PILOT-TRIAL: HIGH FREQUENCY, POISSON DISTRIBUTED CORTICAL STIMULATION IN A SCREENING MODEL FOR EPILEPTIC SEIZURES.

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Aims
Neurostimulation is a promising potential treatment for patients with refractory focal epilepsy who are not amenable to resective surgery. We have evaluated the effect of high-frequency cortical stimulation on cortical excitability in the motor cortex model (CSM). In the CSM, a ramp-shaped pulse train with increasing intensity is delivered to the motor cortex. The threshold intensity for eliciting forelimb clonus is determined through behavioural observation, and used as a measure for cortical excitability.

Methods
Three Wistar rats were implanted with epidural stimulation electrodes positioned over the motor cortex (AP -1mm; ML ±3mm). All rats underwent 1h of therapeutic cortical stimulation or control stimulation on alternating days (Poisson pulse, 130Hz, PW 100µs). The threshold intensity needed to elicit forelimb clonus was determined before and after stimulation (mean of 3 measurements, performed at 5min intervals). The intensity of therapeutic stimulation was individually determined for each rat as 100µA lower than the baseline threshold intensity. Control stimulation was performed with an intensity of 10µA.

Results
Control stimulation did not significantly alter the threshold to forelimb clonus (436±61µA before and 454±90µA after stimulation). Therapeutic stimulation (mean intensity 293µA) significantly increased the threshold to forelimb clonus from 393±22µA before to 537±57µA after stimulation ($p<0.05$).

Conclusion
High-frequency, Poisson-distributed cortical stimulation during 1h decreases cortical excitability. Further studies are needed to determine whether this type of stimulation can become an effective alternative treatment for patients with focal neocortical epilepsy who are not amenable to surgery.