FUNCTIONAL ORGANIZATION AND BEHAVIORAL SIGNIFICANCE OF THE ROSTRAL SPINOCEREBELLAR SYSTEM IN BEHAVING PRIMATES

Oren Cohen1, Ran Harel2, Timothy Aumann3 & Yifat Pru1

1Dept. of Medical Neurobiology, Hadassah Medical School, The Hebrew University, Jerusalem, ISRAEL. 2Dept. of Neurosurgery, Sheba Medical Center, Tel-Aviv, ISRAEL. 3Florey Neuroscience Institute & Center For Neuroscience, The University Of Melbourne, Victoria, AUSTRALIA

Goals
1. Identifying the functional organization of the rostral spinocerebellar tract (RSCT) in behaving primates.
2. Understanding the task-related activity of the system.

1. Behavioral paradigm

Superior Cerebellar Peduncle (SCP) stimulation electrodes

1. Visual Cue
2. Instructed Delay
3. Go
4. Active Hold
5. Back to Center

2. Spinal response to SCP stimulation

Antidromic
Post-synaptic
Anti+Post

4. Distribution of response types

No reaction
Antidromic
Anti-Post
Post-synaptic

184 spinal sites (59%) responded to SCP stimulation (directly or indirectly)

Ventral
Dorsal
Neuromuscular

10. Proposed mechanism for SCP activation of spinal INs

Summary and Conclusions:
We found that the RSCT is a robust network of inter-neurons (INs) located in the lower cervical-enlargement in deep dorsal-horn laminae.

These INs were divided into sub-groups, with distinct laminar location, afferent input, firing properties and task-related activity.

The information delivered by the RSCT might be related to posture and general motor state of the upper limbs and mainly for proximal joints.

The system complex components implies that the RSCT provides the cerebellum an integrated input about the periphery and the Ropurspinal system (*cerebello-spinal close loop*).