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SPARC - Gastrointestinal myoelectric recordings from the behaving ferret

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1 Works for me dx.doi.org/10.17504/protocols.io.6a8hahw

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ABSTRACT

This protocol provides the steps for recording the gastrointestinal myoelectric responses and stimulation of the abdominal vagus nerve from the behaving ferret. These tests occur after an animal is surgically implanted with gastrointestinal and vagus nerve electrodes (see the protocol "SPARC - Chronic implantation of gastrointestinal and vagus nerve electrodes in the ferret" for implantation methods).

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EXTERNAL LINK

https://www.biorxiv.org/content/10.1101/607242v2

THIS PROTOCOL ACCOMPANIES THE FOLLOWING PUBLICATION

Machine learning prediction of emesis and gastrointestinal state in ferrets Ameya C. Nanivadekar, Derek M. Miller, Stephanie Fulton, Liane Wong, John Ogren, Girish Chitnis, Bryan McLaughlin, Shuyan Zhai, Lee E. Fisher, Bill J. Yates, Charles C. Horn bioRxiv 607242; doi: https://doi.org/10.1101/607242

GUIDELINES

The following guidelines are important:
1) care must be taken to not damage the head connector (e.g., getting debris inside the connection)
2) a ferret will often play with the tether, especially during initial exposure; therefore, the position of the tether will need to be manipulated manually to avoid the animal getting tangled

MATERIALS

NAME	CATALOG #	VENDOR
feeding tube	9012	Bio-Serv
Emetine dihydrochloride hydrate	45160	Sigma-aldrich

Room setup

1 Cover floor of behavioral test chamber with layer of Alpha-dri bedding. The floor of the plexiglas chamber is 51 x 51 cm (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3348962/)

2 Turn off all lights except lamp over testing chamber.

3 Set up video camera directly above chamber so that entire area is visible with minimal shadows. Set up a second camera to view the feeding tube from the side for feeding trials to track volume consumed.

video camera
camera
Sony HDR-XR550V

4 Suspend tether ~50 cm above chamber and secure with rubber bands to provide elasticity as the animal moves.

5 Keep the room quiet during recording except for white noise.

Animal

6 Animal should be fasted 3 hours before starting recording.

7 Place animal in chamber and allow 10 minutes for acclimation.

8 Connect animal to tether.

9 During testing, hold the tether straight above the animal out of its reach, but with some slack. If the animal tries to grab the tether, especially during adaptation, a plastic straw can be inserted through the breathing holes in the side of the chamber to distract the animal from the tether.

Recording: Baseline control

10 Record electrode impedances before the recording begins.

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11 Electrophysiological recording and video recording should be started at the same time.

Media Recorder
video to computer recording system
Noldus Information Technology MediaRecorder

12 Record 1 h of baseline data for control days.

Recording: Feeding

13 For feeding trials, introduce Ensure liquid diet in a graduated tube (100 ml Richter glass feeding tube) attached to the side of the chamber at 10 min after the start of recording. Remove the feeding tube 45 min after presentation. Finish with 10 min of baseline recording.

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Recording: Feeding with vagus stimulation

14 For feeding with stimulation trials, introduce Ensure at the same time as in Step 13. Start stimulation 2 minutes after food introduction. Stop stimulation and remove food at the same time, i.e., minute 45 in the recording. Finish with 10 minutes of baseline

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Recording: Emetiine (emesis testing)

15 For emetine trials, begin infusion at the 10 min in the recording. Infusion rate is 10ml/min. Record for 1 hour after infusion has ended.

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15.1 After recording is done, animal should be monitored until there is no further emesis.

Recording: Water control

16 For water control trials, follow Step 15.

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End

17 Stop electrophysiological and video recordings at the same time.

18 Measure impedances at the end of each recording.

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