

MagnetoEncephaloGraphs (MEGs) are the most accurate instruments for recording neuronal activity. However there are only 150 of these devices worldwide due to their binding use, coming from the use of SQUID sensors that require cryogenic cooling to -269°C. Quantum sensors developed by Mag4health, namely helium-based optically pumped magnetometers (He-OPM), do not suffer from these limitations and pave the way for a new era of MEG and the democratization of their use. Mag4health, a startup currently incubated by CEA, prepares the industrialization, production and sale of these MEGs.

MEG are used in clinics for the localization of epileptic focus on drug resistant patients and to localize important brain zones before tumor resection. The potential accessible market with Mag4health MEG is 670 M€, and should grow beyond 2000 M€ with new indications such as early markers of Alzheimer's disease and rehabilitation after strokes / COVID.

MEG addresses the market of functional imaging. Unlike fMRI, MEG makes a direct measurement of neural activity: it is as accurate on brain disorders as on healthy brains, and provides a fine temporal decomposition of brain activity to have a better evaluation of the importance of each brain zone. MEG should take markets shares to fMRI in the years to come.

The quantum technology used within Mag4health MEG was developed for space applications at CEA. Sensors are still in flight, and working, after 8 years in Space. We evaluate that 12 million euros and 5 years would be required to reach the same level of maturity, 10 patents would have to be bypassed too. Some other alternatives to Mag4health approach are conducted in the world. These alternatives are basically limited by a bandwidth insufficient to detect whole epileptic activity, they can not replace the intracranial EEG applied to epileptic patients, and still have to handle the thermal perturbations due to their heating at 150°C.

Our strategy is to follow a direct path towards the industrialization of a MEG certified for clinical use. 2 prototypes of Mag4health MEG are used by 7 neurology institutes and record brain activity as expected. The next step, incremental vs current prototype, is to make a clinical proof with a whole head MEG in 2023 (cost of 5.5 M€, 2.8 M€ Equity). Then we will obtain the FDA / CE marking of a MEG in class II/II-a mid 2026 (cost of 15 M€).

Mag4health will make a few sales of prototypes of MEG, for clinical research, from the end of 2023, in Europe and US. The aim of these sales is to make KOL demonstrate and communicate on the quality of Mag4health products.

4 cryogenics MEG companies share current MEG market. 3 of them at least plan to integrate cryogenics-less sensors and are looking for solutions. We are deeply involved in OPM community and do not see any realistic alternatives to Mag4health. These companies could also acquire Mag4health after the clinical proof of 2023.

2 M&A occur on cryogenics MEG companies in 2016 and 2018, amounts are undisclosed. The acquisition of companies, with clinical marking, on the market of strokes are published at 100 M\$ and 480 M\$. Similar acquisition of Mag4health could be done by one of the big Medtech companies.