

Genetically encoded magnetic receptors

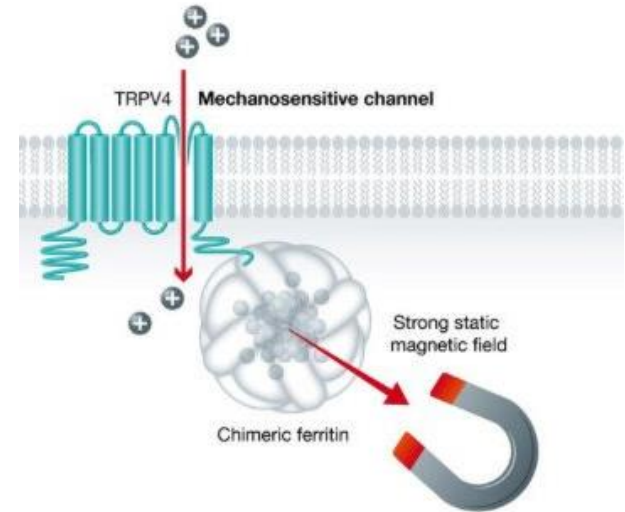
Inventors: Ali Deniz Guler and Michael Alex Wheeler



LICENSING & VENTURES GROUP

Magnetogenetics

- Genetically-targeted magnetic control
- DARPA launched ElectRx program in 2015 highlighting electromagnetic strategy implantation
 - Aims to improve physical and mental health by using targeted stimulation of the PNS to exploit the body's natural ability to effectively heal itself
- Clinical Problem:
 - Currently, optogenetic and chemogenetic actuators are utilized to deconstruct neural correlates of behavior
 - These require invasive models of stimulation and/or slow on/off kinetics

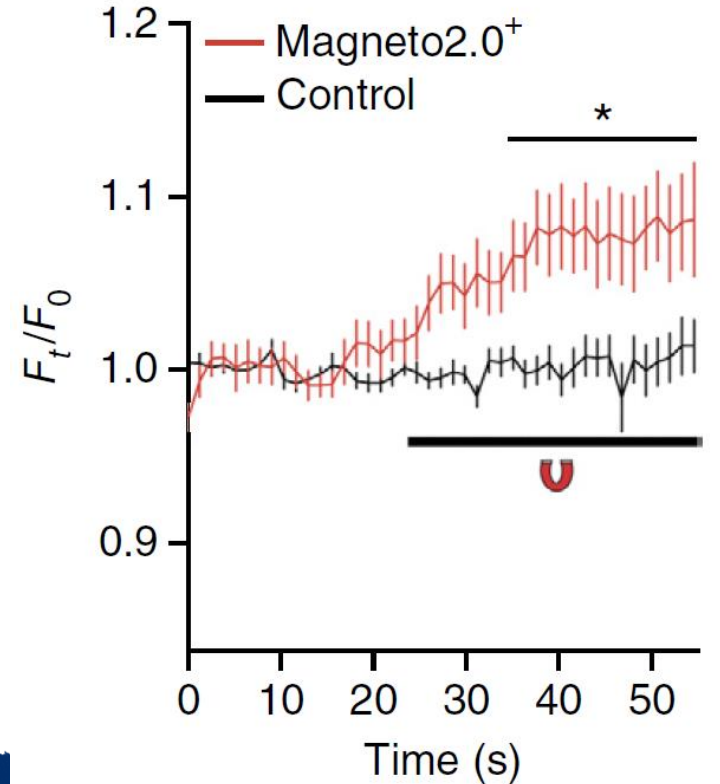


The EMBO Journal: Is magnetogenetics the new optogenetics?

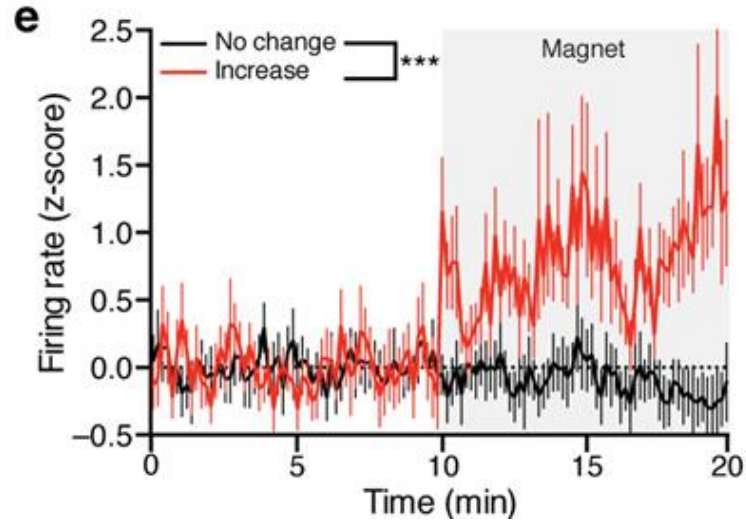
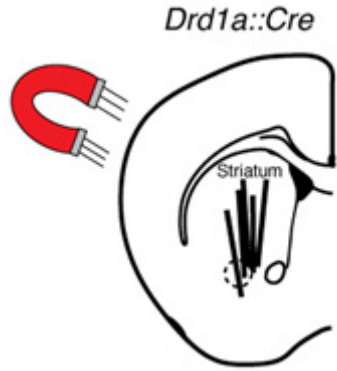
Magneto

Solution: Researchers at the University of Virginia have discovered a non-invasive, magnetic device “Magneto” that can remotely control neuronal circuits.

- Single-component, magnetically sensitive actuator
- Potential applications in treatments of metabolic disorders, such as metabolic and autoimmune disorders through restoration of healthy neural signaling patterns



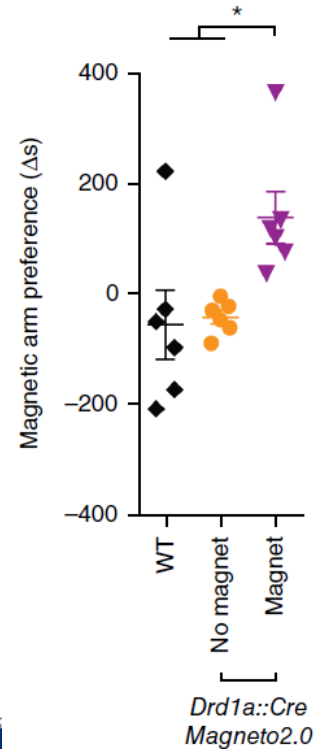
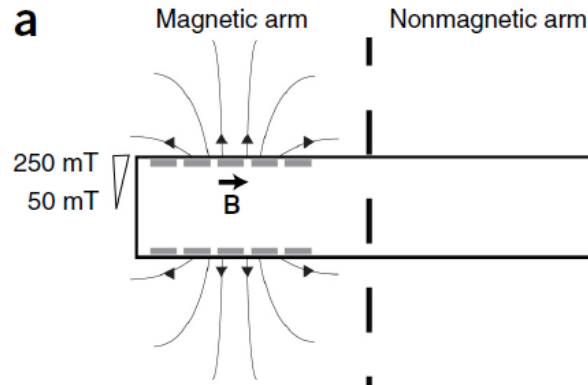
Magneto-dependent control of neural activity in vivo



Representation of magnetic stimulation and recording of DRD-expressing cells, which demonstrates magnetogenetic control of the mammalian nervous system in vivo.

Control over complex mammalian reward behaviors

- **Magneto-expressing mice showed a significant preference for the magnetized arm of the chamber and removal of the magnets eliminated this preference**
- **Magneto's success in remote control of complex mammalian behaviors in freely moving mice**



Relevant Publication

- Nat Neurosci. 2016 May;19(5):756-61. doi: 10.1038/nn.4265. **Guler AD**, et al.

Intellectual Property

- UVA Tech ID: GULER-RECEPTO
 - Title: Compositions and their use for controlling the nervous system in vivo
 - U.S. Patent Application 15/770,141 filed Apr. 20, 2018