Coil Parameters:

Magnetic field at 2.3 mm distance from the surface – 2.6 T.

Pulse duration – 280 μs (biphasic).

Coil type – figure-of-eight coil.

Winding dimensions – Ø 25 mm x 2.

Coil case dimensions – 58 mm x 35 mm x 27 mm.

Typical Protocol Performance

Stimulation frequency	Train	Interpulse interval (IPI)	Pulse intensity	Number of pulses
10 Hz	50 pulses / 5 s	55 s	80%	>1200
5 Hz	60 pulses / 12 s	48 s	70%	>1200
1 Hz	-	-	80%	>1200

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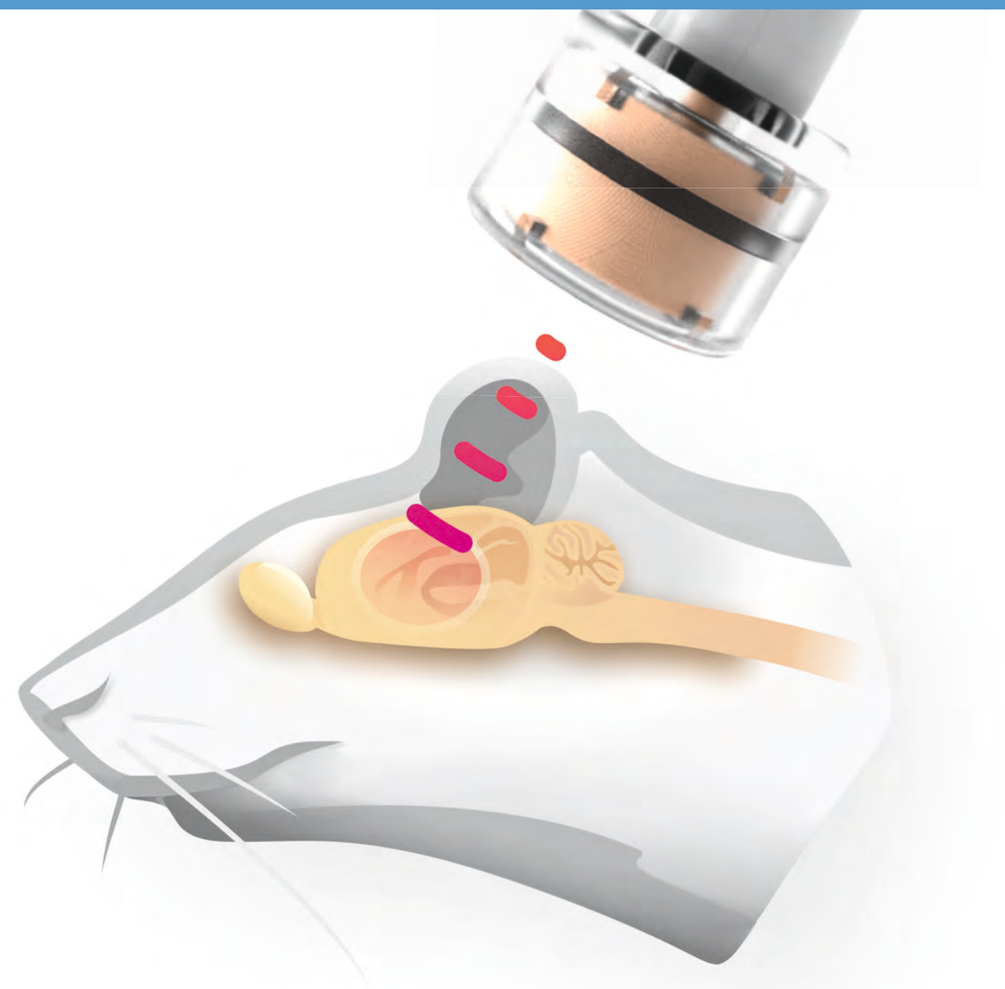
Cooled Rat Coil

For Unilateral Single Pulse and Repetitive Transcranial Magnetic Stimulation of Small Animals

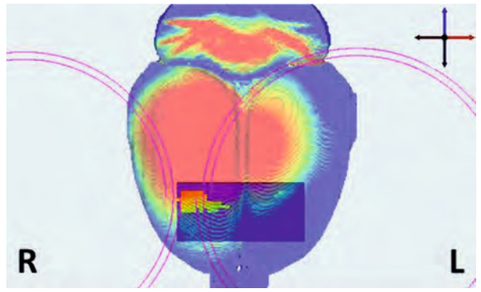


- Optimal coil size allowing focused unilateral stimulation
- Strong magnetic field enough to produce reliable unilateral response and record MEP
- Dynamic liquid cooling allowing to perform long rTMS protocols with high frequencies
- Neuronavigation during TMS of the rodents (coming soon)

Neurosoft

Optimal Coil Size Allowing Focused Unilateral Stimulation

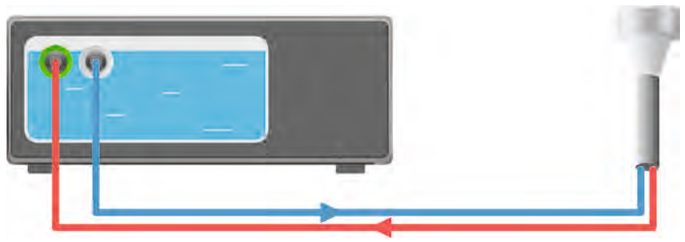
Scientists from different brain research areas traditionally use animal models in the experiments.
One of the widely used models is rodent brain. Therefore researchers today need modern tools for transcranial magnetic stimulation of rodents. One of the most technically challenging tasks is to perform unilateral TMS of rats.
Modeling of electrical field distribution generated by figure-of-eight TMS coil using the fine element model of rat brain shows that optimal size of one coil winding should be about 25 mm.



The team of collaborators from Brain Science Tools Company and Neurosoft Company developed and produced Cooled Rat Coil (Ø 25 mm) FEC-03-25-C which was successfully tested by users from the University Medical Center Utrecht (UMCU).

Dynamic Liquid Cooling Allowing to Perform Long rTMS Protocols with High Frequencies

Having such a small size the coil has very limited possibility to dissipate the heat appearing in the windings when high electrical current passes the coil during stimulation.
To avoid the heating and make the coil able to perform long stimulation sessions, active liquid cooling system was added to the coil.



Neuro-MS/D Cooling Unit *Cooled Rat Coil*

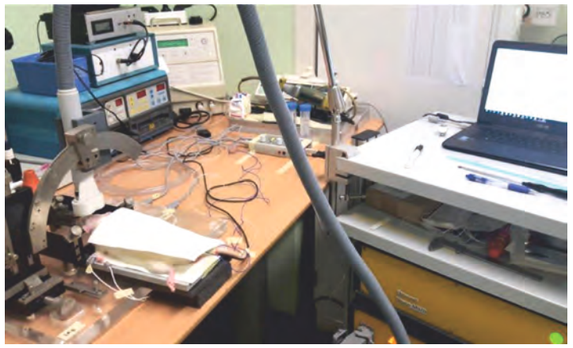
Strong Magnetic Field Enough to Produce Reliable Unilateral Response and Record MEP

First prototype of the coil was tested in Neurosoft TMS lab and then by the Biomedical MR Imaging & Spectroscopy Group in the Center for Image Sciences of University Medical Center, Utrecht, the Netherlands.
Experiments clearly showed that the cooled rat coil can reliably evoke unilateral motor evoked potentials in rats.

To record EMG, Neuro-MEP-Micro system manufactured by Neurosoft was used.

Unilateral Single Pulse and Repetitive Transcranial Stimulation of Small Animals

Focused repetitive transcranial magnetic stimulation is widely used for brain activity modulation. This modulation is already actively applied for the treatment of extensive list of psychiatric and neurological diseases in humans including stroke, Parkinson's disease, depression, etc. However, the mechanism of this action is still being investigated. Small coil allowing focused and navigated repetitive stimulation of the animal models of the diseases could help in understanding of such mechanisms.
The next task for the developer team was to make the coil able to perform long treatment sessions. To solve this task the internal geometry of the cavities where liquid is circulated was optimized and the several temperature sensors were added in the coil.
The coil now can perform long HF and LF rTMS sessions.



The setup for TMS of the rats in the UMCU lab.