DeepEn

in vivo Microendoscopy

for animal model research

Powerful bioimaging in deep tissue through a hair-thin endoscope.

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Hair-thin Endoscope for High-Resolution Deep-Tissue Bioimaging

DeepEn's cutting-edge technology delivers powerful in vivo bioimaging through a hair-thin probe, just **110 µm in diameter.** It enables probing deep into the living brain — reaching regions such as the **amygdala, VTA, medial septum, brainstem, and spinal cord** — while minimising structural damage and preserving physiological function.

DeepEn's Microendoscopy Setup

With submicron lateral resolution and a 100 µm x 100 µm field of view, the Microendoscope provides **imaging with real-time focus** adjustment. Its high readout speed makes it ideally suited for recording fast neuronal activity, including studies based on voltage imaging in animal models.

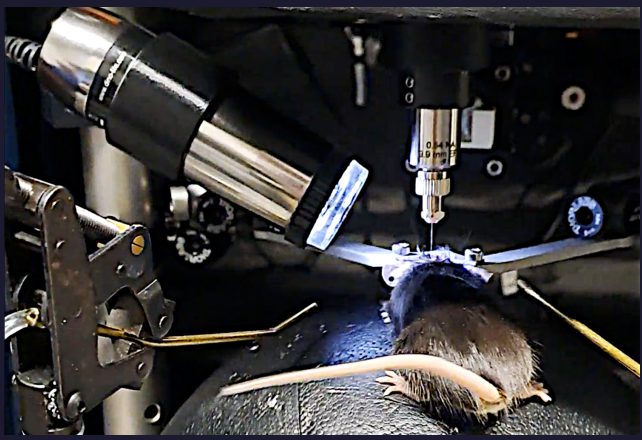
A new hair-thin imaging probe is attached

Key Research Areas

Fundamental neuroscience: neuronal plasticity, connectivity mapping, calcium and voltage imaging, microcircuit analysis.

Disease research: Alzheimer's, Parkinson's, psychiatric disorders (depression, anxiety, schizophrenia), addiction, chronic pain, epilepsy, sleep, and arousal studies

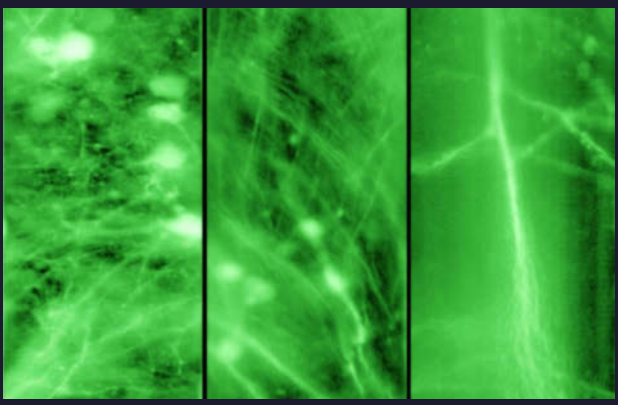
Biomedical discovery & preclinical research: drug testing, mechanism-of-action analysis, and biomarker validation.



Behavioural setup with mouse model on a floating ball

Structural Imaging

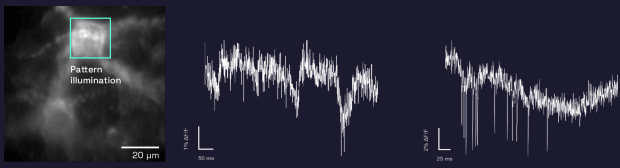
With a slower frame rate, **submicron resolution** can be achieved – ideal for visualising individual cells, fine neuronal structures such as dendrites and spines, and even subcellular compartments. This high-resolution imaging capability does not degrade with depth.



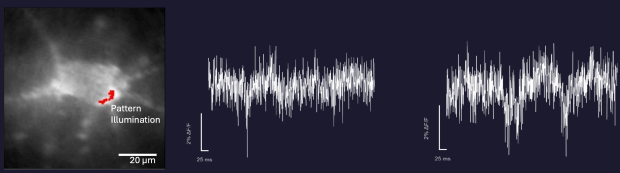
Structural recordings along the insertion path

Voltage Imaging

The fast-frame-rate mode, suitable for voltage imaging, is used to record **action potentials** and **subthreshold events** for capturing neuronal activity in real time. By reducing spatial resolution and focusing on selected readout areas, this mode achieves the speed required.



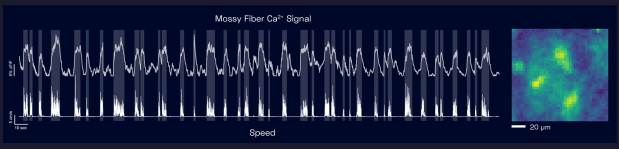
Voltage recording from **Cortex**



Voltage recording from **Amygdala**

Calcium Imaging

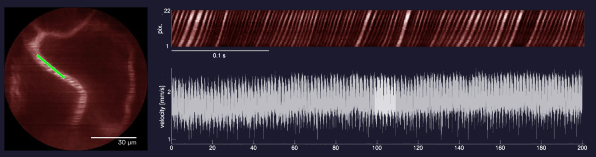
The fast-frame-rate mode is suitable for calcium imaging, enabling the capture of neuronal activity in real-time. This mode achieves the speed necessary to monitor dynamic calcium signals in labelled neurons. It provides an efficient solution for studying neuronal **signalling, network dynamics, and functional connectivity** deep in living tissue.



Correlation between movement and calcium signals of mossy fibres deep in cerebellum during locomotion by Prof Dr Janelle Pakan, Leibniz Institute of Neurobiology (2024)

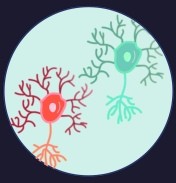
Blood flow tracking

The technology allows high-resolution in vivo imaging of fluorescently labelled blood vessels (e.g., with FITC-dextran). By performing imaging at approximately 1kHz, the researchers captured red blood cell traces to derive blood-flow velocity profiles and power spectra, which revealed characteristic peaks associated with **heart rate, respiration, and slow (<0.1 Hz) vascular oscillations** linked to neurovascular coupling.

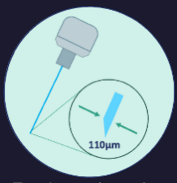


Source: Stibůrek, M., Ondráčková, P., Tučková, T. et al. 110 µm thin endo-microscope for deep-brain in vivo observations of neuronal connectivity, activity and blood flow dynamics. Nat Commun 14, 1897 (2023).

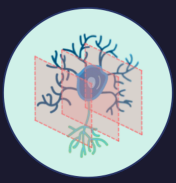
Modalities



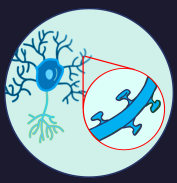
Multicolour operation



Reduced probe footprint



Adjustable focal distance



High-resolution imaging

Technical Specifications

Specification	Description
Fibre size / field of view (FOV)	Ø 110 µm / Ø 100 µm
Excitation wavelength	Blue 488 nm or Green 532 nm (450, 471, 488, 515, 532, 561 nm) two - colour excitation possible
Submicron optical resolution	Equivalent to 20x microscope objective
Focal plane adjustment	Up to 50 µm from the fibre facet
Signal readout speed	kHz range

Microendoscope technology is under development and not marketed by DeepEn in the United States. All recordings were obtained in European Laboratories. Microendoscopes are intended for research use on animal models only.

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