Novel device for minimally-invasive optical stimulation of nerve cells

Reference Number: 21-00022

Challenge

In recent years, optical stimulation of nerve cells received massive attention in the field of neuronal research. Presently, the technology is believed to be of outstanding importance in future drug-free treatment options for neurological disorders. However, therapeutic application of optical stimulation requires improved medical devices to address the challenges of a clinical application. For instance, medical devices should be compatible with minimally-invasive surgical procedures and tissue injury by thermal output of the light emitters should be prevented. Only by such improvements a clinical application of optical stimulation will be achievable.

Technology

The newly developed stimulation device is designed for minimally-invasive implantation and is suitable for insertion by catheterization into small cavities of the brain e.g. near to the locus coeruleus of the brainstem. Thus, the implant can be placed in nearly every desired brain region and can easily be anchored there by expansion of the support structure in radial direction. Individually controllable light sources enable selective activation of neuronal structures. Of particular advantage, the support structure has multiple openings and channels through which the cerebrospinal fluid can flow after implantation in the brain. This renders it possible to cool the light sources in a natural manner avoiding injury to the surrounding tissue. In summary, the novel tool is perfectly adapted to the requirements of future therapeutic applications for optical stimulation of the brain.

Commercial Opportunity

In-licensing or collaboration for further development is possible.

Developmental Status

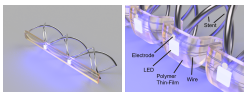
A prototype has been developed and initial proof-of-concept studies have been performed.

Patent Situation

European patent (EP 3145586 B1) with priority of 2015 has been granted. US patent application is pending.

Further Reading

Janitzky K, Lippert MT, Engelhorn A, Tegtmeier J, Goldschmidt J, Heinze HJ, Ohl FW. 2015. Optogenetic silencing of locus coeruleus activity in mice impairs cognitive flexibility in an attentional set-shifting task. *Front Behav Neurosci*. 9:286, 1-8. LaLumiere RT. 2011. A new technique for controlling the brain: optogenetics and its potential for use in research and the clinic. *Brain Stimul*. 4(1):1-6.



Detailed description of of a prototype for an optical stimulation device.

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