

New Research and Hope for People suffering with Multiple Sclerosis

I recently was very lucky to be introduced to a group of people. (I will tell you about them in a moment.) They had a call out to people living with MS for a research project looking into re-learn basic functions that had been lost to MS.

I was very eager to find out more. I meet with Yuri and we both decided that I would be one of the ten test cases that they had funding to do. The actual name of the program is Non-invasive Neuromodulation. (They need an easier name for us lay people.) The program involved preliminary testing to establish levels and starting off on twice daily training.

During the training I learned how to move and balance again. I discovered in my case that I compensate for a lot with my vision. The minute that I had to do anything with my eyes closed I went down like someone turned the gravity dial and I was suck down to mother earth. (I fell) I learned how my body used to work and twice a day I worked with a thin plastic strip on my tongue. This strip transmitted a low electric current. The purpose was to retrain your brain and learn function again.

During my enrolment in the program I witnessed amazing results and saw other people go from unable to walk unassisted too moving under there own power and lasting forty minutes at a trot on the tread mill.

This program involves work and like all things in life the more you put in the more you get back. I was initially charted as a 3.5 on a scale that reflects how much restriction you have. You needed to fall between 3 and 6 to qualify for the test program. At the end of my two weeks, (That is how long the program runs) I tested out at 1.5. I improved to the point that I feel like I am ten years younger. When I started I would not have even considered walking down stairs with the hand rail. Now I walk down the stairs without even a second thought. I now can dress myself with needing to hold on to something to stay upright. These days, I can balance. Long term results are still an unknown, but I am staying positive and working hard to not lose what I have gained back.

Long term plans are to hopefully bring this technology to everybody who needs it. This was designed for people with traumatic brain injuries. The work that is being done with MS is brand new and at least in my case very successful. The scope of this program is so broad that it is a little overwhelming. I will keep you all up to date as we roll along here.

I have included the three people who are responsible for this work. Here's hoping that funding is found to keep this moving forward. I am indebted to all three of these folks for not only getting me moving again but giving me hope again.

Thank You!

The TCNL leadership team has a combined 65 years of experience in the fields of tactile communication, sensory substitution, engineering, and neuroscience. The TCNL uses a shared leadership model.

Inquiries should be directed to the TCNL director in your area of interest.

- **Yuri Danilov**, Neuroscience, Neuromodulation, Rehabilitation
- **Kurt Kaczmarek**, Tactile Communication, TCNL Administrative Director
- **Mitchell Tyler**, Sensory Substitution and Clinical Studies



Yuri P. Danilov is a neuroscientist with over 25 years experience in research on brain function and the special senses, including vision, taste, hearing and balance. Dr. Danilov is the lead discoverer of the balance retention effect, lead development of the specific training regimens, and continues to identify potential clinical and non-clinical application of neuromodulation and sensory substitution technology. Dr. Danilov received the M.S. degree in biophysics, in 1978, from St. Petersburg University in Russia and the Ph.D. degree in neuroscience, in 1984, from the Pavlov Institute of Physiology, Russian Academy of Science. Dr. Danilov was Senior Scientist (11/00 – 12/04) and Director of Clinical Research at Wicab, Inc., where he oversaw both conceptual development for the BrainPort system as well as its clinical testing. His interest areas are neuroplasticity, neurorehabilitation, human performance, human performance, and human sensory systems.



Kurt A. Kaczmarek is an electrical and biomedical engineer and scientist with over 20 years experience in developing haptic displays and both vibro- and electro-tactile interfaces for sensory substitution. He is a recognized expert and NIH-funded researcher in electrotactile stimulation, and is the co-inventor (with Dr. Bach-y-Rita) of the core tongue display technology on which the CN-NINM and BrainPort systems are based. He designed, developed and tested the first version of both the tongue display and electrotactile stimulation system for vision applications. He received the B.S. degree from the University of Illinois, Urbana, in 1982, and the M.S. and Ph.D. degrees from the University of Wisconsin, Madison, in 1984 and 1991, all in electrical engineering. His doctoral thesis concerned developing optimal methods for communicating information using controlled electrical stimulation of touch (electrotactile or electrocutaneous stimulation) and this remains his core research area today. His other interest areas are tactile displays, substitution and augmentation, sensory aids, neuromodulation, and instrumentation design. He is a Senior Scientist in the UW Department of Orthopedics and Rehabilitation Medicine, and has been with TCNL since 1991.



Mitchell E. Tyler Mitchell E. Tyler is a mechanical and biomedical engineer and scientist with over 20 years of experience in research & development of visual and tactile displays for human-machine interfaces, and has been with TCNL since 1992. Mr. Tyler was co-founder of Wicab, Inc., (with Dr. Paul Bach-y-Rita), and Vice-President of Research and Development. He is the lead inventor of the BrainPort™ Balance device, and co-discoverer of the retention effect and the neurorehabilitation potential of tongue electrotactile stimulation. He was Principal Investigator on NIH SBIR grants developing balance, vision, and auditory substitution applications, and on a DARPA contract for an underwater navigation & orientation systems. Mr. Tyler received the B.S. degree in mechanical engineering from San Jose State University, San Jose, CA, in 1980, and the M.S. degree in biomedical engineering from the University of California, Berkeley, in 1985. He is a Researcher in the UW Department of Orthopedics and

Rehabilitation Medicine and a Senior Lecturer in the UW Department of Biomedical Engineering, where he teaches biomedical engineering design, biomechanics, bioinstrumentation, and neuromotor control. His research interests include cutaneous and tongue-based electrotactile displays, human-machine interaction, and in clinical applications of non-invasive neuromodulation for rehabilitation. He is a Registered Professional Engineer in both California and Wisconsin.