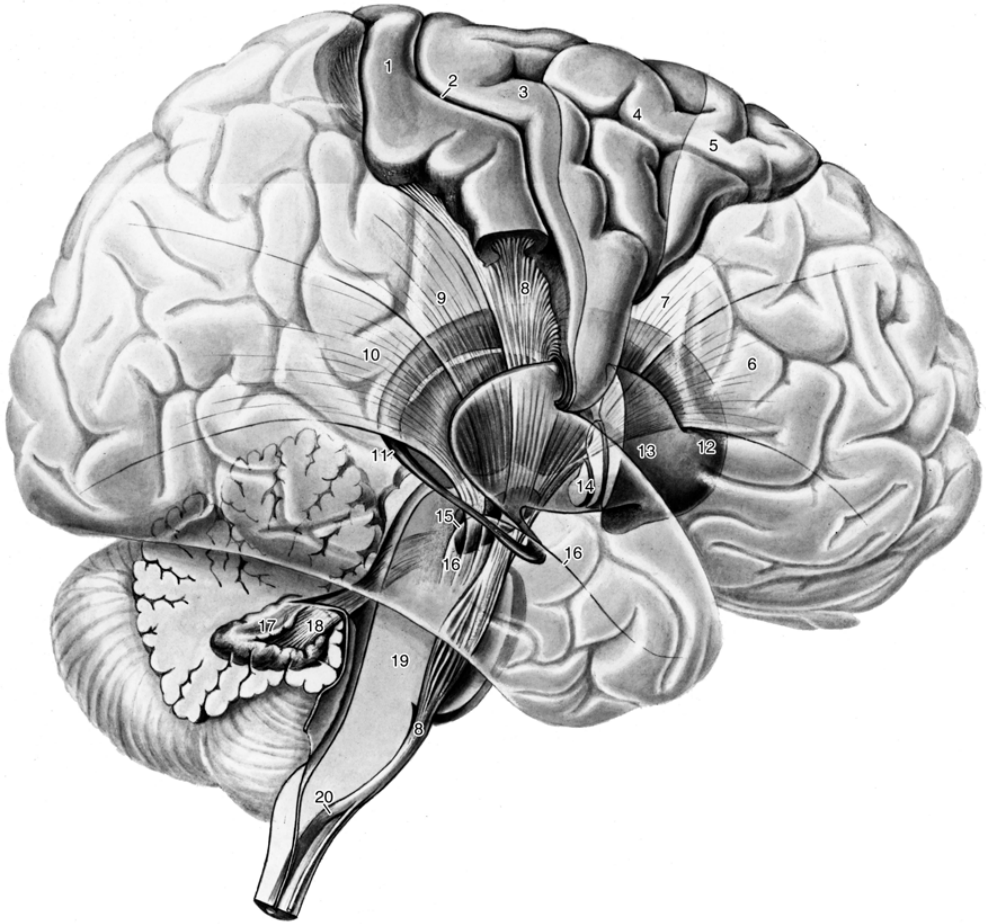
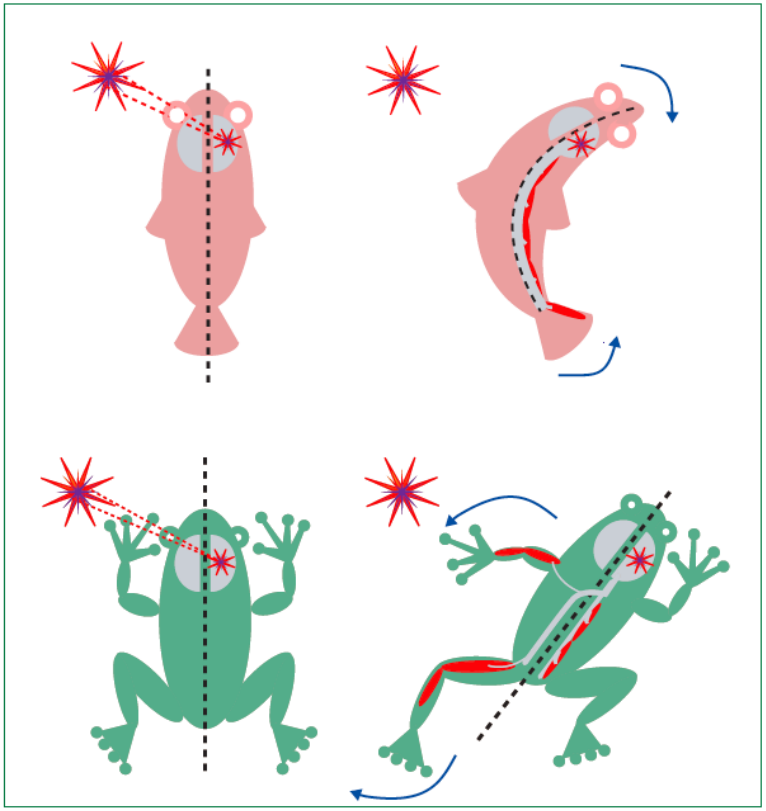
Corticospinal Pathways: Tractography

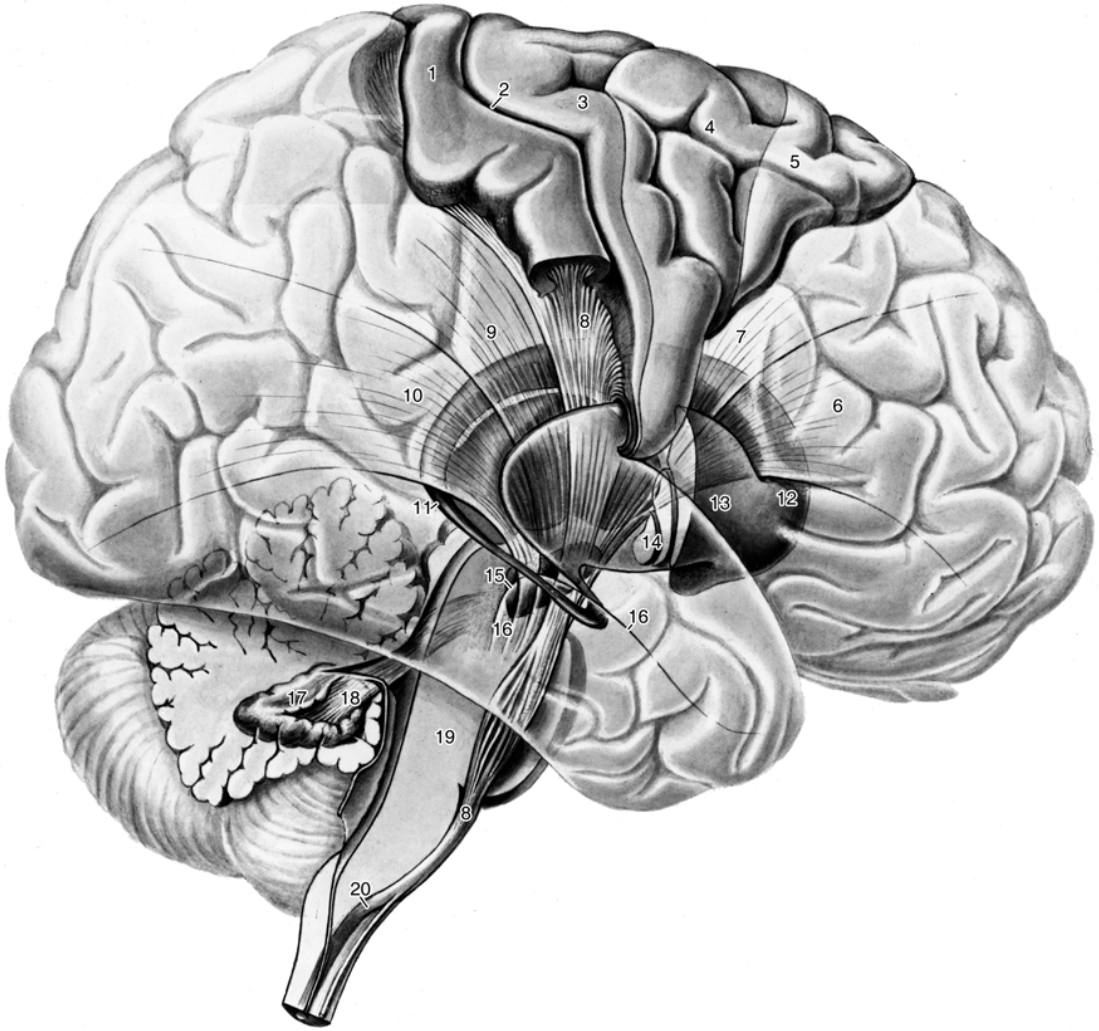




Virtual Neuroanatomy

Lecture Date: 11/13/2014

Multiple Segments of the CSP



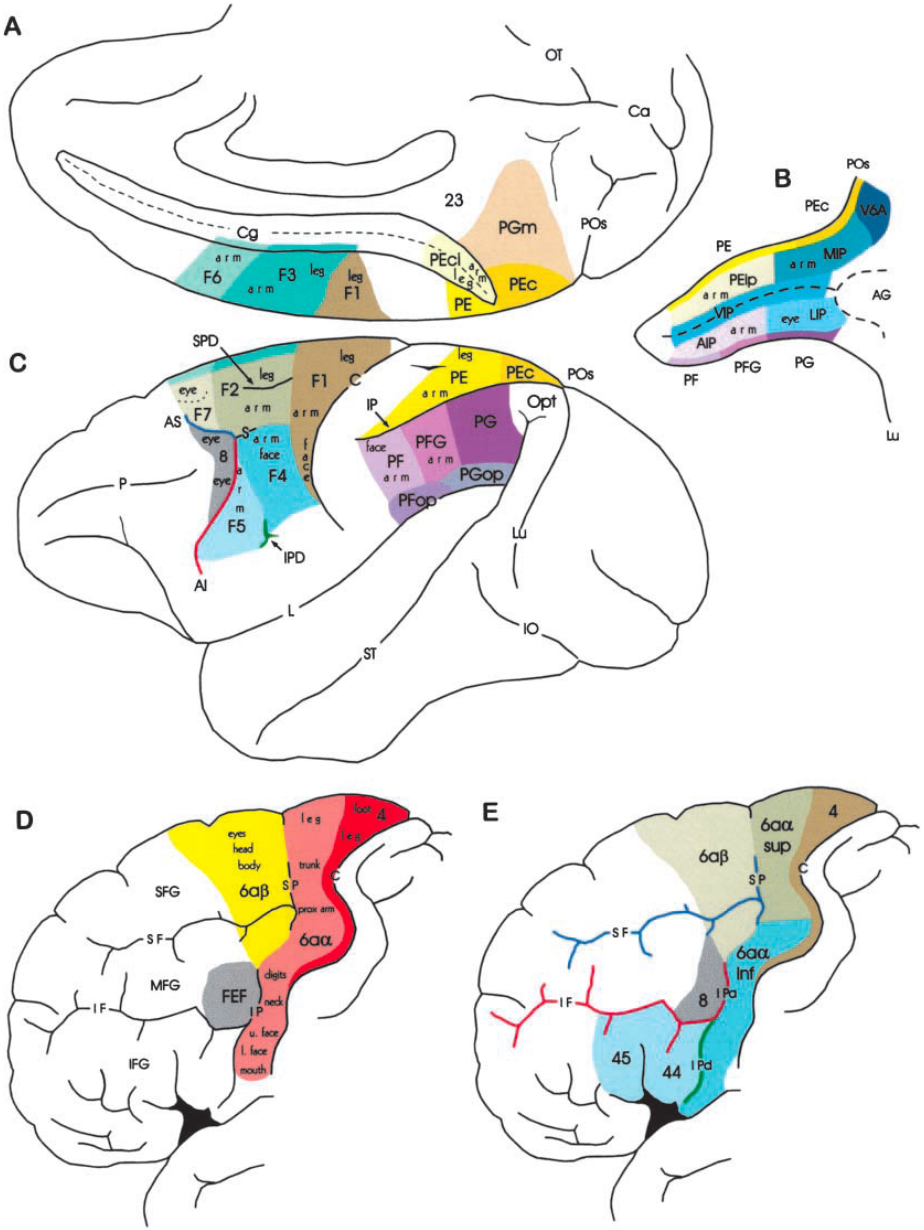
Cortex

Spine

(from Nieuwenhuys, Voogd, & van Huijzen 2008)

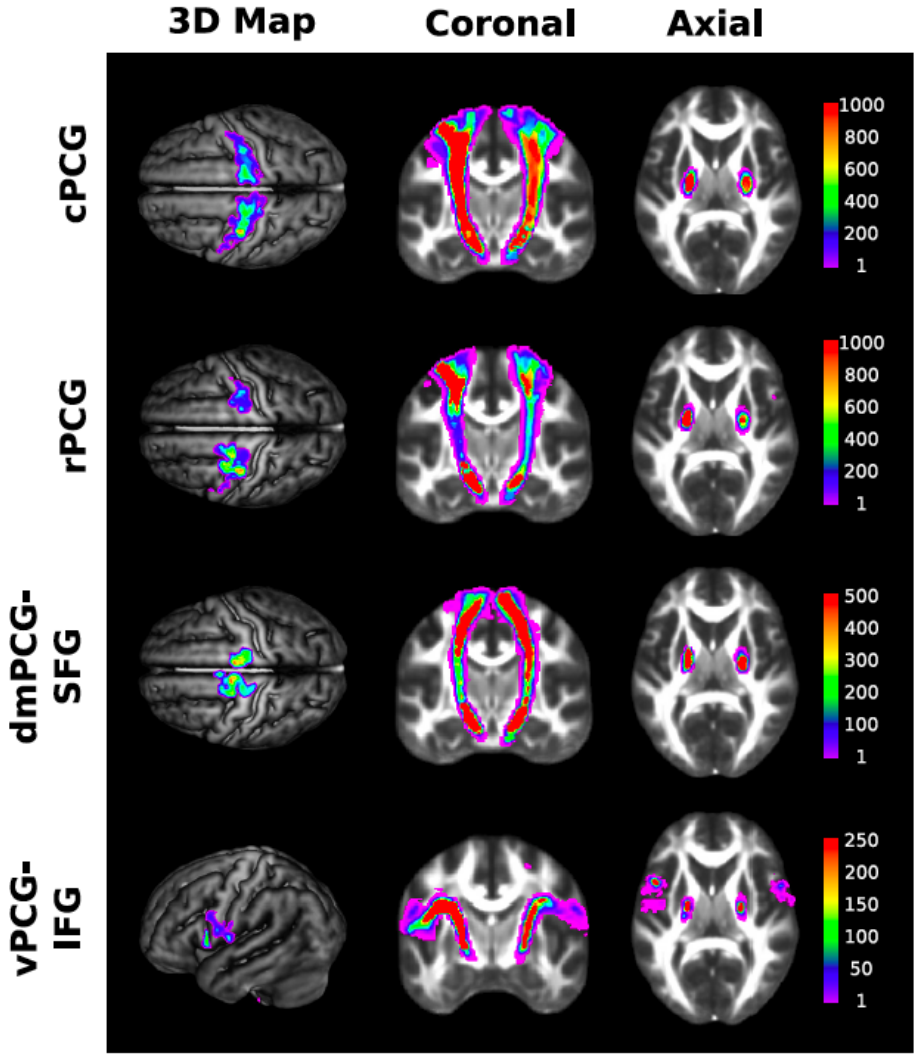
Multiple Segments of the CSP

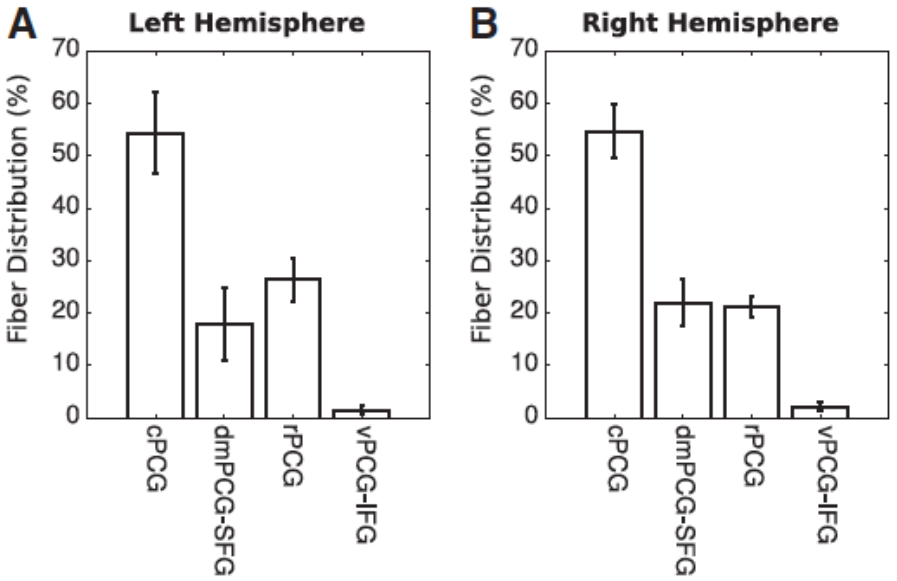
- Primary motor
- Dorsal premotor
- Ventral premotor
- SMA
- Somatosensory



(from Geyers et al. 2000)

Cortical inputs to pyramidal neurons

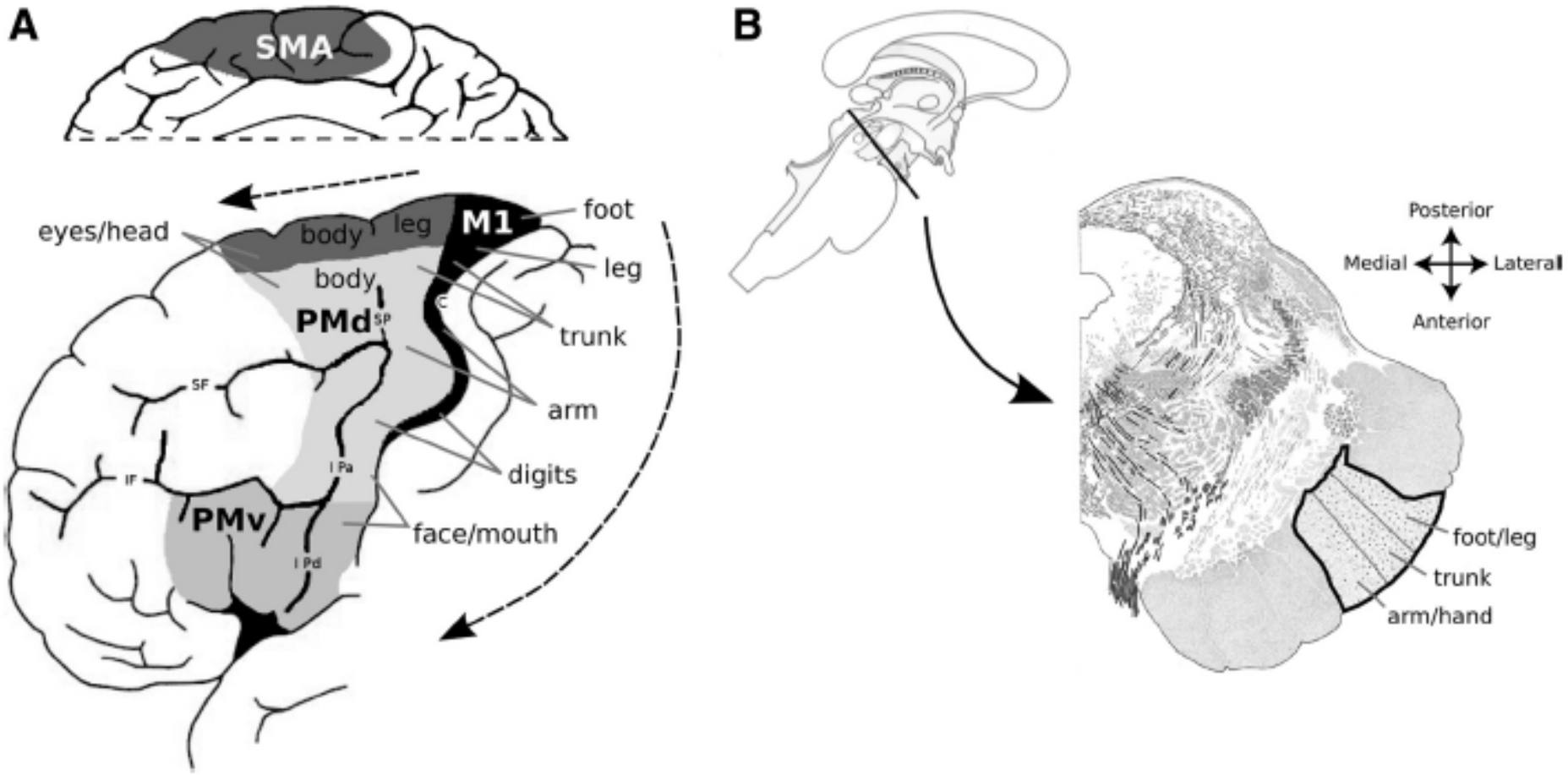




1. cPCG = M1
2. dmPCG-SFG = SMA
3. rPCG = Dorsal Premotor
4. vPCG-IFG = Ventral Pemotor

(Verstynen et al. 2011)

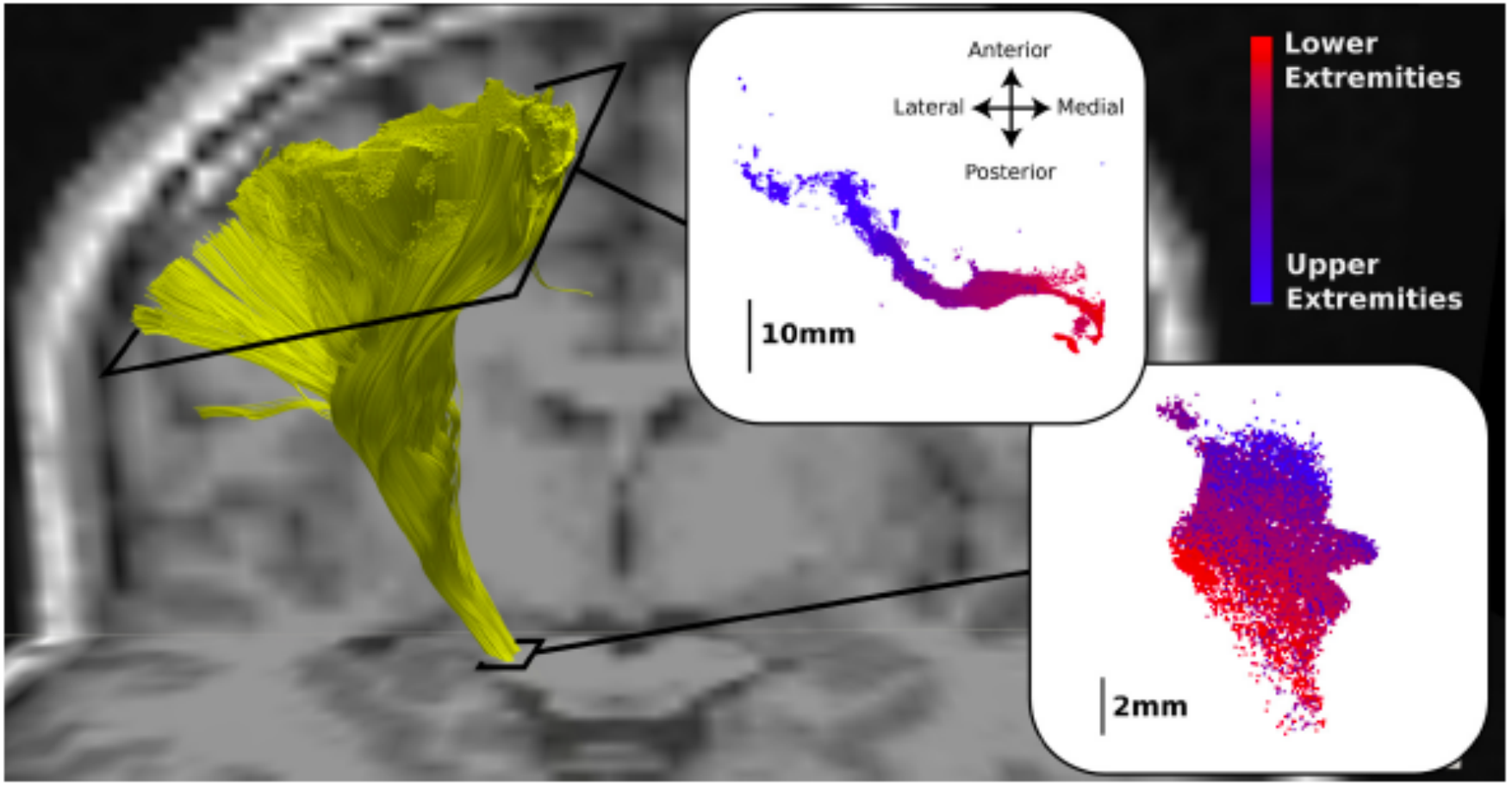
Midbrain Trajectory



Mediopontine pathway maintains motor somatotopy.

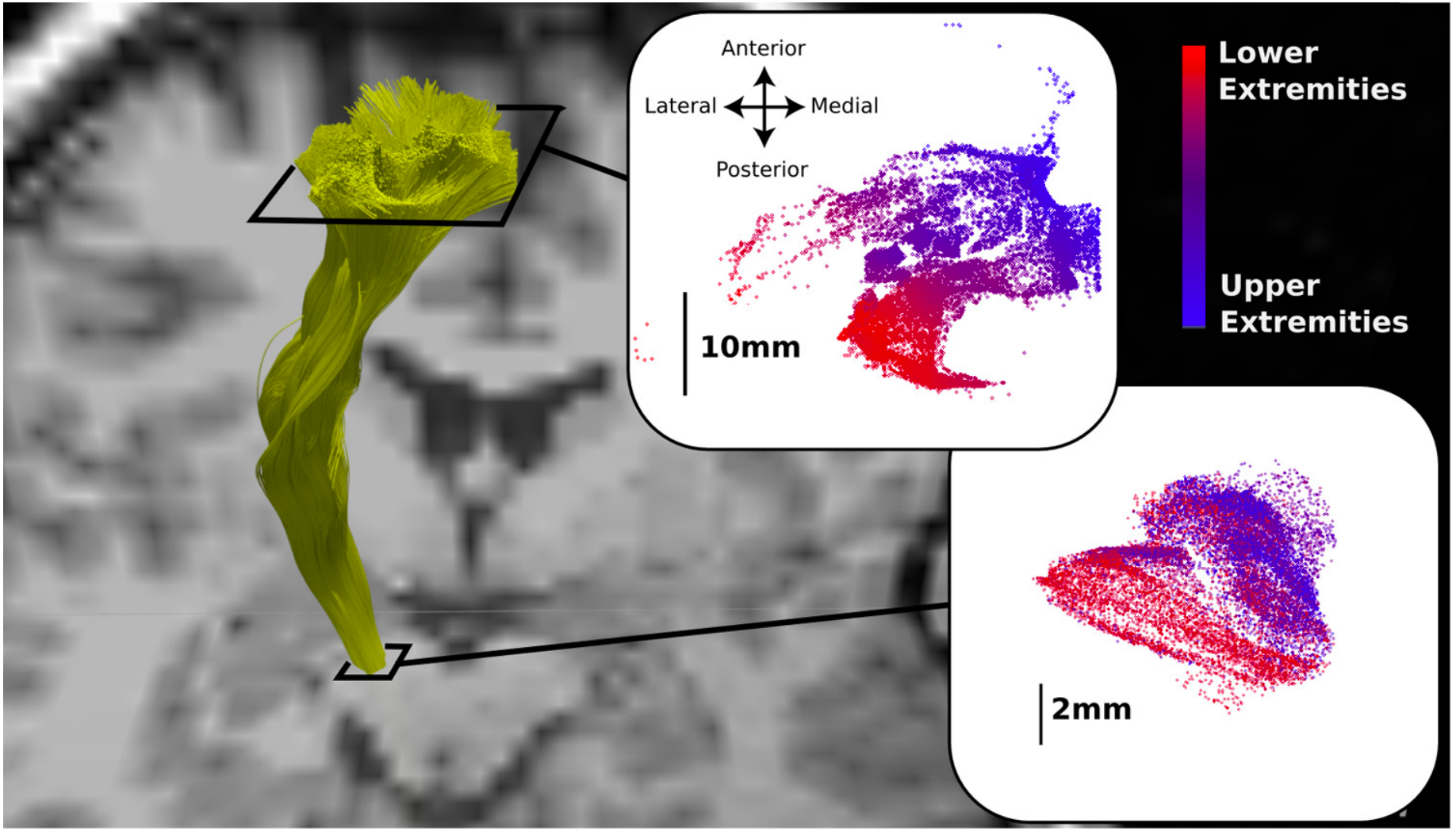
(from Verstynen et al. 2011)

Capturing the Fan



(from Verstynen et al. 2011)

SMA Projections



(from Verstynen et al. 2011)

Tractography:

In the left hemisphere, map the corticospinal pathways from three separate regions.

1. **Primary motor cortex** (posterior section of the precentral gyrus & anterior section of the central sulcus)
2. **Dorsal premotor Cortex** (anterior section of the precentral gyrus)
3. **SMA** (medial wall regions, dorsal segment)

Streamlines should descend through: a) central segment of the internal capsule, b) medial segment of the the cerebral peduncle, c) out the ventral segment of the brain stem.

Recommended Approach

1. Precentral Gyrus Mask (AAL) as ROI.
2. Custom mask through ventral segment of the brainstem, single slice as ROI.

Use custom deletion and selection of fibers to resolve the best representation possible.