

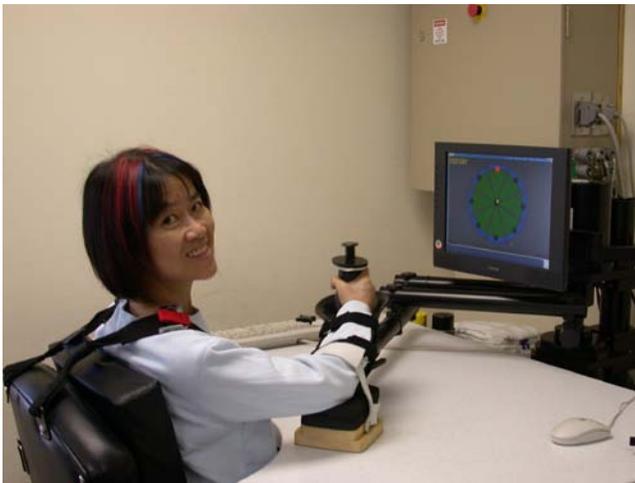


Historical Note to the Physician

1. Upper limb robotics, as currently and historically performed in our clinic, is highly recommended by the American Heart Association and Department of Defense Guidelines for people with arm weakness after a stroke, to improve function.
2. Our program will typically run for six weeks (3x per week), as this is the time shown for most dramatic improvement in function.
3. Patients can best participate in the robotics if they have; (a) at minimum - at least trace voluntary muscle activation at the biceps and shoulder, (b) can understand basic instructions; and do not have; (a) strong fixed contracture, (b) visual or perceptual deficits that would preclude them from playing the video game on the robotic screen, (c) comorbidity that would preclude them from doing mild upper extremity repetitive activity.

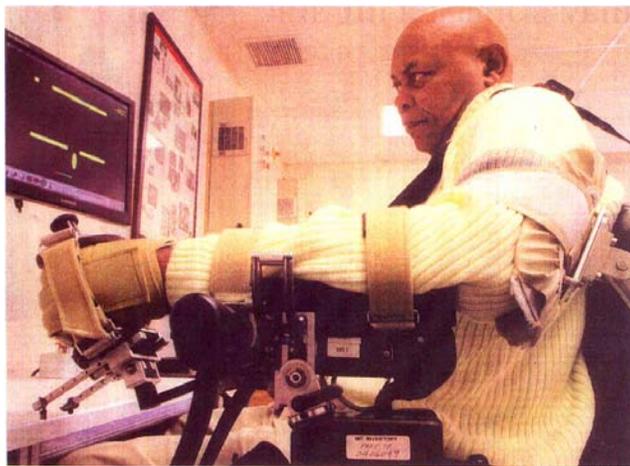
The Planar Robot

The MIT-manus (the planar robot) was designed and built at the Massachusetts Institute of Technology, and provides customized, goal-directed, robot assisted arm therapy. During therapy, the patient's hand and wrist are "held in a rigid support affixed to the robotic arm," and the patient must reach towards points in space that correspond to the positions of the targets on a screen. Throughout each therapy session, the participant completes a series of flexions, extensions, and rotational movements across the elbow and shoulder joints. If a limb is initially paralyzed, the robot will move it passively, but as motor function returns, the robot will require the patient to initiate progressively more movement. Thus as movements become increasingly accurate, it is believed that their trajectories are re-established and updated within the motor cortex.



The Wrist Robot

The wrist and forearm "play an important role in enhancing the usefulness of the hand by allowing it to take up a variety of orientations with respect to the elbow." To that end, the wrist robot is designed to strengthen two types of wrist rotation, extension/flexion and pronation/supination (palm down, palm up), as well as one type of forearm rotation. During therapy, the "patient's lower arm is held in place in a bracket by Velcro strips while the injured hand is wrapped around a joy stick that is used to maneuver an on-screen object in the video game. If the patient is too weak to move their arm or wrist, the system gently guides them through the desired range of motion and then, as they progress, the movements and games get tougher. Improvement comes from the progressive resistance of the exercises rebuilding atrophied muscle, as well as through the retraining of the brain."



GUIDE: Stroke victim Veneff Blake uses a robot of the Robotic Rehabilitation Center in White Plains, N.Y., which is testing the device that tracks arm motions. Tina Farnsworth Associated Press