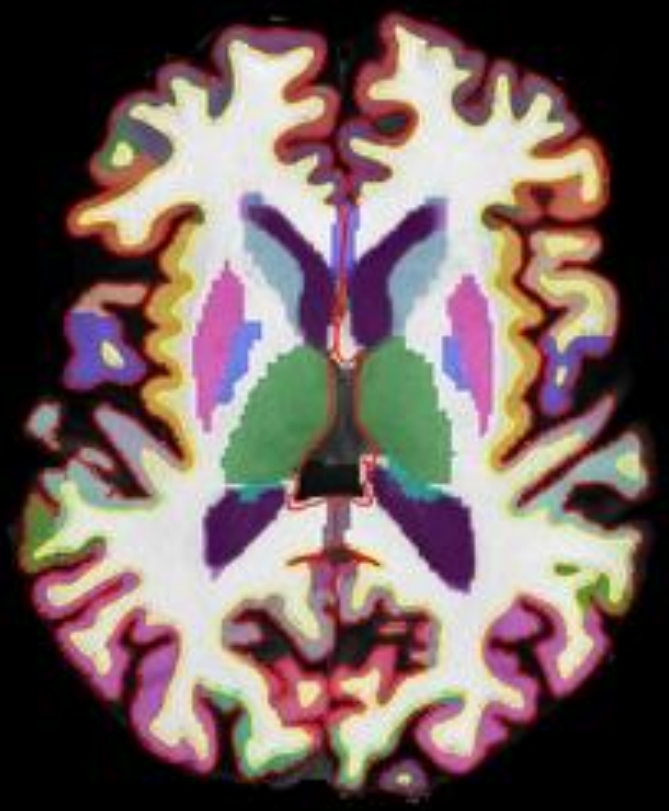
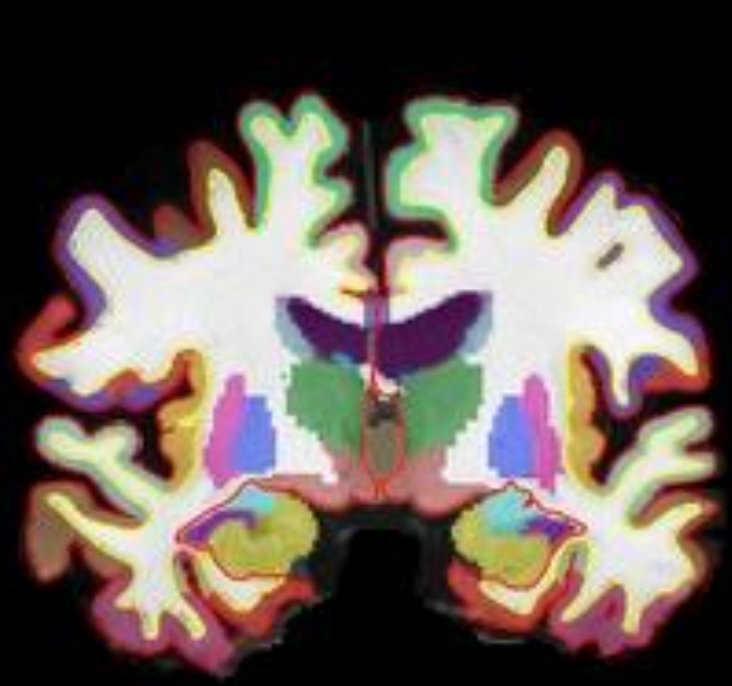
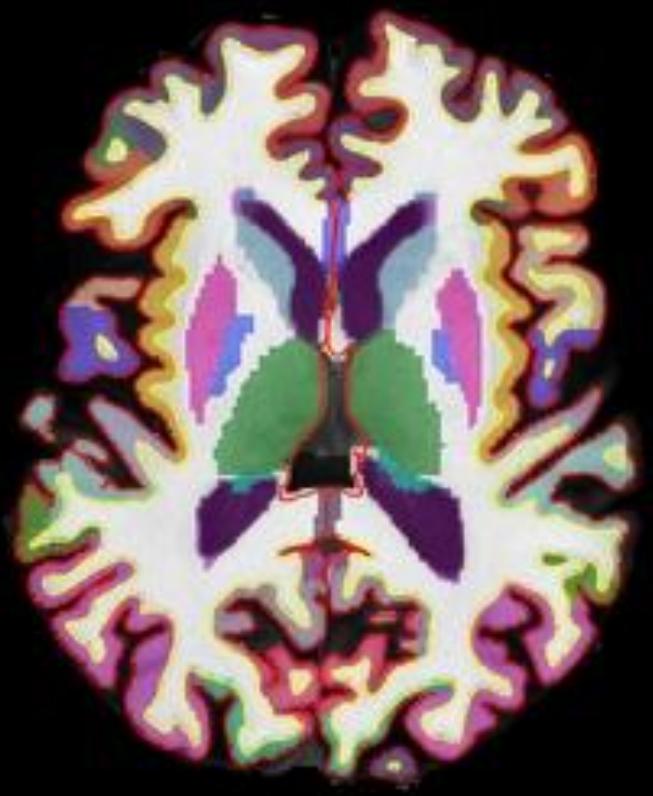


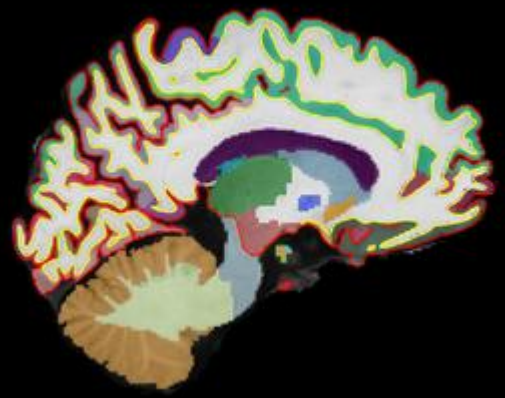
ENIGMA-PD subcortical quality control

Created by Emile d'Angremont and Eva van Heese | July 2025

A quick recap of subcortical anatomy



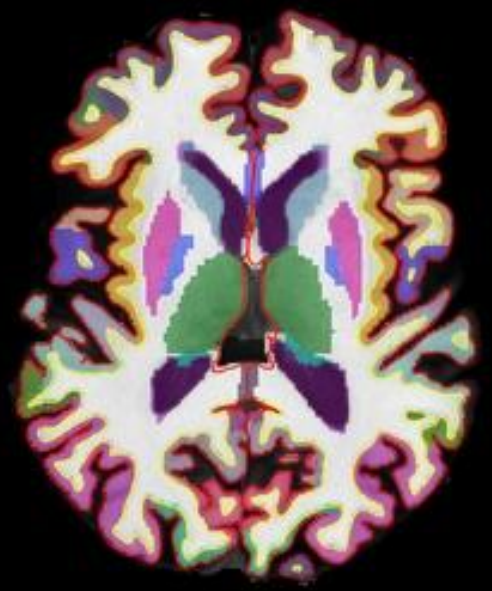




As mentioned in the output and QC sheet:

Thalamus
Pallidum
Putamen
Caudate
Accumbens-area
VentralDC *(diencephalon)*
Hippocampus
Amygdala
Brain-Stem
Inf-Lat-Vent *(inferior lateral ventricle)*
choroid-plexus
Cerebellum-White-Matter
Cerebellum-Cortex

Instructions for subcortical quality control



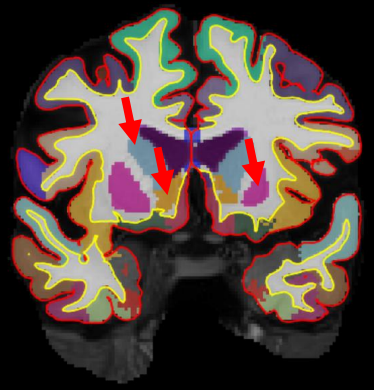
We ask you to quality check the following brain regions:
Thalamus, Pallidum, Putamen, Caudate, Accumbens-area, VentralDC *(diencephalon),* Hippocampus, Amygdala, Brain-Stem, Cerebellum-White-Matter, Cerebellum-Cortex

<u>Key instructions:</u>

- Do **cortical QC first** to help develop an eye for failed segmentations
- Inspect all subcortical regions **simultaneously** (they are located close together and typically easier to assess in a single glance than cortical regions)
- Segmentation errors are **rare** in the subcortex; most regions should pass. Minor shape or asymmetry issues are okay. *Fail* only for clear, severe errors (e.g., very distorted or misplaced regions)
- If there's a problem, it's often **widespread**. Errors often affect multiple neighboring regions - or all subcortical regions - rather than just one
- When in doubt, *pass*

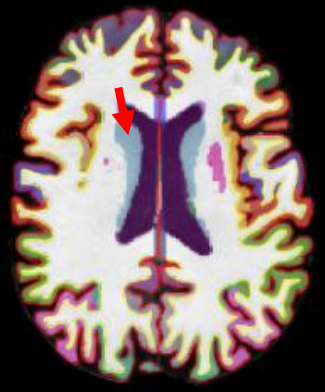
Which slices to use for each subcortical region? (with arrows)

More **anterior** coronal slices (on the left side of the html): Thalamus, Pallidum, Putamen, VentralDC, Hippocampus, Amygdala



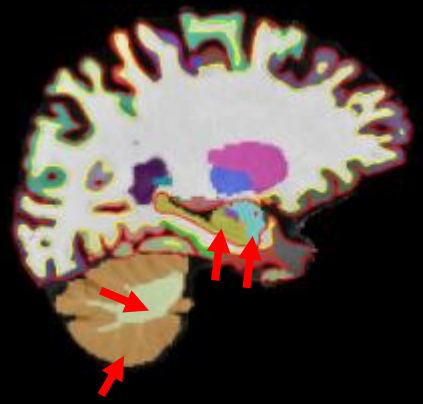
More **posterior** coronal slices (on the right side of the html): Putamen, Caudate, Accumbens-area

Inferior **horizontal** slices: Thalamus, Pallidum, Putamen

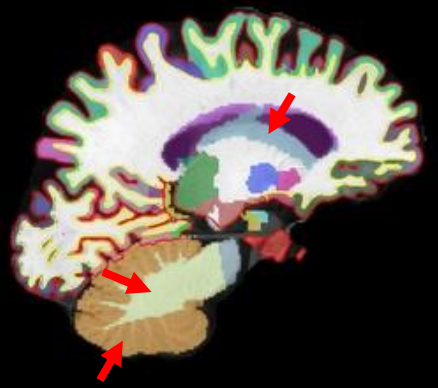


Superior h**orizontal** slices: Caudate

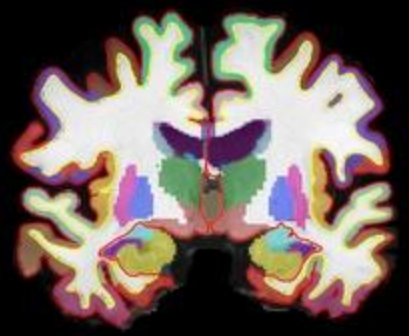
Medial **sagittal** slices: VentralDC, Brain-Stem, Cerebellum-White-Matter, Cerebellum-Cortex



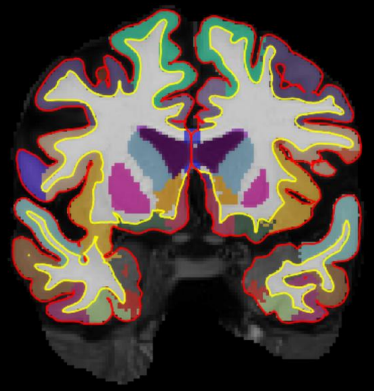
Most lateral **sagittal** slices Hippocampus, Amygdala, Caudate, Cerebellum-White-Matter, Cerebellum-Cortex



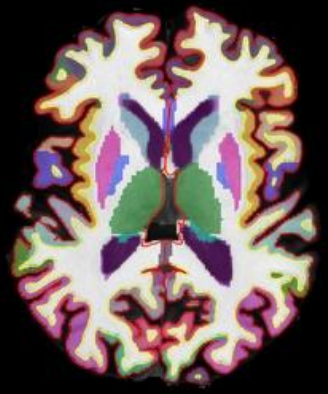
Which slices to use for each subcortical region? (without arrows)



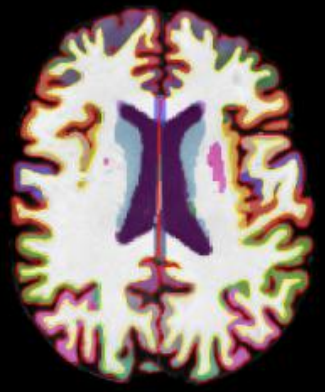
More **anterior** coronal slices (on the left side of the html): Thalamus, Pallidum, Putamen, VentralDC, Hippocampus, Amygdala



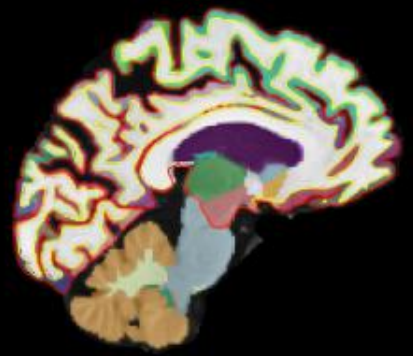
More **posterior** coronal slices (on the right side of the html): Putamen, Caudate, Accumbens-area



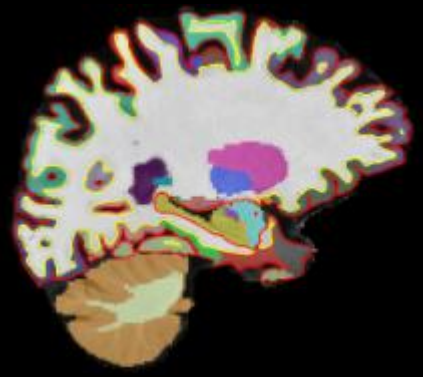
Inferior **horizontal** slices: Thalamus, Pallidum, Putamen

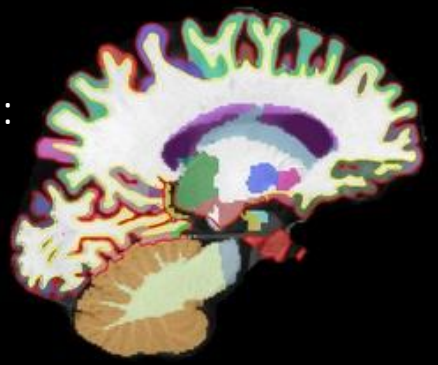


Superior h**orizontal** slices: Caudate



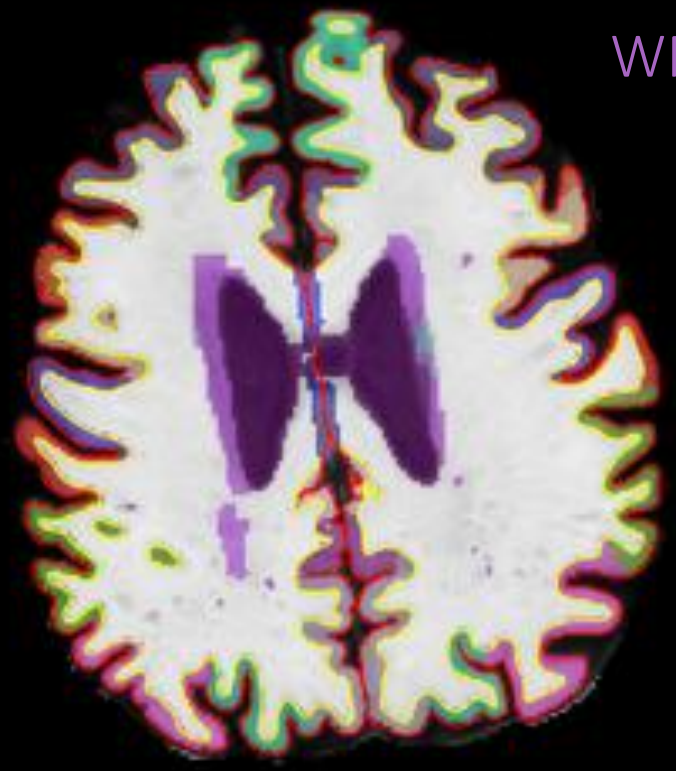
Medial **sagittal** slices: VentralDC, Brain-Stem, Cerebellum-White-Matter, Cerebellum-Cortex





Most lateral **sagittal** slices: Hippocampus, Amygdala, Caudate, Cerebellum-White-Matter, Cerebellum-Cortex

Good to know

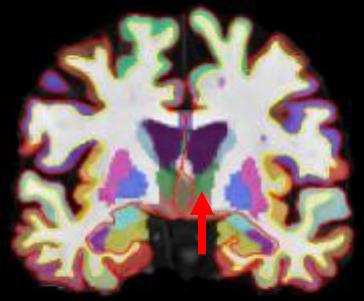


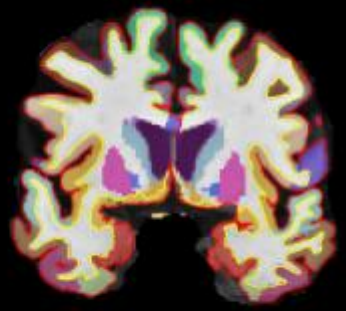
WM-hypointensities

White matter hypointensitites (*hypo* on T1, *hyper* on T2/FLAIR) are depicted in lighter purple, for example on this image, where they surround the ventricles (in darker purple).

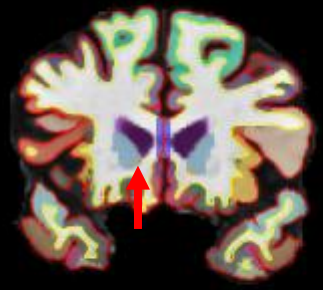
Good to know 2

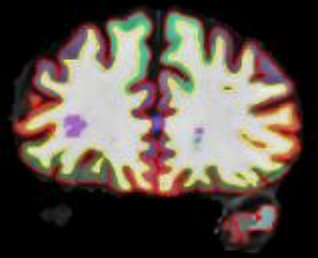
The slices that were selected for these **coronal** screenshots, appear on a different level for each participant. Sometimes the selected slices are not perfect for the quality control of subcortical regions:





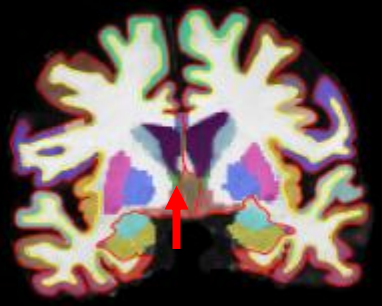
thalamus not very visible

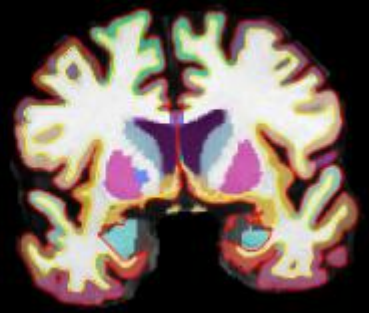


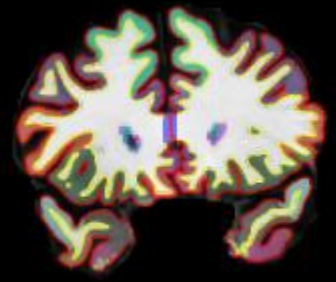


accumbens-area not very visible

slice not useful at at all





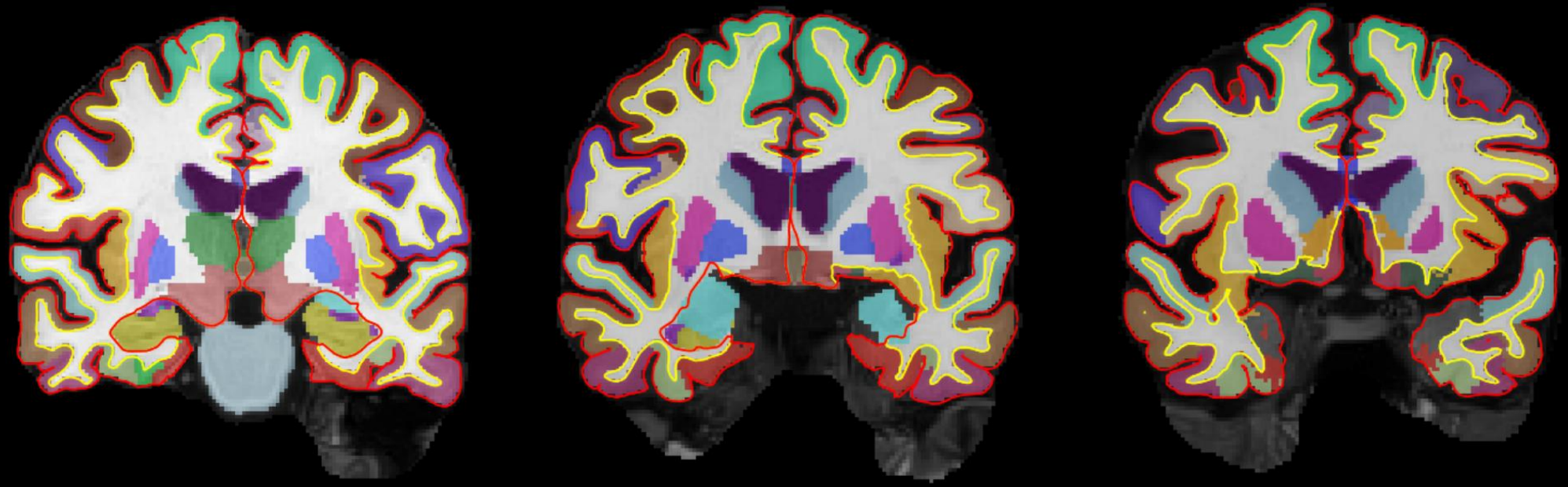


In these cases, try to use the **sagittal** and **horizontal** to estimate whether serious issues are present.

Good examples

Coronal view

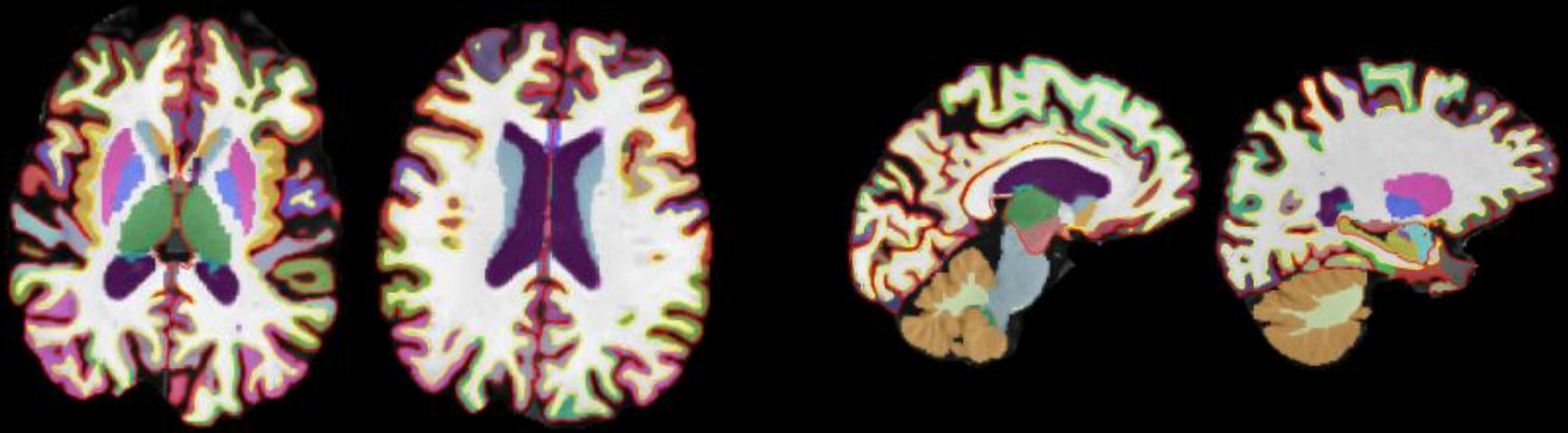
posterior



anterior

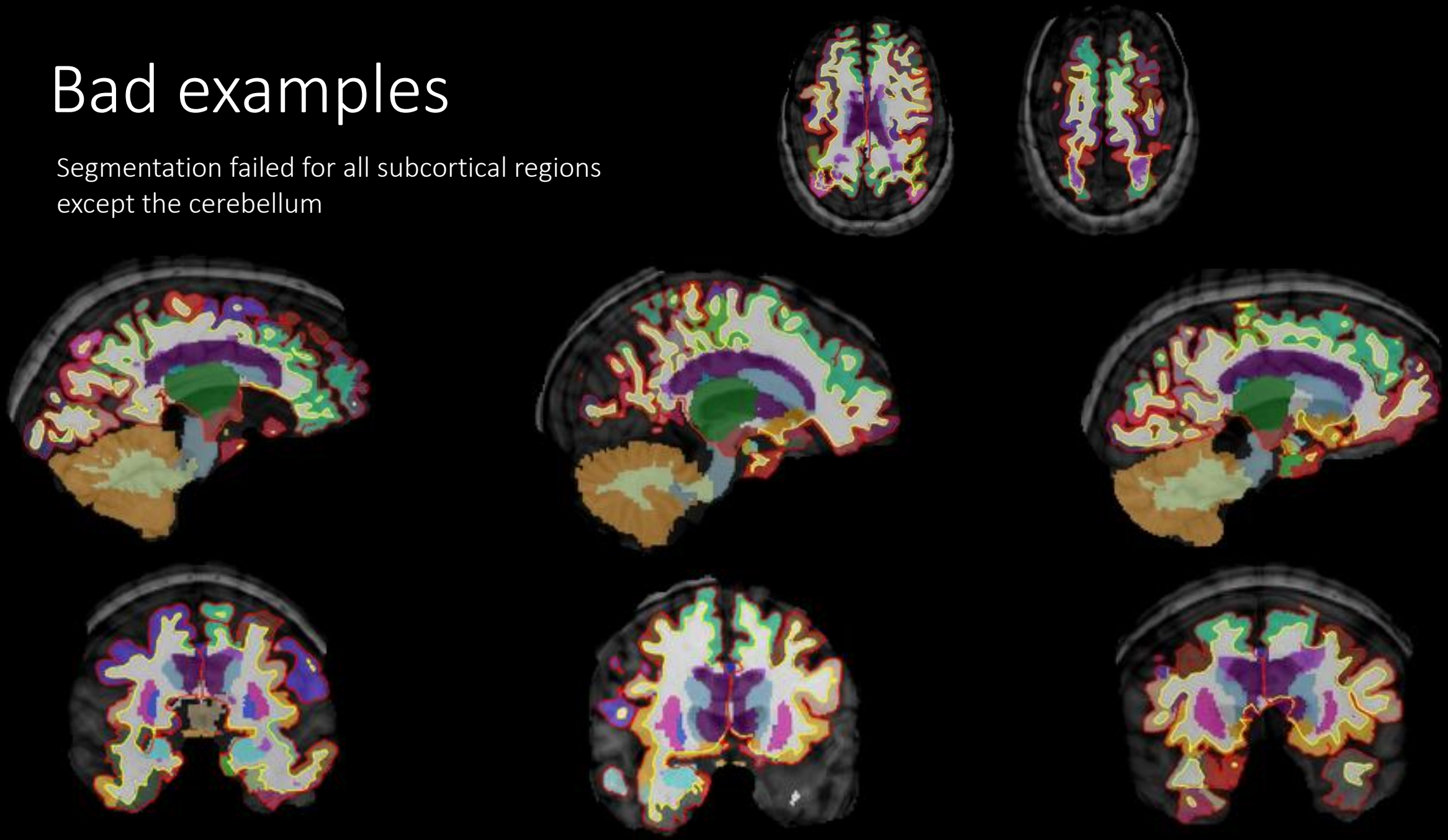
Good examples

Horizontal and sagital view



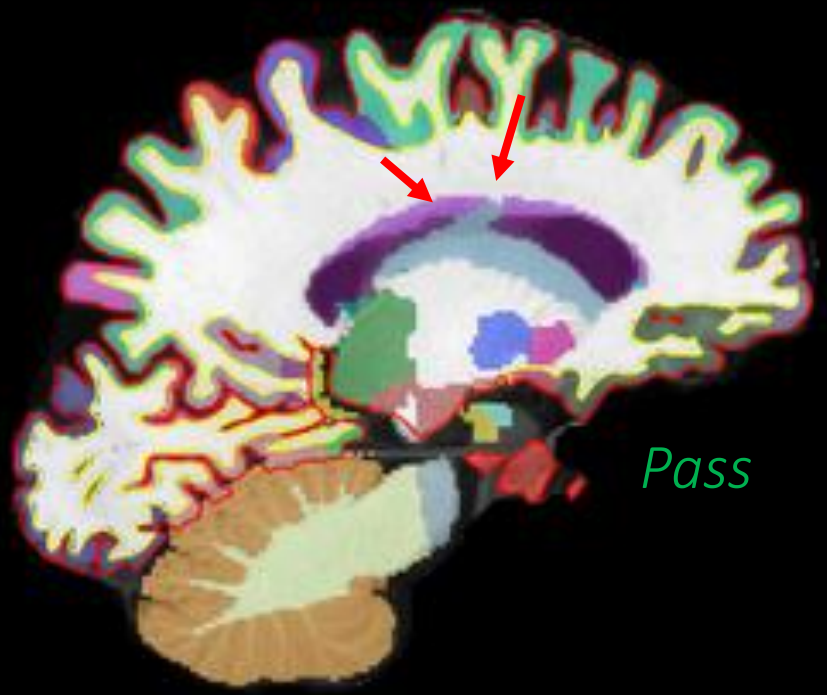
Bad examples

Segmentation failed for all subcortical regions except the cerebellum

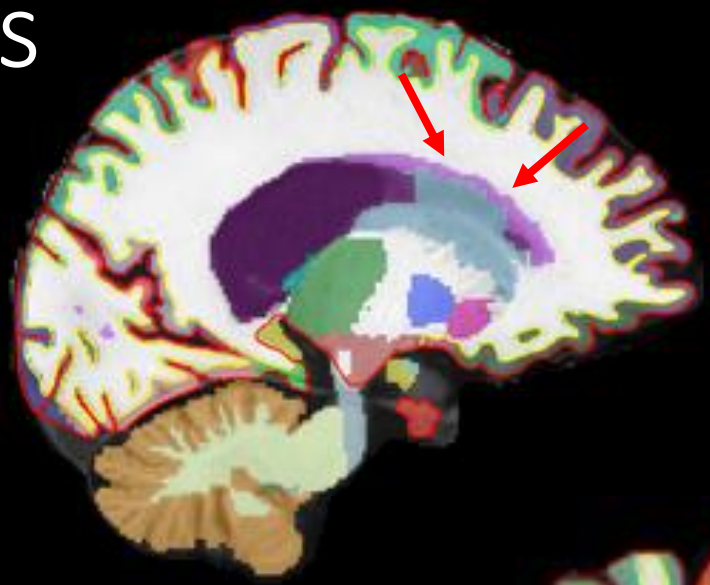


Doubtful/Bad examples

Overestimation of the Caudate



Pass



Fail

Fail

Bad examples

Failed skull stripping -> failed cerebellum (both Cerebellum-White-Matter & Cerebellum-Cortex)