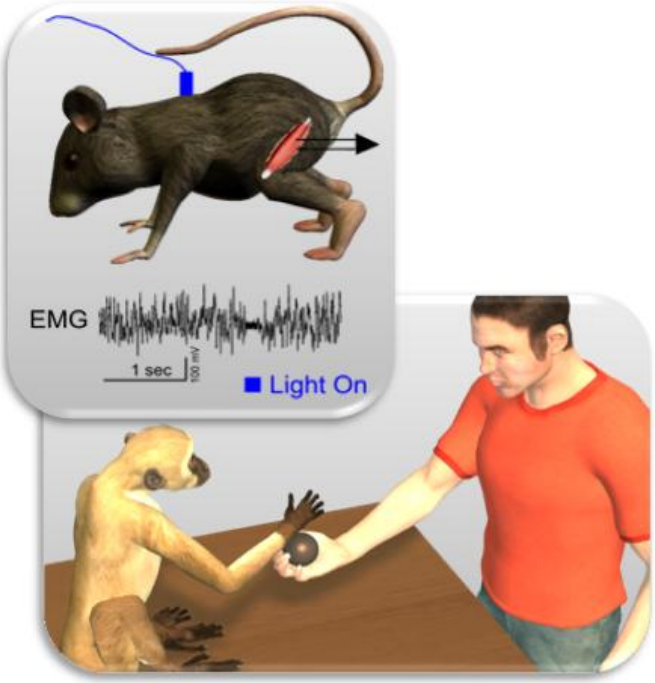
"Cortical and spinal circuits behind executive and interactive behaviors: Mirror Neurons and Optogenetics"



Seminario tenuto da:

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25 giugno 2013

AULA LUCIANI ore 14.30

EDIFICIO DI FISIOLOGIA, Università La Sapienza

(città universitaria, angolo tra viale dell'Università e viale Regina Elena)

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ABSTRACT

Actions are the means by which we interact with the world around us. The capacity for voluntary action relies on complex motor circuits involving both cortical/subcortical areas and the spinal cord. Motor commands generated in cortical and sub-cortical motor areas are routed to the spinal cord, which connects with the peripheral end-effectors. While it is common knowledge that the motor neurons located in the ventral horn of the spinal cord constitute the "final common pathway" of the central nervous system, less is known about the complex network of spinal interneurons, populated by a mosaic of excitatory and inhibitory interneurons sub-types (e.g. serotonin, somatostatin, parvalbumin, glycine). Recently, the newly developed field of optogenetics has made it possible to control the activity of specific classes of neurons on the timescales of milliseconds by means of light. In the course of this seminar, I will present new results about the functional organization of subclasses of interneurons in the spinal cord of rodents. At the same time I will present new application of the optogenetic technique to the study of the spinal cord and to the study of the cortico-spinal interaction for action selection and control.

The same cortico-spinal neurons responsible for the control of action have been shown in primates to respond both during action execution and action observation. Those neurons named Mirror Neurons, have been supposed to play a pivotal role both in executing actions and in understanding the actions of others. In the course of this seminar, I will present new social functions of mirror neurons. In particular, these neurons are able to discriminate between the possibilities to interact with others actions. In addition, they encode the subjective value of the observed actions. Thus, these neurons are perfectly suitable to be key players in action selection for social interaction.