nature research

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MRI Studies Reporting Summary

Form fields will expand as needed. Please do not leave fields blank.

▶ Experimental design

1. Describe the experimental design.

   Single trials based on defined block stimuli.

2. Specify the number of blocks, trials or experimental units per session and/or subject, and specify the length of each trial or block (if trials are blocked) and interval between trials.

   All data presented is from individual trials. Sample numbers for each experiment are presented in Methods and figure captions.

3. Describe how behavioral performance was measured.

   n/a

▶ Acquisition

4. Imaging

   a. Specify the type(s) of imaging.

   Structural and functional.

   b. Specify the field strength (in Tesla).

   7 T for in vitro studies. 9.4 T for in vivo.

   c. Provide the essential sequence imaging parameters.

   RARE T2 (TR = 3000 ms, effective TE = 90, RARE factor = 8)
   T2 SE-EPI (TE = 60 ms, TR = 4 s)
   matrix size = 75 × 50, FOV = 3 cm × 2 cm, slice thickness = 1.2 mm

   d. For diffusion MRI, provide full details of imaging parameters.

   n/a

5. State area of acquisition.

   Multiple 2D slices centered around the area of probe infusion.

▶ Preprocessing

6. Describe the software used for preprocessing.

   All processing done in MATLAB.

7. Normalization

   a. If data were normalized/standardized, describe the approach(es).

   fMRI data was normalized to baseline data from within each block. There was no normalization across animals.

   b. Describe the template used for normalization/transformation.

   n/a

8. Describe your procedure for artifact and structured noise removal.

   Whole datasets with significant artifacts or noise were excluded from the study.

9. Define your software and/or method and criteria for volume censoring, and state the extent of such censoring.

   Only ROI analysis was reported in this study; no volume censoring was performed.

▶ Statistical modeling & inference

10. Define your model type and settings.

    n/a

11. Specify the precise effect tested.

    Fractional signal changes due to stimuli were evaluated.

12. Analysis

    a. Specify whether analysis is whole brain or ROI-based.

> ROI data were plotted for analysis with whole slices presented for display.

    b. If ROI-based, describe how anatomical locations were determined.

> ROIs were chosen algorithmically based on post stimulus signal change. They were not biased to the area of probe injection.

13. State the statistic type for inference.
(See Eklund et al. 2016.)

> n/a

14. Describe the type of correction and how it is obtained for multiple comparisons.

> n/a

15. Connectivity

    a. For functional and/or effective connectivity, report the measures of dependence used and the model details.

> n/a

    b. For graph analysis, report the dependent variable and functional connectivity measure.

> n/a

16. For multivariate modeling and predictive analysis, specify independent variables, features extraction and dimension reduction, model, training and evaluation metrics.

> n/a