



# Cerebellar control of gaze orientation toward visual targets: studies in the non-human primate

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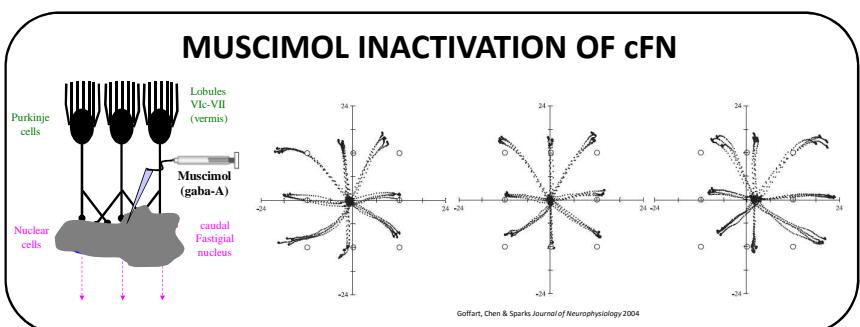
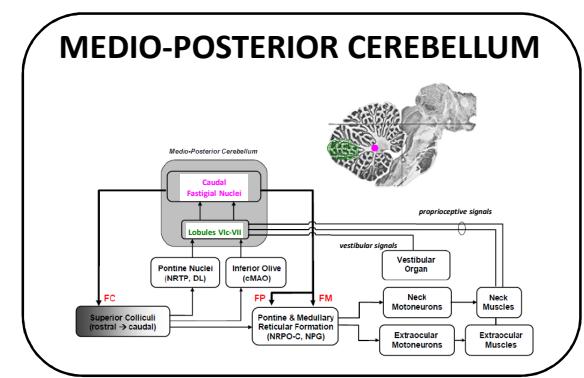
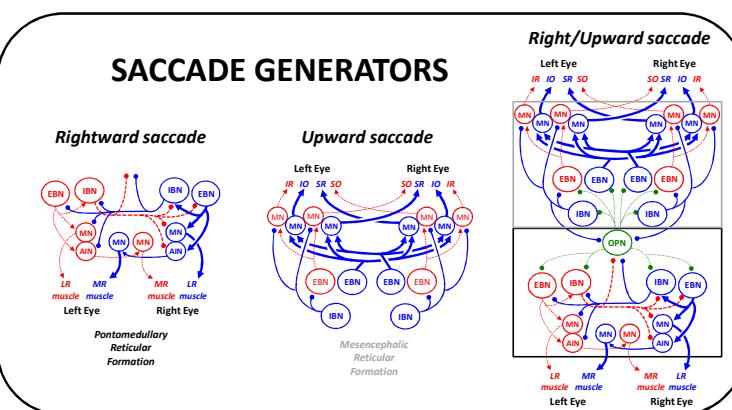
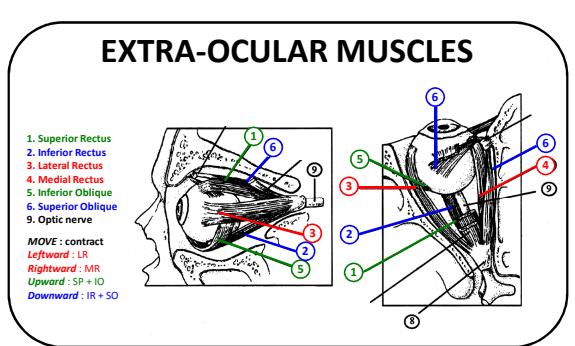
# Cerebellar control of gaze orientation toward visual targets: studies in the non-human primate



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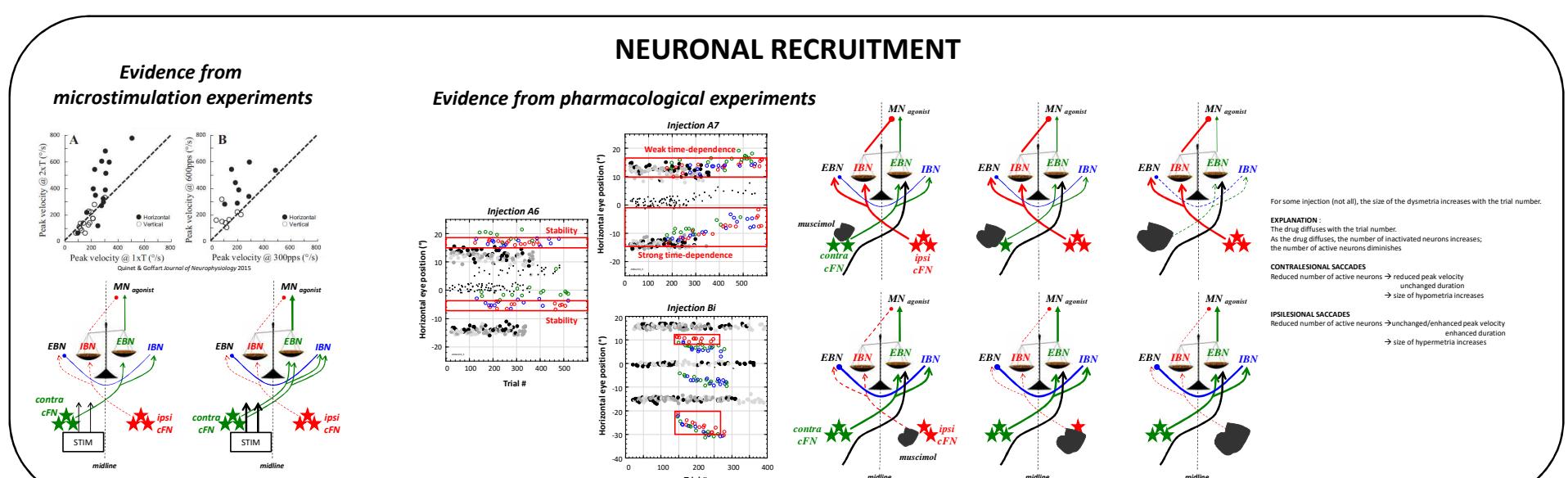
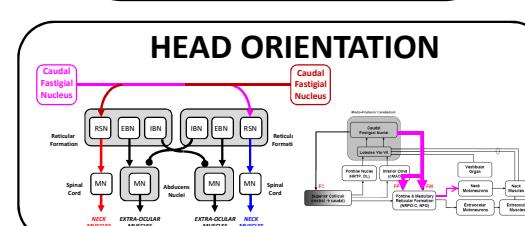
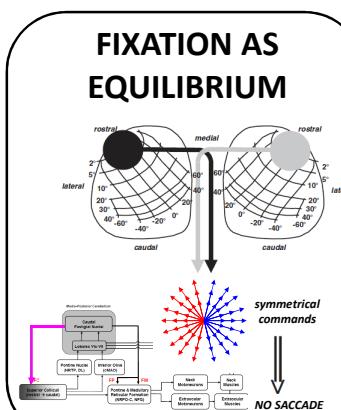
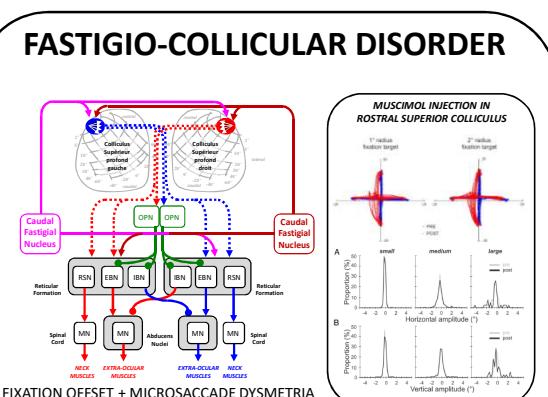
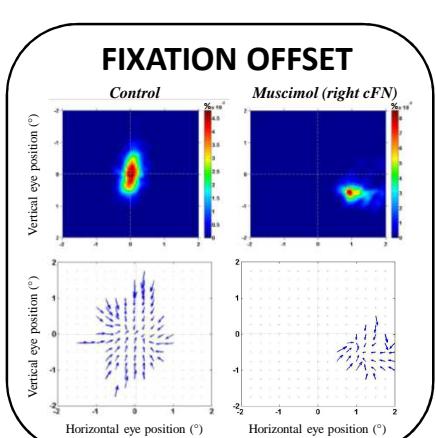
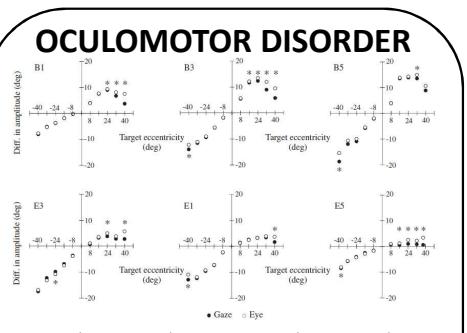
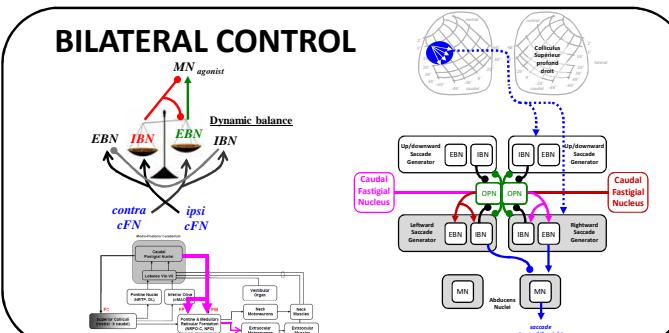
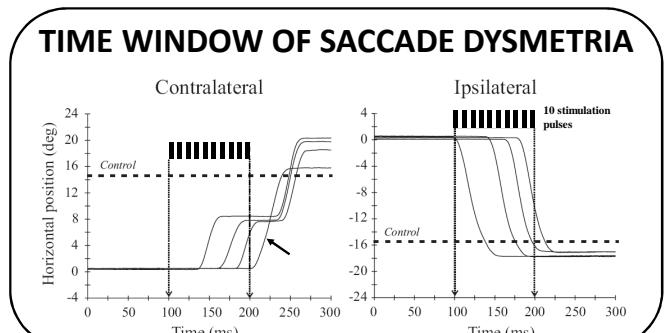
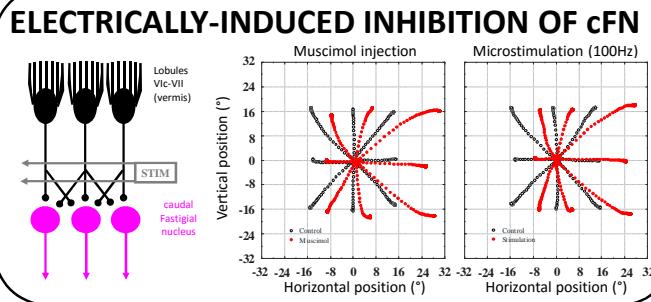
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### FIRING RATE OF SACCADE-RELATED NEURONS

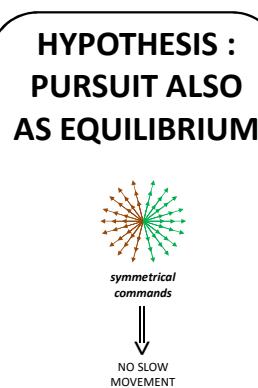
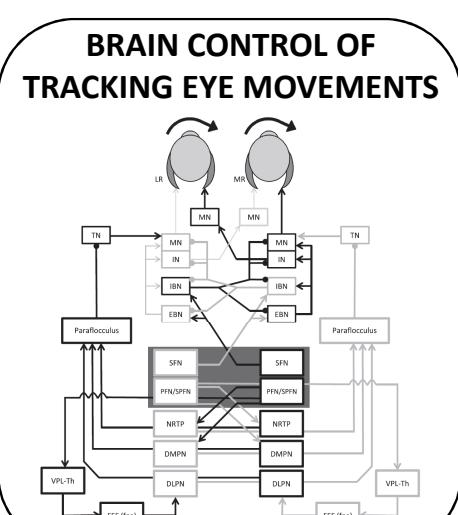
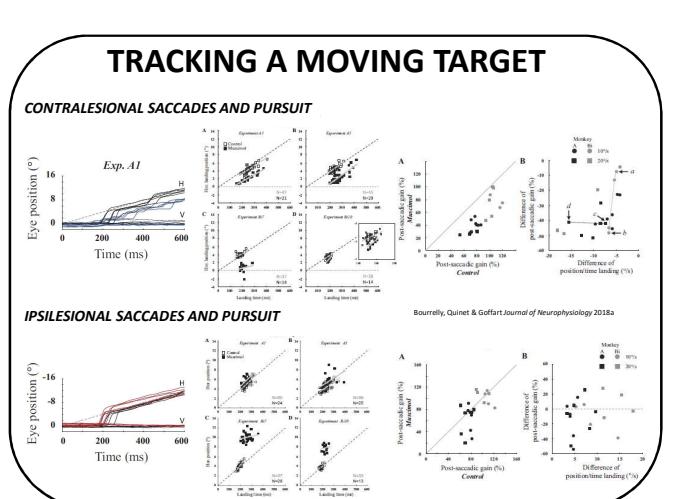
In the caudal fastigial nucleus (cFN), saccade-related neurons exhibit a burst of action potentials during saccades as a sigmoidal firing rate between 0 and 1. Electrophysiological recordings show the timing of the burst to the acceleration and deceleration of saccades, i.e. with kinematic parameters. The dysmetria observed after cFN inactivation was considered as the outcome of the suppression of the burst; the pre-saccadic sustained firing rate was not considered for unjustified reasons. Therefore I searched for the critical time window during which an imbalance of cFN activity leads to horizontal dysmetria.



For some injection (not all), the size of the dysmetria increases with the trial number.  
**EXPLANATION:** The drug diffuses with the trial number. As the drug diffuses, the number of inactivated neurons increases; the number of active neurons diminishes.

**CONTRALESIONAL SACCADES:** Reduced number of active neurons → reduced peak velocity unchanged duration → size of hypometria increases

**IPSILESIONAL SACCADES:** Reduced number of active neurons → unchanged/enhanced peak velocity enhanced duration → size of hypermetria increases



**STRENGTH and NOVELTY**  
- Theory of neural control of movement which is strictly neurophysiological and does not embed kinematic notions (position, amplitude, velocity etc.) within the inner functioning of the brain.

**LIMITS and PERSPECTIVES**  
- Extension to binocular eye movements  
- Connections with reticulo- and vestibulo-spinal tracts (eye-head coupling)  
- Extension to spatial cognition and the neural correlates of loci  
- Inclusion of the climbing fiber input from CMFOA  
- Extension to basal ganglia and DA neurons

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Dr Patrick Cavanagh

