

Recumbent Trike with Epidural Electrical Stimulation

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Abstract

Following a mountain biking accident in 2013, Sebastian Tobler became quadriplegic. In order to combine a sport activity with a functional movement, he developed a recumbent trike with the particularity of having two pairs of cranksets, for the hands and the feet: able-bodied members who can train disabled or partially disabled limbs and thus participate in active rehabilitation. In 2016,



together with Eric Belloy, he created the start-up GBY Ltd (Go By Yourself) which develops and produces the recumbent trike. They tested their product with 6 disabled riders. One of them, a paraplegic incomplet gained 70% more force on a leg press in 6 weeks of trike riding. In 2017, he was enrolled in an ongoing research project at EPFL (as described in [1]), which involves implanting an electrode array on the spinal cord to develop a stimulation protocol that allows paraplegics to walk again. Implanted, Sebastian Tobler proposed to combine the EES with the recumbent trike. The EPFL team realized the connection between the implanted rider and the machine. This combination allows the user to have the muscles of the disabled limbs activated without sticking transcutaneous electrodes. The next step is to make this system stable and usable on trails. The presentation will allow you to see one of the possibilities of applying EES.

References

- [1] **Targeted neurotechnology restores walking in humans with spinal cord injury.** Fabien B. Wagner, Jean-Baptiste Mignardot, Camille G. Le Goff-Mignardot, Robin Demesmaecker, Salif Komi, Marco Capogrosso, Andreas Rowald, Ismael Seáñez, Miroslav Caban, Elvira Pironcini, Molywan Vat, Laura A. McCracken, Roman Heimgartner, Isabelle Fodor, Anne Watrin, Perrine Seguin, Edoardo Paoles, Katrien Van Den Keybus, Grégoire Eberle, Brigitte Schurch, Etienne Pralong, Fabio Becce, John Prior, Nicholas Buse, Rik Buschman, Esra Neufeld, Niels Kuster, Stefano Carda, Joachim von Zitzewitz, Vincent Delattre, Tim Denison, Hendrik Lambert, Karen Minassian, Jocelyne Bloch & Grégoire Courtine. *Nature* **563**, 65–71 (2018) doi:10.1038/s41586-018-0649-2

Short Biography

Sebastian Tobler is a lecturer at Bern University of Applied Sciences. He trained as an automotive engineer. He is a great sports lover. These skills acquired in different areas helped him overcome a mountain biking accident that left him quadriplegic. Today he is still a lecturer and also CEO at GBY, a start-up that he founded in 2016.