Spinal cord injury causes a devastating loss of sensory, motor and autonomic functions to the patients, and therapeutic strategies to enhance their quality of life is an urgent demand. In many cases, the injuries are partial, therefore promoting the functions of remaining neural systems should be the key. Here I introduce our studies on the recovery of hand movements after the partial spinal cord injury in the macaque model. When the injury is confined to the lateral corticospinal tract, the monkeys can recover precision grip in several weeks through training. In this case, the spinal cord interneurons bridge the injury and work for the recovery. Moreover, dynamic change in the cortical network occurs; in addition to the contralesional primary motor cortex (M1), ipsilateral M1 is activated during the early stage (~1 month after injury) by the contralesional M1 via the corpus callosum and contribute to recovery. In the later stage (3-4 months after injury), the bilateral premotor cortices (PM) contribute to the recovery. In contrast, in case of the subhemisection (larger lesion), the recovery of hand movements is slow and very limited even at 6 months after injury in preceding studies. However, through intensive training and weekly extensive electrical stimulation of bilateral PM and M1, coarse grip considerably recovered in several weeks after injury. In this case, the bilateral PM and M1 are highly disinhibited and the corticospinal tract from the contralesional M1 exhibited a massive re-routing; 20-30% of the corticofugal fibers became uncrossed, descended in the contralesional side, crossed the midline caudal to the lesion and reached the gray matter including the motor nuclei of the affected hand/arm muscles. These basic animal experimental studies renewed our concepts for the future therapeutic strategies against the neuronal injuries.