

*Cascadia Institute for Neurotechnology (CIN). Seattle, Washington, USA. 2045.*

Known for its cutting-edge research, CIN provides comprehensive neurotechnology therapies and procedures. Today, the Board of Directors is reviewing the cases of four current patients to better understand the realities of using neurotechnology therapies.

----- CIN Pediatric/Adolescent Unit -----

At four years old, Oliver suffered a traumatic brain injury. As a result, Oliver developed some cognitive issues. These manifested in his younger years as irritability, intense tantrums, and communication delays. As he aged, this lack of self-control developed into more violent, dangerous outbursts. A year ago, at age 14, he and his mom agreed to have a deep brain stimulation (DBS) device implanted using CIN's standard robotic nano-surgery protocol. The implant reads his neural signals to determine when an outburst may occur. It then sends electrical impulses to override the limbic system, a group of structures responsible for behavioral and emotional responses, in his brain.

Recently, Oliver's mother has noticed that he is calmer and his outbursts have all but stopped. However, his sleep schedule has become erratic, and he has lost interest in sports. Now she wants to abandon the techno-treatment, believing Oliver needs to learn to control his impulses through more traditional methods, such as meditation and breath control.

Oliver disagrees with his mom and is adamant that the implant offers him the opportunity for a normal life. While he admits his insomnia has gotten worse, his grades are stable, and he just joined his high school's drama club.

----- CIN Neurology Unit -----

Nikola, a recently decommissioned officer of the Drone Force, is visiting CIN to discuss the military-mandated implant officers receive before their service. This implant reduced stress responses by adjusting the soldier's autonomic nervous systems and hormones and was -- literally -- a lifesaver during active duty. The implant connects to a computer link controlled by a soldier's commanding officer using encrypted radio signals. Nikola knew that commanders used the link to maintain her entire platoon's level of focus. She had occasionally received controlled bursts of adrenaline to produce eustress for periods of tough and intense work.

When Nikola retired, she was told that there was no way to remove the implant -- it had become too deeply enmeshed in her brain tissue to be considered safe to extract. However, it had been deactivated and should no longer interfere with her natural emotional response.

But Nikola's headaches have been getting worse recently. Her stress levels have risen as she looks for work and reintegrates back into civilian society. Last week, she stepped into a busy crosswalk without even thinking about the cars whizzing toward her.

As Nikola rehearses the questions she plans to ask during the appointment, another stroke of pain shoots through her temple.

----- CIN Neuro-Zoology Office -----

Prisha arrives to discuss new options to help control her severe depression and anxiety. Last year, after a debilitating bout of SARS-41, Prisha developed symptoms similar to the “brain fog” of previous pandemics. This was accompanied by constant worry, panic attacks, sleeplessness, and trouble with concentration. Unfortunately, standard treatments, including counseling and antidepressants, have not been as successful as she anticipated.

Today, her treatment team is discussing assigning her an Enhanced Emotional Support Animal Assistant (EESAA). Prisha is meeting neuro-enhanced animals to determine which animal best suits her needs and emotional condition. Each animal was genetically designed through a modified cloning process. Then it was neurologically altered with enhanced empathetic responses to distress. These abilities combine with facial, voice, and scent-recognition technology to sense the owner’s mental state and provide comfort. Prisha has the choice between a marmot, a dog, or a sheep. It is vital that the EESAA and its owner establish a strong connection. Therefore, Prisha spends time with each of the animals before discussing the options with a neuro-zoologist.

EESAA’s come with a steep price. Because this is an experimental therapy option, the US Affordable Healthcare System will only cover 40% of the costs. Prisha’s supplemental policy, a private insurance plan, has reluctantly agreed to pay for another 40%. They will require her to participate in a research study on the effects an EESAA has on her life. Even with the out-of-pocket costs and additional responsibilities associated with joining the study, Prisha and the team determine that an EESAA dog is a good fit for her lifestyle.

----- CIN Physical Therapy Unit -----

Ricardo undulates the fingers on his robotic hand. He is always intrigued by how the electroencephalogram (EEG) headband interprets his thoughts. He reaches out to grasp a set of chopsticks from the bench, clumsily maneuvering them into place. As he clicks them together, they clatter out of his grasp, and he sighs. Sushi will have to wait.

“You say you’re not ready for a more invasive option, Ricardo,” the therapist says, watching him get increasingly frustrated. “I hope you’ll think about it. These prosthetics are becoming outdated. I just don’t know how much longer the institute will even support them. These things require constant tech support, you know. Brain-computer interfaces (BCI) are the wave of the future!”

He flexes the beautifully-crafted hand into a fist. The E-Sports Outfitters warehouse where he works already surveils him at all times, tracking his smart devices to calculate everything from when he should arrive for his shifts to his productivity and general physical health. “What would happen if they also had access to my BCI data?” he wondered.

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**The Cascadia Institute for Neurotechnology’s Board of Directors have asked you, Future Problem Solvers, to analyze their use of neurotechnology. Select an Underlying Problem related to the use of neurotechnology at the CIN, then develop an appropriate Action Plan detailing a strategy for the successful continuation of neurotechnology therapies.**