NeuroNexus
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NeuralGlider Inserter

The NeuralGlider Inserter from Actuated Medical uses ultrasonic micro-vibration to reduce forces and resultant dimpling during neural implant insertions. It has been tested *in vitro*, *ex vivo*, and *in vivo* with a variety of neural implants. The reduced insertion force facilitates slow (0.1 mm/s), accurate implant insertions while minimizing displacement/dimpling of the cortical surface, helping to preserve the integrity of the underlying neural tissue.

Say goodbye to cortical dimpling

- **Reduces Insertion Force –** Micron-scale, ultrasonic vibration during insertion reduces the force required to penetrate the brain surface.
- **Improves Accuracy –** Reduced insertion force facilitates slow (0.1 mm/s or slower), accurate array insertions while minimizing dimpling or tissue displacement.
- **Preserves Tissue Integrity –** Slow and accurate insertions with minimal tissue displacement can result in a better signal-to-noise ratio compared to conventional insertions.
- **Integrated software –** Controls insertion velocity and depth.
- **Produces consistent insertions –** The NeuralGlider Inserter standardizes electrode insertions for all users so researchers can eliminate variability in electrode placement methodology (e.g., velocity, depth, tissue deformation) and ensure reproducibility across experiments.
- **Compatibility with a wide range of neural implants –** Custom coupling solutions are available to facilitate NeuralGlider Inserter use with a wide range of commercial and 'homemade' implant styles. Rental or purchase of the NeuralGlider Inserter includes engineering time to support the development of a coupler for your preferred neural implant.

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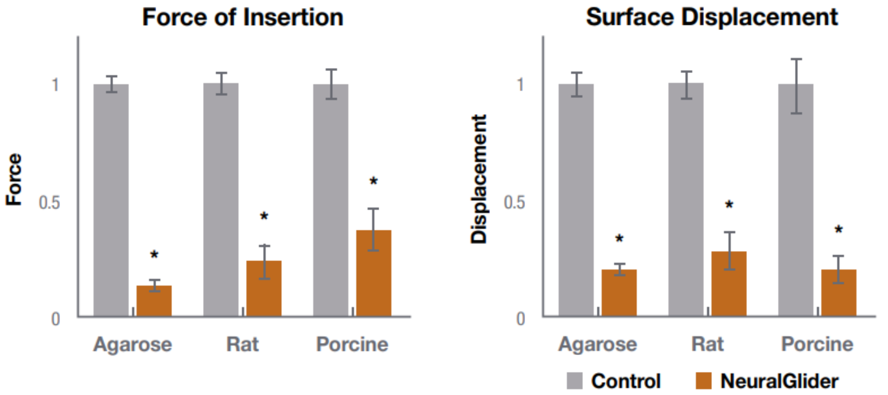
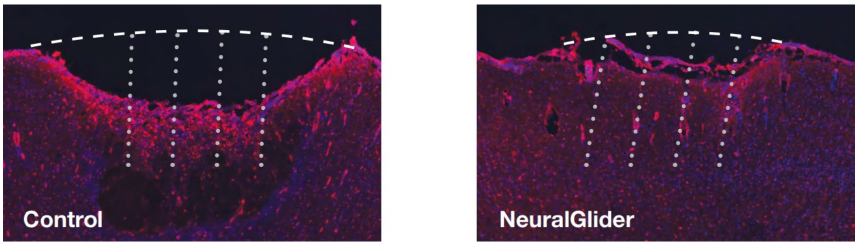
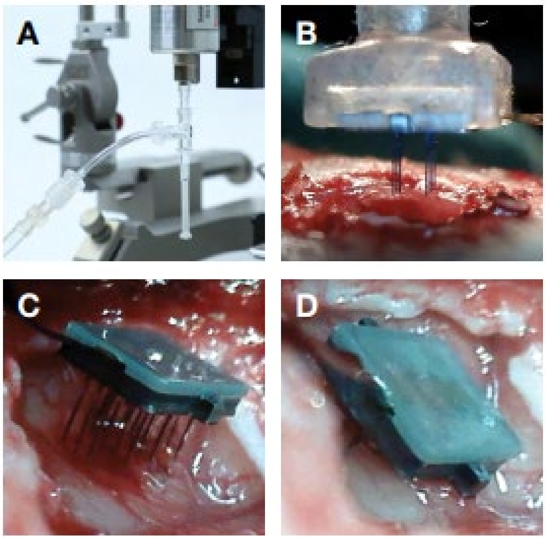


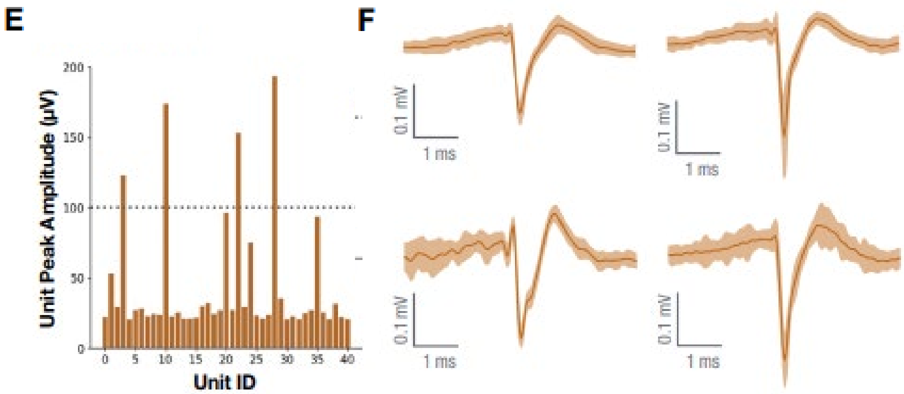


Ultrasonic vibration of microwire arrays during insertions with NeuralGlider significantly reduced penetration force in an agarose brain model, and ex vivo rat and porcine cortex (reductions in force = 86.3%, 76.5% and 62.7%, respectively). The reduction of force correlates to a 70 - 80% reduction in cortical surface displacement/ dimple during array insertion, for all tissues. *p< 0.0001; error bars = standard error of the mean. All data were normalized to the non-vibrated/control insertion average for each tissue.

Compared to a standard control insertion (left), NeuralGlider reduced cortical surface damage and blood brain barrier leakage (IgG staining, red) at the microwire array insertion site (right). Images showed 20 μm rat cortical sections, 2 weeks after implantation with 2x4, 50 μm microwire arrays.

NeuralGlider vibration allows Matrix arrays to be fully inserted at slow velocities





(A-B) NeuralGlider Coupler transmits vibration while using vacuum pressure to secure the neural implant during insertion.

(C) Control and (D) NeuralGlider insertions into *in vivo* brain model. Insertions performed at velocity = 0.05 mm/s. Note complete penetration of NeuralGlider array. Spontaneous multi-unit neural activity (MUA) was recorded over a period of 15 min following a 45 min post-insertion recovery period. (E) Action potential waveforms were clustered using a spike sorting algorithm and waveforms corresponding to single neurons (N= 41) were isolated from MUA recordings. (F) Spike waveform templates with action potential amplitudes exceeding 100 μV (dashed line E) were selected and each template was compared to underlying action potential waveforms to validate automated sorting process.

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