

rehabilitation. The sections below outline emerging diagnostic and therapeutic approaches that have the potential to transform the lives of patients with neurologic disorders. These include technologies to harness plasticity, neuroimaging, neurostimulation, and brain–machine interfaces.

Technologies to Harness Plasticity

Neurologic rehabilitation aims to harness activity-dependent plasticity mechanisms to maximize functional restoration. This principle can be applied to a diverse range of functional domains such as movement control, sensory processing, language, pain, and cognition. For example, recent randomized controlled clinical trials for motor recovery after stroke have suggested that intensity of training may be particularly important for sustained long-term improvements. Moreover, studies of the effects of such training in rodent and nonhuman primate models further suggest that plasticity of cortical “motor maps” as well as the coordinated firing of neurons in remaining networks underlie observed functional improvements with rehabilitation. The incorporation of technology for neurologic rehabilitation has the great potential to revolutionize the delivery of care by significantly increasing access, reducing the burden for adherence to high-intensity regimens, and by maximizing engagement. Below are three examples of how emerging technology can be used to harness neural plasticity and to maximize functional restoration.

■ Robotics

Rehabilitation robotics for both the upper and the lower limb have the potential to improve motor outcomes after stroke or other forms of brain injury. There is a growing recognition that focused training involving a range of tasks might be important for improved functional outcomes. While it remains unclear exactly when such training might be optimal after the initial stroke and during the early recovery period, such training likely has a role in both the acute and the chronic periods after stroke; maintenance therapy may also guard against known declines in function over time. Notably, the delivery of