campinas (Sao Paulo, Brazil) is far removed from the life Fernando Cendes had while growing up in the small city of Anapólis, close to the nation's capital Brasilia. "I had seen several family members suffer serious illness and wanted to be a doctor from an early age", Cendes tells *The Lancet Neurology*.

He got into medical school at the Federal University of Goiás (Goiânia, Brazil), where his family had recently moved. As his studies progressed, he considered psychiatry as a speciality, and volunteered at a local psychiatric hospital. Only in his last year of medical school did neurology become a consideration, but his focus remained on neuropsychiatry and cognitive disorders. "I was prepared to be a psychiatrist", he explains, "but I found myself more interested in neuroscience and biology, and wanted to do more research".

After completing medical school, Cendes moved to the University of Campinas to do his residency in neurology, where his interest in epilepsy accelerated. "In epilepsy there are many interfaces between psychiatry and neurology", he explains. "It's a condition that allows us to understand much better how the brain works." In the following years, at McGill University (Montreal, QC, Canada), Cendes used MRI to quantify hippocampus volume in patients with temporal lobe epilepsy. While there he also began a PhD in neuroscience and, in 1997, he defended his thesis on non-invasive in vivo quantification of metabolic and structural hippocampal damage in people with epilepsy using volumetric MRI and spectroscopy. At the end of this 6-year spell at McGill University, the University of Campinas opened positions for Professors, and Cendes and his wife, Iscia Lopes-Cendes, returned to Brazil to take posts there.

There was no epilepsy surgery programme at that time, so Cendes had to set it up from scratch, recruiting a multidisciplinary team while developing the university's neuroimaging laboratory. Since then, the Department of Neurology at the University of Campinas has grown to become a major centre in Brazil, focusing on neuroimaging, neurogenetics, and neurosurgery, and encompassing other specialities, such as movement disorders, stroke, and neuromuscular diseases. As his department expanded, it joined with other universities across Sao Paulo state, making it possible to obtain larger grants and secure funding for further upgrades. These upgrades enabled Cendes' team to move into characterisation of neurological manifestations, including epilepsy, in patients with systemic lupus erythematosus; and in spinocerebellar ataxias, Huntington's disease, Parkinson's disease, and Alzheimer's disease.

In 2011, Cendes' efforts to grow the department and the overall research group were rewarded with formal

designation as a centre of excellence by FAPESP (the Sao Paulo Research Foundation), opening up further channels of funding to continue their research activities. He is currently Principal Investigator of The Brazilian Research Institute for Neuroscience and Neurotechnology (BRAINN), a Research, Innovation and Dissemination Center sponsored by FAPESP. This centre focuses on investigation of the basic mechanisms that lead to epilepsy and stroke, combining genetics, neurobiology, pharmacology, neuroimaging, computer sciences, robotics, physics, and engineering.

His team's wide remit includes association studies and next-generation DNA sequencing to identify candidate loci and genes in different types of epilepsy, and malformations in cortical development, stroke, and other neurological disorders. Cendes and his team are integrating these findings with behavioural data to search for new therapeutic targets, create a suitable human-based model for testing novel therapies, and develop better instrumental and analytical methods to study brain images.

Although 70–80% of patients with epilepsy have their seizures well-controlled with medication, some 20% will require surgery, and Cendes' team uses EEG and MRI software to determine the lesion pattern and devise a surgical plan. Surgery will control around two-thirds of these people with multiple seizures in one day. "This surgery should be done as soon as possible, but some people are left waiting decades. We try to minimise treatment delay using an algorithm to ensure the worst cases are treated quickly."

For the future, Cendes wants to exploit personalised medicine, to optimise treatment for different patients. "We are linking patterns of genetic markers with other markers and response to treatment", he explains. "We are trying to better match treatment to patients. The heterogeneous response to surgery is also a challenge. We are trying to understand why some 70% of patients with refractory epilepsy respond better to surgery, while the remaining 30% fail to improve."

"Fernando is undoubtedly one of my heroes. He is a beacon in epilepsy research, and what is most remarkable is that this beacon of world-class research shines from Latin America, where doing cutting edge science is so challenging", says Samuel Wiebe, President of the International League Against Epilepsy and Professor of Neurology at the Cumming School of Medicine (University of Calgary, Calgary, AB, Canada). "He has accomplished his vision of multidisciplinary research in epilepsy with remarkable efficiency, the product of a brilliant mind and tremendous work capacity."

Tony Kirby



Published Online  
February 19, 2019  
[http://dx.doi.org/10.1016/S1474-4422\(19\)30074-2](http://dx.doi.org/10.1016/S1474-4422(19)30074-2)  
For more on **MRI and spectroscopy in epilepsy** see *Ann Neurol* 1997; **42**: 737–46 and *Neurology* 1993; **43**: 1083–87  
For research into the **basic mechanisms of epilepsy** see *Ann Neurol* 2018; **83**: 623–35  
For research linking **patterns of genetic markers with other markers and response to treatment** see *PLoS One* 2017; **12**: e0169214