**Comparison of corticopontine and corticostriatal projections from sensorimotor cortex. Anatomic evidence of stronger within-modality integration in cerebellar as compared to basal ganglia circuits.**

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The major cortico-subcortical re-entrant pathways through the basal ganglia and cerebellum are often describes as anatomically separated channels or 'parallel circuits'. While segregation is a prominent feature in these pathways, there is also evidence suggestive of integration both within and across functional modalities. To address the unresolved issue whether overlap occurs within and /or across modalities in the pontine nuclei (the first link in the cerebro-cerebellar pathways), a dual tracing approach was used to map the spatial relationship between corticopontine projections originating in the primary somatosensory cortex (SI), the secondary somatosensory cortex (SII), and the primary motor cortex (MI). The anterograde tracers biotinylated dextran amine (BDA) and fluoro-ruby (FR) were injected into homologous whisker representations of either SI and SII, or SI and MI. The ensuing pontine labeling patterns were analyzed using a computerized three-dimensional reconstruction approach. The results demonstrated that whisker-related projections from SI and MI were largely segregated but occupied partly adjacent territories of the pontine nuclei. Furthermore, SI contributed significantly higher amounts of corticopontine projections than MI. By comparison, projections from corresponding representations in SI and SII were to a larger degree co-located, with considerable spatial overlap of the terminal fields of labeling. Comparison of corticopontine and corticostriatal projections in the same experimental animals revealed that this SI-SII overlap was significantly larger in the pontine nuclei than in the neostriatum. This larger opportunity for within modality integration in the pontine nuclei may facilitate transfer of information about selected behavioral states to the cerebellum.