What are the fiber compositions of the three cerebellar peduncles?

Inferior: mostly afferent (ipsilateral dorsal spinocerebellar tract; contralateral inferior olive); a few efferents (from fastigial nucleus to brain stem, from floculonodular lobe to vestibular nuclei)

Middle: all afferent (from contralateral pontine nuclei)

Superior: mostly efferent (dentate and interposed >> fastigial; all mostly contralateral); few fibers from the ventral spinocerebellar tract

What portion of the cerebellum is imaged in the midsagittal MRI?

Vermis and nodulus of floculonodular lobe

And what are the functions of this portion of the cerebellum?

Proximal and axial muscle control; balance; eye movements

Where are the cells of origin of the dorsal and ventral spinocerebellar tracts located?

Dorsal: Clarke's nucleus

Ventral: scattered about the gray matter

What is the rostral-caudal distribution of these cells?

Clarke: T1 to L2 (this is the only relevant cell group)

Do axons of the dorsal and spinocerebellar tracts ascend on the ipsilateral or contralateral side?

Dorsal: ipsilateral

Ventral: contralateral

Through which peduncles do the dorsal and spinocerebellar tracts enter the cerebellum?

Dorsal: inferior

Ventral: superior

What are the connections and functions of the accessory cuneate nucleus, vestibular nuclei and the inferior olive?

Accessory cuneate nucleus: from primary afferent fiber innervating the upper unk, arm, and neck; to the spinocerebellum

Vestibular nuclei: from vestibular afferents: to spino- and vestibulocerebellum

Inferior olive: from various sources (inc. spinal cord, brain stem, cortex); to deep cerebellar nuclei and Purkinje cells

What cerebellar afferents course the inferior cerebellar peduncle?

Inferior olivary axons

Dorsal spinocerebellar tract axons

Vestibular afferents

From what structure do the pontine nuclei receive most of their input?

Cerebral cortex

Through which peduncle do the axons of the pontine nuclei project?

middle

From which deep nuclei do most of the fibers in the superior cerebellar peduncle originate?

All, but dentate and interposed >> fastigial

Where specifically do the fibers from the different nuclei project?

All axons crossed…

Dentate: thalamus, mostly to premotor areas; association cortex too; parvocellular red nucleus

Interposed: thalamus, to go to motor areas serving distal/limb muscle control; rubrospinal neurons of the red nucleus (magnocellular)

Fastigial: thalamus, to go to motor areas serving proximal muscle control

Where is the ventral lateral nucleus located in relation to the ventral posterior nucleus?

Rostral

To what region of the cerebral cortex does the ventral lateral nucleus project?

Primary motor and premotor cortex

What is the other major termination of the superior cerebellar peduncle?

Red nucleus (see comment above)