Category

Best Startup

Product/Solution Name

o8t

Date of Approval

N/A

Indications

NA

Therapeutic Categories

NA

Background information and need for solution/product

The most vexing, intractable, and society altering problems in medicine share a common root cause: We do not understand how the human brain generally works, especially its cognitive and emotional systems. It is not exaggeration to state that the results of this knowledge gap are increasingly catastrophic: Mental illness costs western nations around 10% of their GDP in lost productivity, and in the past decade the teenage female suicide rate has nearly tripled, to say nothing about the huge costs of chronic pain, dementia and stroke. Without actionable insights into what specifically is wrong with a specific patients brain, notably where and what is wrong, it seems unlikely that even advanced tools and drugs will achieve their full therapeutic potential. We cannot treat what we do not understand.

The evolving field of Connectomics involves using big data and machine learning type approaches to make sense of the complex connections and electrochemical signals of the human brain. Nearly 50,000 peer reviewed publications support that connectomic methods can be used to provide unparalleled insights into problems like mental illness, cognitive disorders, and brain injury among many others, however prior to our founding, there were no industry led efforts to develop useful tools for mental illness and numerous other brain diseases which apply connectomics in a clinically useful tool.

We think that without exaggeration, that the tools we have pioneered represent a major paradigm shift in how brain disease and mental illness is being treated and will be treated. Better knowledge makes better physicians.

History of the development of the solution/product

Quicktome started from my long standing desire to understand better what is happening in the brain and to make better decisions, to improve patient outcomes based on this. I am a US neurosurgeon who is an internationally recognized expert in the management of brain tumors. After completing Medical school at Columbia, and neurosurgery residency at UCSF, I was the director of the brain tumor

center at the University of Oklahoma for 7 years. I have performed over 3000 brain surgeries, published over 300 peer reviewed publications, and written 5 textbooks about brain surgery. I have lectured at nearly 200 institutions in 20 countries on the use of connectomic tools in clinical practice and am known internationally as an expert in this topic.

Quicktome began as an extension of over a decade of my research into the anatomy of the human connectome, specifically providing detailed annotations of different parts of the human cortex which described the connections and function of different parts of the brain and synthesizing large datasets of information into useful well curated sources of information.

I met my cofounder Stephane Doyen in 2019, a ML expert with a PhD in computational neuroscience and extensive industry experience and pitched him a wicked problem, which is that given that brain tumors can cause the brain to reorganize , and that the brain is misshapen from the tumor, how do we locate critical cognitive, language and emotional brain networks given that they may not be in the normal location. The elegant Machine learning based solution was able to rapidly locate language areas, even if they had moved, and could do this under any situation seen in neurosurgery. This became the basis of the first version of Quicktome which cleared the FDA 18 months after its invention.

This tool within Quicktome helps surgeons find and not cut through the cognitive system of the brain, it helps radiation doctors minimize radiation to these systems, and provides unparalleled assessments of brain damage from stroke or traumatic brain injury which improves our understanding of the individual patient in a way not really possible before.

Since then, we have leveraged the core IP in the first version of Quicktome, to expand its utility far beyond brain surgery, making it an extremely powerful platform for interpreting clinically relevant MRI sequences for better decision making with implications for neurorehab, neurology, psychiatry, radiation oncology, and many other fields.. Without exploring all use cases, I will summarize what we think is the truly exciting use case: it is possible to take a psychiatric patient, study their connectome with a simple MRI, see exactly where in the brain is misfiring to cause their symptoms, and potentially take direct action with existing tools to "edit" this.

Why this solution/product is innovative, the broad implications for future research, and/or how it will improve the human condition

As stated before, by not having patient specific information about why they experience symptoms like suicidal thoughts, hallucinations, cognitive decline etc., we often select the wrong drugs for mental illnesses, fail to have viable treatment strategies for functional neurologic diseases and other mysterious poorly defined diseases, design clinical trials in ways which have cohort heterogeneity which we are unaware of which dooms drugs to trial failures, and provide inaccurate prognostic and diagnostic information to patients.

Quicktome uses two widely available MRI protocols, advanced machine learning methods, and novel organization and simplification of the massive body of neuroscientific knowledge to make understanding the brain simple, cost effective and reproducible. In other words, we made extremely complex neuroimaging into simple, point and click tools which speed up clinical workflows, but provide extremely powerful analytic and treatment options.

How will this improve the human condition?

In the immediate term, we can confidently conclude that we reduce the rate of neurologic decline after brain surgery, by protecting the large scale brain networks by making them apparent to the surgeon and linking this to surgical image guidance systems.

In the medium term, studies by our group and by others suggest that we can improve response rates for treatments like TMS for depression among others. We anticipate that this will iteratively make our existing tools more effective, and to help new tools and drugs have a better chance of success. We base this on the 40+ peer reviewed studies we have published to date

In the long term, we are confident that providing detailed useful knowledge about the human brain at the point of care will revolutionize multiple fields of medicine, and make new treatments possible that were not conceived of 5 years ago. For example, we cannot envision implanting neuromodulation devices if we have no idea where these devices need to be placed in the brain.

Please provide appropriate references (ie Pubmed links)

NA