

NeuroGeneces



NeuroGeneces

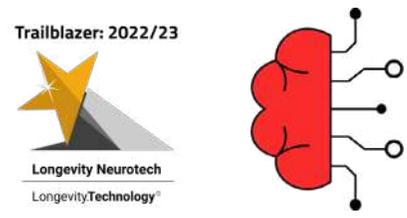
Company Profile

NeuroGeneces is a neurotechnology company integrating sleep activity with neuroscience to provide non-invasive neuromodulation and brain health measurement. Established in 2016, NeuroGeneces is developing an EEG sleep wearable that measures brain health biomarkers and unleashes the brain's natural restorative powers of sleep. The company's core belief is that brain health is the next frontier in healthy aging, and everyone should have the opportunity to improve their brain health to live happier, healthier lives. Its non-invasive, low-cost consumer headband analyzes EEG data to benchmark brain function over time against normal distribution to identify neurological changes and enable timely intervention.



NeuroGeneces' headband incorporates machine-learning algorithms and delivers closed-loop audio stimulation to enhance the natural restorative benefits of slow-wave sleep activity to promote healthy aging with improved memory consolidation, enhanced HRV, reduced cortisol, and normalized glucose metabolism. The light-weight, flexible form factor is being designed with input from users in order to maximize consumer comfort, an important differentiator from other sleep tech headbands on the market.

NeuroGeneces co-founder, Karen Crow's, mother suffered from Alzheimer's Disease and her son wrestled with a sleep disorder. As she researched both conditions, Karen learned about the role of slow-wave sleep on cognitive impairment and neurodegenerative decline. She further discovered how closed-loop audio stimulation can effectively enhance slow-wave activity to achieve targeted outcomes in memory improvement, heart rate variability (HRV) enhancement, stress resilience, and reduced neural inflammation. Karen partnered with co-founder Jason Worchel, M.D., a neuropsychiatrist and



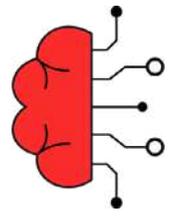
recognized expert in neurostimulation. Together they launched NeuroGeneces to develop safe, natural, and clinically proven ways to improve memory and brain health. Their mission is to enhance brain health as we age, using neurotechnology to optimize the benefits of restorative sleep.

As Karen summarizes, “By the time my mother was diagnosed, the damage was done and there was very little that we could do to help her. My passion is to provide a low-cost, scalable product that each of us can employ to measure our own brain health, detect issues quickly and get timely interventions. NeuroGeneces wasn’t there in time to help my mother, but I hope it will help all of us avoid her fate.”

NeuroGeneces’ approach to the market is a unique and superior competitive solution for several reasons. Unlike most memory enhancement solutions, the company has focused on clinical research and proof of efficacy. The company has completed a pilot study with the University of New Mexico to measure the impact of audio stimulation of slow-wave activity on memory retention. Several additional studies, in early stages, will measure the impact of audio stimulation on stress resilience, mental health and glucose metabolism.

NeuroGeneces’ Brain Age application is a novel solution and represents a new product category in brain health. This diagnostic component has tight synergy with neurological therapies. The headband combines EEG and deep learning to analyze and track biomarkers for cognitive diseases, using the resulting data to better inform and target neuromodulation or other interventions. The headband delivers personalized neurological therapies based on machine-learning algorithms that provide precisely timed stimulation to maximize biological effects and targeted behavioural effects. Additionally, NeuroGeneces has developed a novel, proprietary and growing dataset. Having a sizable proprietary database (both neurological and behavioural) with ongoing beta testing provides a distinct competitive advantage, allowing for quick iteration of algorithms to further enhance personalization and efficacy while also creating opportunities for new insights. NeuroGeneces has submitted a utility patent application directed to systems and methods of use for Sleep Performance and Brain Fitness for triggering audio stimulation. Additional patent filings are underway to further document and protect the company’s intellectual property.

NeuroGeneces is well-positioned for success on its work on brain health measurement and neurostimulation applications. Key drivers include world leading scientific advisors, a strong clinical partner, and support from key business networks. NeuroGeneces’ scientific advisors from UCSF and UNM bring expertise in neuromodulation, cognitive aging and sleep and its role on cognition, mental health, cardiovascular disease, inflammation and acute stress. NeuroGeneces has a long-established partnership with the Psychology Clinical Neuroscience Center at the University of New Mexico to conduct wide-ranging clinical studies. As a Techstars backed company, NeuroGeneces leverages the resources and community of the Techstars network with its long and deep track record of building successful companies.

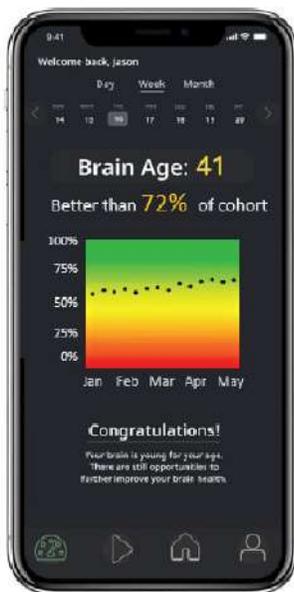


Flagship Product Deep Dive: Memory consolidation sleep headband

NeuroGeneces' sleep headband and ML algorithms measure brain age to let users know how they compare to a healthy cohort with the same age/gender and track changes over time. There are no consumer products available today that measure brain health or brain age, and NeuroGeneces' solution is significantly less costly and more accessible than MRI scans, requires no prescription, and puts individuals in charge of their own brain health.

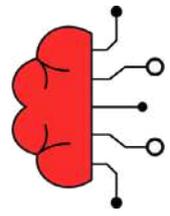
Unlike most products in the memory enhancement market (i.e., brain supplements and training apps), NeuroGeneces has validated its efficacy in university-based trials. In addition, audio stimulation has no side effects – a claim memory drugs cannot make. Trial results demonstrated that audio stimulation enhanced slow oscillation (SO) spindle coupling and density, key metrics of brain aging. Strengthening SO-spindle coupling has profound anti-aging implications; no other brain or sleep enhancement product has been shown to have similar therapeutic effects.

Brain age is currently measured through MRI scans and has a mean absolute deviation (MAD) of 5.0 years to chronological age in healthy participants. Because sleep EEG reflects functional changes in the brain, NeuroGeneces has been able to predict chronological age with a MAD of 4.2 years for healthy participants. NeuroGeneces' headband is less expensive than MRI, can be self-administered, and can be repeated to mitigate internight variability and track changes over time. Thus, it can be used as a scalable screening device. NeuroGeneces' personalized ML algorithms provide precisely timed audio stimulation to enhance memory consolidation. University-based trials demonstrate strong biological effects as well as enhanced memory retention.



Brain age monitoring alerts users to unexpected changes or accelerated decline in brain function. This early detection of potential neurologic problems is critical to enable early intervention, which is when they can be most impactful. Slowing cognitive decline during aging has profound impacts on quality of life.

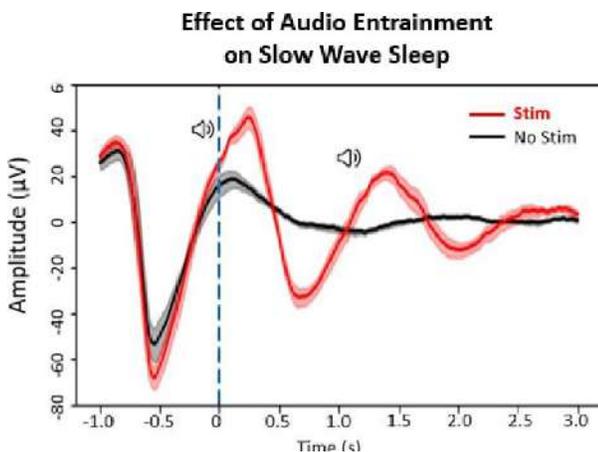
Audio stimulation therapy strengthens restorative sleep. Restorative sleep directly improves the quality of life through cognitive, emotional, and physical effects. Enhancing cognitive functions and related executive functions improves almost every aspect of daily life. It supports the ability to learn, to develop new interests and to live independently. Restorative sleep is bidirectional with mental health. It improves mood, mitigates the emotional reactivity associated with stress, and is the most critical factor in supporting social functioning. Enhancing restorative sleep results in multiple physical health benefits, some of which are improved HRV, immune response, decreased inflammation, physiological homeostasis, synaptic plasticity, and insulin sensitivity.



NeuroGeneces plans to launch as a consumer wellness product that meets the FDA requirements. The company intends to extend laboratory research and clinical testing beyond memory enhancement to validate the accuracy of brain age prediction and to quantify the impact of its audio stimulation on stress resilience and HRV and inflammation. At the conclusion of clinical trials, it will submit for software as a medical device and therapeutic device.

Evidence of safety and efficacy

NeuroGeneces conducted its first trial at the University of New Mexico using a prototype headband. This study was focused on measuring the impact of audio stimulation of slow-wave sleep on memory consolidation as well as the biological effects on micro-sleep features, specifically slow oscillation (SO) power, SO-spindle coupling and SO-spindle density, since these are key indicators of brain function atrophy and overall brain health.

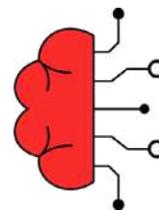


In a within-subjects double-blind study, healthy adults ages 18-40 years old used the NeuroGeneces headband for a total 82 nights, consisting of 41 pairs of stim and sham nights. Each night and the following morning, participants completed an associative word-pair memory assessment. The results from the stim nights were compared against those of sham nights, showing significant increase in slow oscillations of slow wave activity of 30% (p-value 0.001), and increases in SO-spindle coupling (8.9%, p-value 0.006) and SO-spindle density (10.0%, p-value 0.06). Memory improvement from one night of stimulation was 14% (p-value of 0.06).

These outcomes support the findings that NeuroGeneces' headband effectively enhances memory consolidation and counters aging effects on brain function.

Future development

To date, the company has achieved several key milestones, all with limited outside funding. These include the development of a validated EEG-based headband prototype with machine-learning algorithms that accurately target and stimulate slow-wave activity. The first university pilot trial has been completed to measure the impact of audio stimulation on biological and behavioural (e.g., memory) effects.



Future product development efforts are focused on improvements to the headband form factor and adding more sensors, continued development of personalized algorithms for targeted outcomes of HRV and stress resilience and brain health scoring.

The company plans to protect its IP through more patent filings and will continue to expand its partnerships for additional research trials and commercial channels.

Target market

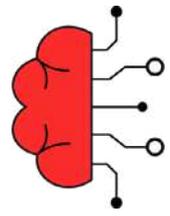
NeuroGeneces' headband with brain age scoring is targeted at health-conscious healthy adults who want to establish a brain health benchmark and monitor over time to quickly identify unexpected changes in brain function and seek timely intervention. This is particularly relevant for adults who have parents afflicted with Alzheimer's Disease, dementia or other neurodegenerative diseases.

NeuroGeneces' therapeutic audio stimulation applications are targeted at individuals with acute or chronic stress and seek to restore homeostasis to pre-stress levels before damage to the body and brain occurs. This includes millions of individuals in high-stress work or home environments, as well as those with traumatic stressors associated with PTSD and some mental health conditions like depression or schizophrenia.

Finally, audio stimulation of slow-wave activity is also beneficial for those who do not have significant sleep disorders but want to maximize the restorative benefits of sleep.

Channels to market

Initially, NeuroGeneces plans to market direct-to-consumer through online channels, as well as through health, fitness and longevity centers, health-oriented influence marketers, neurotechnology communities (e.g., NTX, OpenBCI, TransTech) and curated health device web sites. In the future, as more clinical studies are completed, the company will evaluate opportunities to develop additional sales and distribution partnerships and market directly to physicians.



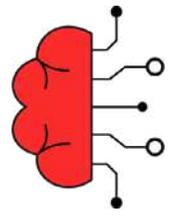
Success Factors

Team and Reputation

- NeuroGeneces' management team brings over 100 years in senior level leadership with subject matter expertise in neuromodulation, artificial intelligence and data analytics, and proven business expertise in starting and scaling businesses, product design and manufacturing at top companies like Google, Facebook, Honeywell, and Everlywell. The team boasts 6 exits, including 4 unicorns and IPOs in the direct-to-consumer health tech industries.
- As a pioneer in measuring brain age and closed-loop audio stimulation, the NeuroGeneces team has developed state-of-the-art deep learning algorithms to advance the neurotech field. The company has strong partnerships with key academic institutions to collaborate on research, apply innovative therapeutics into a suite of applications, and conduct clinical studies.
- The team is driven by its passion to improve cognitive health and broaden the benefits of restorative sleep throughout the aging process. The team is excited to be pioneering the development of technologies to identify individuals at risk for neurodegenerative disease in a scalable, low-cost way, and to provide effective audio stimulation to strengthen and maintain healthy brain function.

Intellectual Property

- The headband combines EEG and deep learning to analyze and track biomarkers for cognitive diseases, using the resulting data to better inform and target neuromodulation intervention. The headband delivers personalized neurological therapies based on machine-learning algorithms that provide precisely timed stimulation to maximize biological effects and targeted behavioural effects.
- Additionally, NeuroGeneces has developed a novel, proprietary and growing dataset. Having a sizable proprietary database (both neurological and behavioural) with ongoing beta testing provides a distinct competitive advantage, allowing for quick iteration of algorithms to further enhance personalization and efficacy while also creating opportunities for new insights.
- NeuroGeneces has submitted a utility application directed to systems and methods of use for Sleep Performance and Brain Fitness analytics to trigger stimulation.. Additional patent filings are underway to further document and protect the company's intellectual property
- The company plans to protect its IP through more patent filings and will continue to expand its partnerships for additional research trials and commercial channels.



Funding

- NeuroGeneces is largely self-funded. The company has received several non-dilutive grants from U.S. Air Force (SBIR) and the New Mexico Economic Development Department.
- To date, the company has accomplished its milestones with limited outside funding. The only two outside investors to date are Techstars and Esther Dyson, a former board member of 23&me and a notable leading angel investor in the digital technology and health tech arena.
- The company is pursuing additional non-dilutive grants to fund these near-term research and development efforts and clinical trials and will raise equity financing to help support the product's commercialization and launch.