

# Surface-based cortical parcellation of the sheep brain

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## Introduction

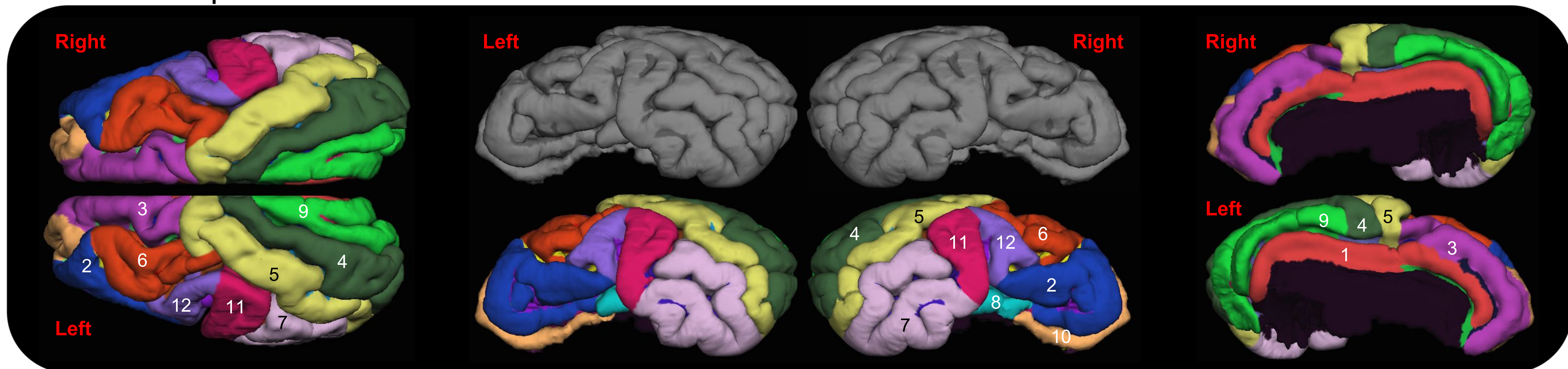
- The sheep model is a compelling yet underused model for understanding structure and function of the cortex.
- Brain atlases have largely focused on subcortical regions in sheep, very little information is available about the cortical parcellation.
- Neuroanatomical labeling facilitates the generalizability and comparability of experimental results across studies and laboratories.
- The current work aimed to produce a surface-based labeling of the entire sheep cortex.

## Atlas of the Sheep Neocortex

Superior

Lateral

Medial

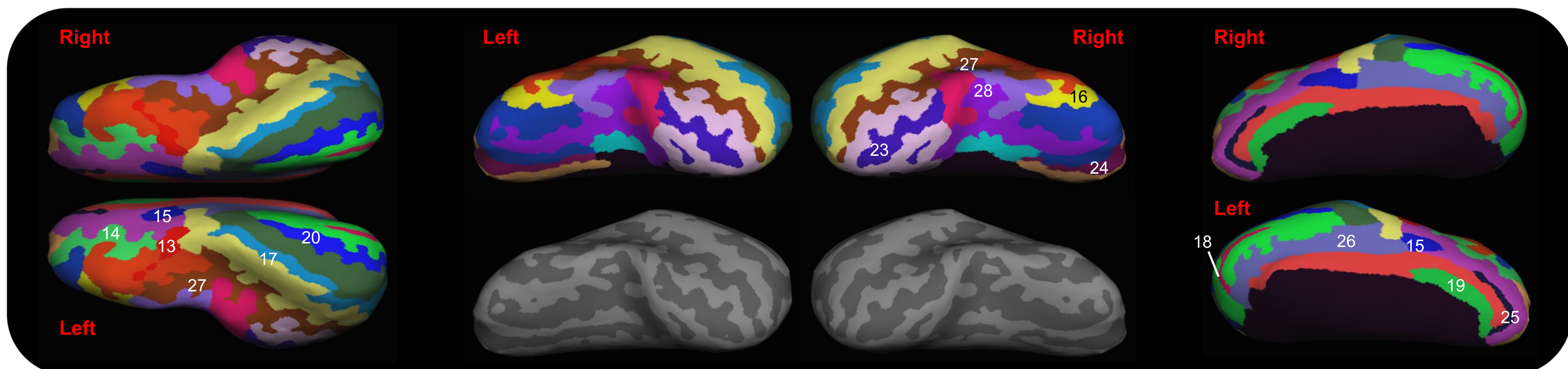


- 1) Gyrus cinguli
- 2) Gyrus compositus
- 3) Gyrus cruciatus
- 4) Gyrus ectomarginalis caudalis
- 5) Gyrus ectomarginalis medius
- 6) Gyrus ectomarginalis rostralis
- 7) Gyrus ectosylvius

- 8) Insula
- 9) Gyrus marginalis
- 10) Gyrus proreus
- 11) Gyrus sylvius caudalis
- 12) Gyrus sylvius rostralis
- 13) Sulcus ansatus
- 14) Sulcus coronalis

- 15) Sulcus cruciatus
- 16) Sulcus diagonalis
- 17) Sulcus ectomarginalis
- 18) Sulcus endomarginalis
- 19) Sulcus genualis
- 20) Sulcus marginalis
- 21) Sulcus occipitotemporalis

- 22) Sulcus olfactorius
- 23) Sulcus posticus
- 24) Sulcus presylvius
- 25) Sulcus rostralis internus
- 26) Sulcus splenialis
- 27) Sulcus suprasylvius
- 28) Sulcus sylvius



## Conclusions

- A computerized labeling of the entire sheep neocortex containing 28 regions (12 gyri, 16 sulci) per hemisphere is provided.
- We also aim to produce a *probabilistic* parcellation that will optimize *automatic* labelling of the entire sheep brain.
- As well as providing an atlas of the sheep cortex it is hoped that the atlas, along with the pipelines used to create it, will also facilitate neuroimaging research of this valuable large animal model.

## Methods

- High-resolution (0.6 mm<sup>3</sup>) T1-weighted MR images were collected from 20, two-year old Ile de France ewes using a 3T Siemens Magnetom Verio.
- Standard processing streams of the Freesurfer software suite (<http://freesurfer.net>, Dale 1999; Fischl 1999) that produce automatically labeled cortical surfaces of the *human* cortex (Destrieux 2010) were modified to enable semi-automatic labelling of the *sheep* cortex.
- Anatomical nomenclature is based on previous literature (e.g., Landacre 1930) and the Nomina Anatomica Veterinaria (5<sup>th</sup> Edition).

