**Press Release**

**Artificial intelligence as a support for drug-resistant epilepsy**

# EPINOV launches the first clinical trial of virtual brain technology to assist brain surgery: EPINOV TRIAL, a world first.

**First patients will be operated in the first trimester of 2020 at the Timone Hospital in Marseille**

**The estimated number of people with epilepsy in France is somewhere between 400,000 and 500,000**. This is the most common neurological disorder after migraine*. **Almost a third** of these patients are diagnosed with **drug-resistant focal epilepsy, half of these being under 25 years old**. For these patients, the only way to become seizure-free is to undergo surgery. Surgery requires an arduous and complex brain operation whose outcomes are uncertain, and **the success rates are at a maximum of 60%.** Why? Because the disease affects all individuals differently and **the epileptogenic structures to be removed** within the brain are **difficult to localize** accurately.

**Professor Fabrice Bartolomei** is the Director of **the first center in France for the investigation and research of pharmaco-resistant epilepsy** at the the Assistance Publique – Hôpitaux de Marseille, AP-HM. Named a **reference center for rare epilepsy** since 2017, AP-HM is **one of the most recognized centers in the world in this field**. In the framework of his research activities within the University Hospital Federation (FHU) which he heads, he has been collaborating for several years **with the renowned scientist Viktor Jirsa**** (Director of the Institute of Systems Neuroscience of the University of Aix-Marseille, Research Director at the CNRS, and lead partner of the European Human Brain Project), on **the development of a personalized virtual epileptic brain** (the Virtual Epileptic Brain - VEB) to computationally **reconstruct the brain of individual patients with epilepsy in order to improve the surgical outcome**.

**The result of 15 years of research**, this **innovative approach to large-scale brain modeling** based on individual data from epileptic patients, and provides a better understanding of the disease, but most importantly **significantly improves the visualization** of epileptogenic (epilepsy causing) networks and foci, clarifies pre-surgical interpretations and **better guides surgical strategies**. In 2018, **Dassault Systèmes** - the world leader in this type of modelling technology – joined forces with the AP-HM and the University of Aix-Marseille to launch the EPINOV project.

Today **EPINOV and its partners, researchers from the AP-HM, CNRS, Inserm, Aix-Marseille University, and the Hospices Civils de Lyon**, are proud to announce **the launching of the first clinical trial of brain surgery with the assistance of a the virtual brain technology: EPINOV TRIAL, a world first**. The trial will be conducted over a 4-year period **in 13 hospitals in France** and will be used **to guide surgical strategies to improve surgical outcomes**. It will include **nearly 400 patients, adults and children over 12 years of age, with drug-resistant epilepsy, candidates for epilepsy surgery**. This is the largest randomized study ever conducted in epilepsy surgery. **The first patients will be operated in the first trimester of 2020 at the Timone Hospital in Marseille.**

*"We are pleased to announce the inclusion of the **first patient with drug-resistant epilepsy** in this clinical trial. **This form of epilepsy affects millions of patients worldwide**. Regardless of technical progress, the success rate of epilepsy surgery has reached a plateau. The individualized modeling of epileptic networks in drug-resistant patients is **an innovative approach** that should improve the interpretation of neurophysiological and neuroimaging exams and **optimize the surgical outcome of epilepsy individually**,"* explains Professor Fabrice Bartolomei, head of the Epileptology and Cerebral Rhythmology department at AP-HM, Research Director and project leader of the EPINOV RHU.

*"The pilot studies we conducted confirmed the feasibility of this approach and produced **promising data in terms of surgical outcomes**. Our virtual brain modelizes the dynamic network of each adult human brain with epilepsy. Each patient is then transformed into a "virtual epileptic patient" (VEP) whose resulting report indicates the most epileptogenic regions of the brain. The report provided to the neurosurgeon is a tool that can be used **to identify the areas to be operated and to virtually prepare the procedure in advance, by testing different actions and their consequences in a non-invasive way**. With EPINOV Trial, we will assess the efficiency of modeling in order to obtain a **more accurate pre-surgical***

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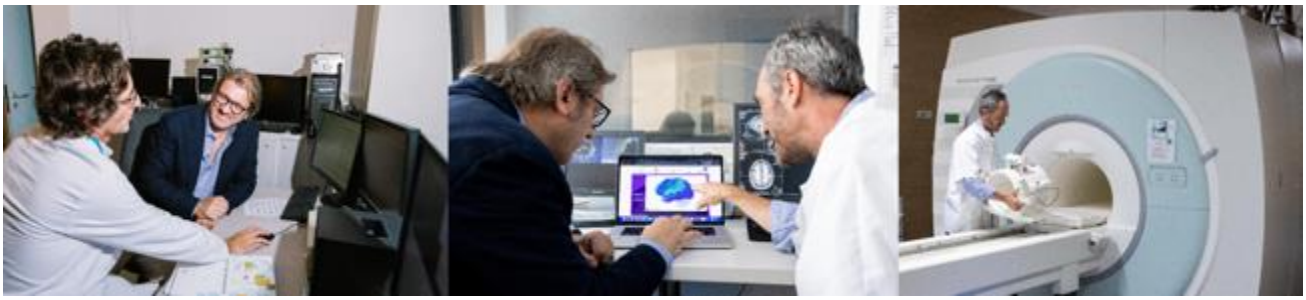
***diagnosis**," adds Dr. Viktor Jirsa, Director of the Institute of Systems Neuroscience at the University of Aix-Marseille and Inserm, Research Director at the CNRS and Scientific Coordinator of the RHU EPINOV project.*



**The study is the world's largest collaboration on epilepsy modeling. This is a world first** which could significantly **improve the treatment of patients with refractory epilepsy.**

This type of large-scale brain modeling and the clinical trial are **a major progress not only for epileptic patients** but also for a range of pathologies affecting the brain and neurodegenerative diseases to which it could be applied (the technology is also currently being tested in stroke and Alzheimer's disease).

If the clinical trial is conclusive, **Dassault Systèmes** could ultimately decide to provide clinics with **simulation software based on the virtual brain technology**.

This type of approach raises the **possibility of personalized brain medicine** and individualized therapeutic solutions through **modeling and simulation**.

* Epilepsie-France.com source

**About Fabrice Bartolomei and EPINOV**

Fabrice Bartolomei is a French neurologist and neurophysiologist, clinical physician and university professor at the University of Aix-Marseille (AMU). He heads the Epileptology and Clinical Neurophysiology Department of La Timone Hospital (AP-HM) and the Epinext University Hospital Federation. He is also a member of the Inserm, Institute of Systems Neurosciences (INS UMR1106). He has authored / co-authored more than 260 publications and his current research activities focus mainly on the preoperative evaluation of patients with pharmaco-resistant epilepsy. His work in collaboration with Viktor K. Jirsa on the virtual epileptic patient is the core of the EPINOV project he leads. EPINOV is one of the ten "University Hospital Research in Health" (RHU) projects funded in France as part of the 3rd phase of the French Investment Plan for the Future (PIA 3). EPINOV intends to improve the management of epilepsy surgery and prognosis by combining the virtual brain technology with large-scale modeling of epileptogenic networks. A unique project in the world. With a strong focus on translational research, RHU projects connect the academic, hospital and industrial sectors. EPINOV was awarded the RHU label in July 2017 and involves several partners: Aix-Marseille Université (project leader), Inserm, Assistance Publique-Hôpitaux de Marseille, Les Hospices civils de Lyon and Dassault Systèmes, as an industrial partner. EPINOV's multicentric clinical trial will bring together the 5 main partners as well as the major French epilepsy health. The project has involved a unique set of scientific experts in the fields of epilepsy, neuroimaging and neuroinformatics, including Viktor Jirsa, Director of the Institute of Systems Neuroscience, Professor Sylvain Rheims, Neurologist specialized in epilepsy at HCL, William Saurin, Senior Director of Science and Research at Dassault Systèmes, Professor Maxime Guye and Professor Fabrice Bartolomei. More information : http://www.epinov.com/ epinov@ap-hm.fr

**** About Viktor Jirsa, the Virtual Brain and the European Human Brain Project (HBP)**

Viktor Jirsa studied physics and philosophy in Stuttgart, Germany. He is Director of Research at the CNRS and Director of the Inserm, Institute of Systems Neurosciences (INS UMR1106). Since the late 1990s, his groundbreaking studies in computational neuroscience have established the theoretical foundation of the virtual brain and associated large-scale modeling. Dr. Jirsa has received several international and national awards for his research, including the “Grand Prix de Recherche” (PACA, 2018), the “Prix d'excellence scientifique” (CNRS, 2011), the “Early Career Distinguished Scholar Award” from NASPSPA in 2004 and the “François Erbsmann Prize in Biomedical Imaging” in 2001. Viktor has considerable experience in coordinating national and international research partnerships and organizations. Since 2005, he has been leading the neuroinformatics project "The Virtual Brain" (https://www.thevirtualbrain.org) involving 11 research institutions from all over the world. He is the leader of the European Human Brain Project (HBP: www.humanbrainproject.eu/en) consortium which is developing a state-of-the-art research infrastructure to advance neuroscience, brain-based medicine and informatics. It is one of the four major FET (Future and Emerging Technology) flagship projects, the largest scientific projects ever funded by the European Union. This 10-year project was launched in 2013 and directly employs around 500 scientists in more than 100 universities, educational hospitals and other research centers in Europe.

**Relations Presse : EVE’VOTREDIRCOM - 06 62 46 84 82 - servicepresse@votredircom.fr**

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