**Behavioral and neural correlates of arm robotic training in patients with brain damage.**

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Stroke is the leading cause of disability in the United States. A total of 750 000 individuals are affected each year and the prevalence rate is about 200 to 300 patients per 100 000 inhabitants. Although prospective epidemiological studies are lacking, findings of several longitudinal studies indicate that in 30% to 66% of hemiplegic stroke patients, the paretic arm remains without function when measured 6 months after stroke, whereas only 5% to 20% demonstrate complete functional recovery.

Robotic therapy in patients with neurological disease is an attempt to improve function in a moderate to severe hemiparetic arm. It allows patients to train independently of a therapist and to improve on their own functional level. In particular, there is evidence for robot- assisted therapy to increase treatment compliance by way of introducing incentives to the patient, such as games. In addition, by using computer-assisted devices for regaining upper limb function, the robot can easily apply new constraints, to optimize the required movement pattern. Therefore, the complexity of a motor task to be learned can be controlled far more precisely with robotics than in conventional treatment approaches.

It has been reported in literature that patients who receive electromechanical and robot- assisted arm training after stroke are more likely to improve their generic activities of daily living. Paretic arm function was also found to improve, but not arm muscle strength.

These evidences have to be interpreted taking into account the variations between trials as to the patient characteristics and type of treatment (i.e. training duration and amount of treatment).