In acute experiments, Sperry et al. demonstrated single-unit neural recordings in sacral dorsal root ganglion of anesthetized felines using a 4.5 µm-thick, high-density flexible polyimide microelectrode array with 60 sites and 30-40 µm site spacing. They delivered arrays into DRG with ultrananocrystalline diamond shuttles designed for high stiffness affording a smaller footprint. They recorded neural activity during sensory activation, including cutaneous brushing and bladder filling, as well as during Electrostimulation of the pudendal nerve and anal sphincter. They used a specialized neural signal analysis software to sort densely-packed neural signals.

They successfully delivered arrays in five of six experiments and recorded single-unit sensory activity in four experiments. The median neural signal amplitude was 55 µV peak-to-peak and the maximum unique units recorded at one array position was 260, with 157 driven by sensory or Electrostimulation. In one experiment, we used the neural analysis software to track eight sorted single units as the array was retracted ~500 µm.

This study is the first demonstration of ultrathin, flexible, high-density electronics delivered into DRG, with capabilities for recording and tracking sensory information that is a significant improvement over conventional DRG interfaces [1)].

1)
Sperry ZJ, Na K, Jun J, Madden LR, Socha A, Yoon E, Seymour J, Bruns TM. High-density neural recordings from feline sacral dorsal root ganglia with thin-film array. J Neural Eng. 2021 Feb 5. doi: 10.1088/1741-2552/abe398. Epub ahead of print. PMID: 33545709.