Cross-modal plasticity in sensory systems of young and adult central nervous systems

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Visual deafferentiation carried out during early postnatal stages triggers a permanent reorganization of visual, auditory and somatosensory afferents to the superior colliculus. These reactive changes of connectivity allow that visual structures are able to process other non visual sensory information and that collicular neurons result recruited for behaviorally relevant responses. However, when the postpuberal maturation of the nervous system is accomplished, visual deafferentiation is not followed by the changes of connectivity observed in young animals. Interestingly, molecules like NogoR and RhoA block axonal regeneration after central nervous lesions. In an attempt to rejuvenate the sensory connectivity, the expression of these inhibitory molecules was blocked by the injection of nanoparticles loaded with specific anti-Nogor and anti-RhoA siRNAs. Sprouting of visual and auditory collicular afferents was observed 10 days after administration of nanoparticles to adult deafferented animals. These results open up the possibility of administer inhibitory siRNAs after nervous traumas in order to enhance axonal sprouting.