

University of Rochester Neurorestoration Institute (URNI)

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Institute

MEDICINE *of* THE HIGHEST ORDER



Content of presentation

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 - Research
 - Teaching
 - Community
3. URNI – UR Clinical and Basic Research Programs
 - Devices
 - Pain
 - Regenerative Medicine: stem cells, drugs, and scaffolds
 - Neuroplasticity
 - Integrative Medicine
4. Neuromedicine and URNI ambulatory building

1. University of Rochester Neurorestoration Institute (URNI): Rationale, Mission, Vision and Book

- **Rationale:** Unique moment in medicine and neurologic disease – decade of the brain; epidemic of dementia and memory loss; improved functional imaging; dramatic advances in preclinical models, biomarkers, data science, devices (adaptive, brain-machine, and prosthetic) and new drugs.
- **Mission:** To bring the highest quality and most innovative approaches to restore function in individuals who have suffered damage to their brain, spinal cord, and peripheral nerves.
- **Vision:** To be a national destination for rehabilitation of people with chronic neurologic conditions, and a center for excellence in research on restoration of cognitive, motor, and sensory function.
- **Book:** Using the Mind to Heal the Brain and Body: A Guide for Recovery from Spinal Cord Injury, Stroke, and Traumatic Brain Injury.

1. URNI Book

- **Title:** Using the mind to heal the brain and body: A guide to recovery from spinal cord injury, stroke, and traumatic brain injury.
- **Themes:** A self-help book for patients, families, and providers focused on post-acute care.
 - Psychological features of these 3 diseases are consistent with an acute traumatic event. Hence, the prevalence of psychological disease is very high - anxiety, depression and PTSD in >75.
 - Mind is really a code word for neuroplasticity. The innovative concept is that patients in the chronic stage after injury (> 1 year) can make significant improvements in functional recovery through focused mental efforts.
 - The approach to improving outcomes is similar to acute myocardial infarction. My personal experiences as a cardiologist in the 1980's and 1990's provide me a "crystal ball".

2. URNI Programs

- **Clinical:** Provide multidisciplinary care to patients with stroke, traumatic brain injury (TBI), spinal cord injury (SCI), and peripheral nerve injury.
- **Research:** Provide patients, equipment, rehabilitation space, clinical care coordinators, and office space for clinical trials. Simply put, URNI will be the clinical “arm” for research by investigators in the Ernest J. Del Monte Institute for Neuroscience. Key research areas will include: devices, pain, stem cells, neuroplasticity, and integrative medicine.
- **Education:** Educate the next generation of clinicians and researchers who will become leaders in the field of neurorestoration
- **Advocacy:** Develop programs to raise societal consciousness, stimulate government and philanthropic support

2. Clinical Programs: Typical Visit for a Patient

Head to toe exam with URNI team led by PMR physician

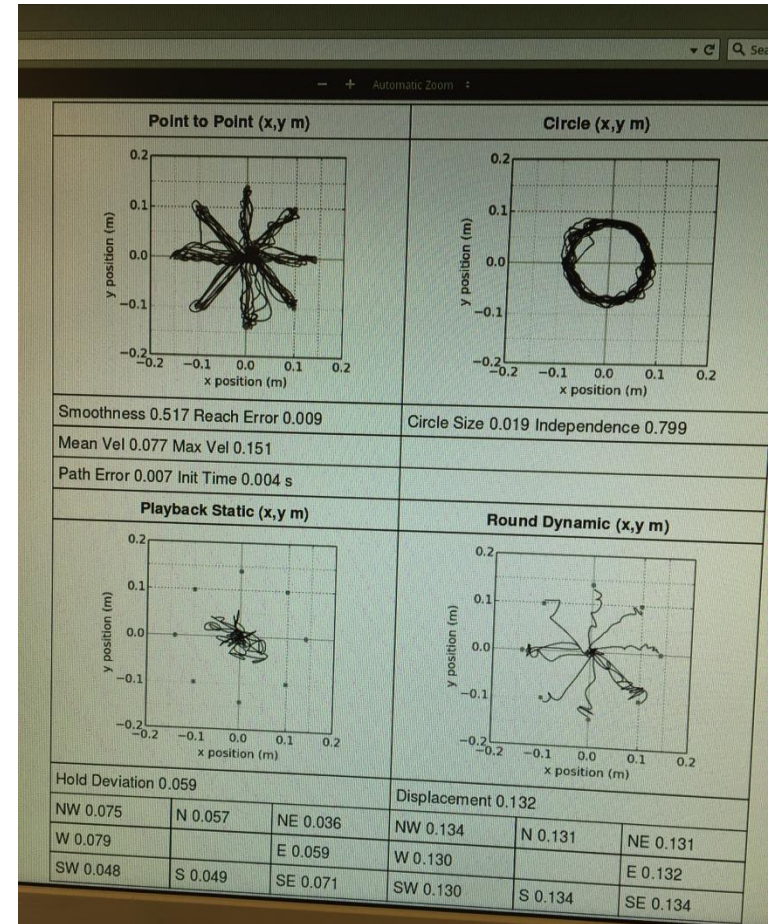
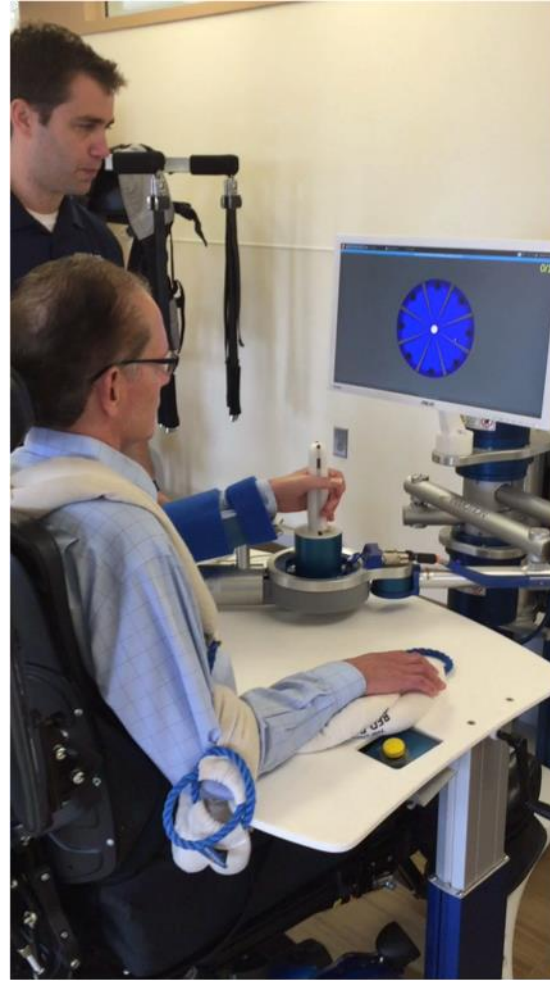
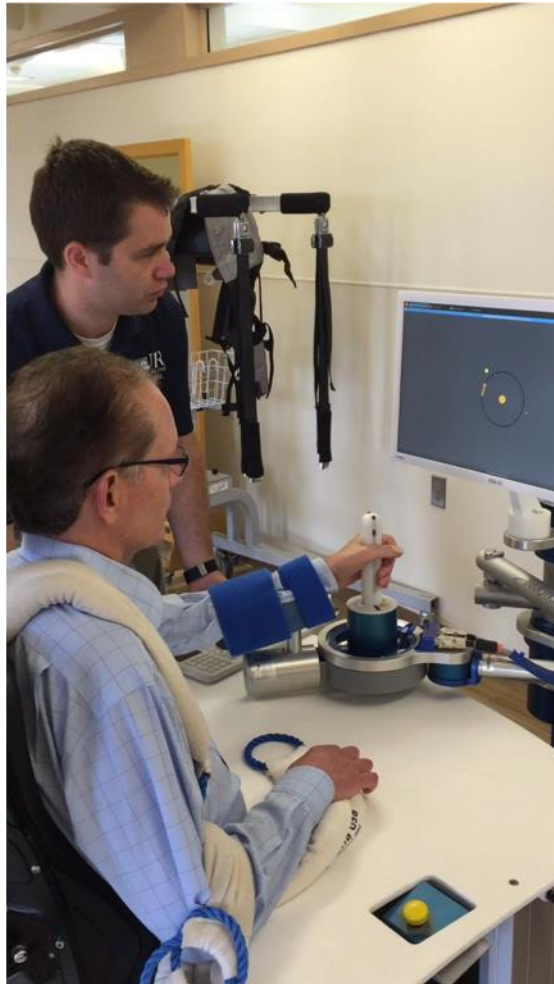
- Psychologist
- Pain specialist
- Urology
- Gastroenterology
- Wound care specialist
- Physical Medicine and Rehabilitation (PT/OT)
- Neurology and neurosurgery
- Integrative medicine
- Nutrition and exercise

At the end of the day – comprehensive diagnosis and treatment plan, clinical trials eligibility, and referrals.

3. URNI Clinical Research Resources

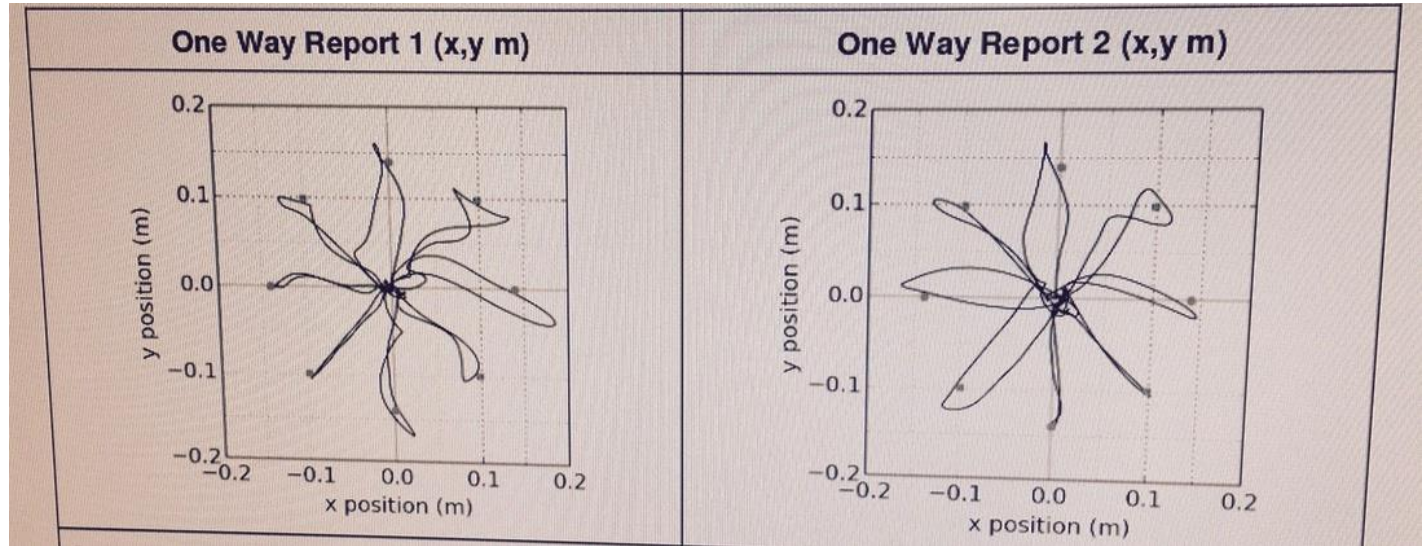
- Patients, patients and more patients
- Develop a large clinical trials network in US and internationally
- Physicians from PM&R and Neurology will coordinate each patient's visit for clinical evaluation. Based on patient's clinical and restorative needs, appropriate clinical trials eligibility will be discussed
- Eligible patients who desire to enter clinical trials will return for enrollment
- Equipment and therapists for trials will be present at URNI for “one stop shopping” whenever possible

3.1 Devices: Robot Training

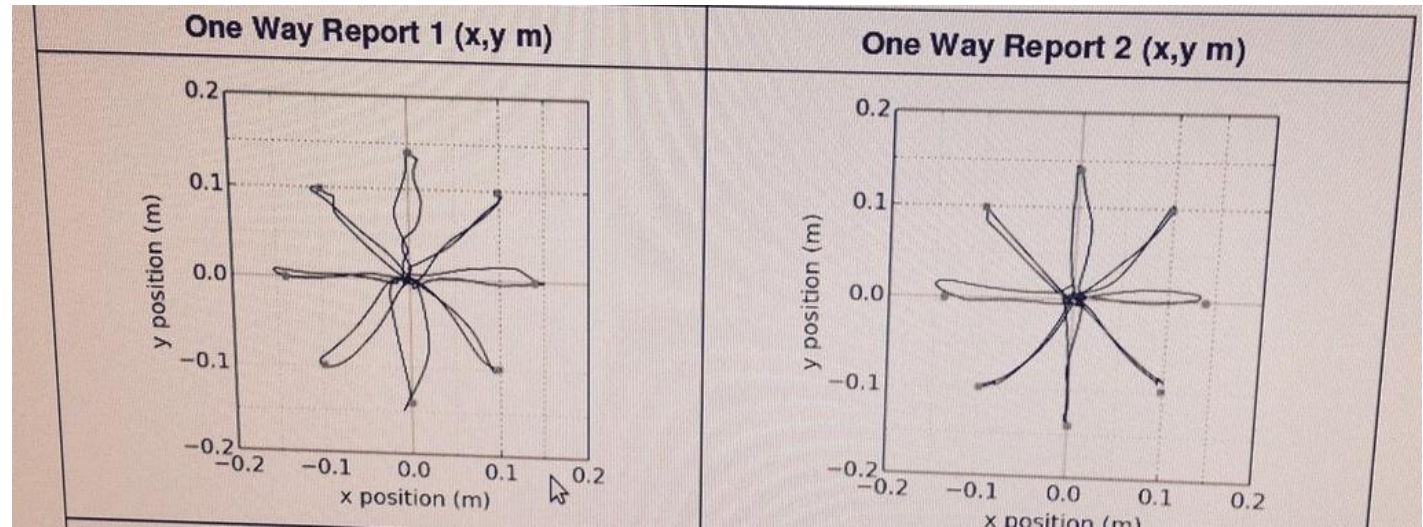


3.1 Devices: Robot Training

June 6, 2015



October 27, 2015



3.1 Devices: Robot Learning PPG

Devices – robots, exoskeletons, nerve-stimulators, brain-machine interface, scaffolds, prosthetics, adaptive and recreational devices, outcome measures (Kinetic with Dave Mitten), and virtual reality

Robot and Learning PPG

Hypotheses: Enhanced learning can improve functional recovery in patients with chronic neurologic injury. Test drugs and devices using hand and arm robot. Measure kinematic parameters quantitatively with the robot and functional changes with standardized tasks.

1. Drugs that enhance nerve function, such as 4-aminopyridine (4-AP or Ampyra)
2. Drugs that improve learning
3. Transcranial electrical stimulation and transcranial magnetic stimulation
4. Artificial intelligence to develop personalized learning approach

3.2 Pain: drugs, devices, integrative medicine

Integrative medicine – acupuncture, chiropractic, hypnotherapy, massage, meditation, mindfulness, movement awareness therapy, nutrition, spiritualism, tai chi, yoga

Integrative Medicine – Pain PPG

Hypothesis: Combined therapy with one or more integrative medicine approaches will improve pain and function. For example, compare acupuncture alone versus acupuncture plus meditation.

- a. Mindfulness
- b. Meditation
- c. Acupuncture
- d. Medical marijuana

3.3 Regenerative Medicine

Spinal cord injury nerve regeneration PPG

Hypothesis: Early intervention in SCI with multiple modalities will restore sensory and motor function

- Stem Cells: Patient specific astrocytes for treating acute and chronic SCI (Proschel, Noble)
- Scaffolds for nerve regrowth
- Drugs to mobilize and differentiate stem cells
- Drugs to promote nerve regrowth

3.4 Neuroplasticity

Multidisciplinary approaches to improve function PPG

Hypothesis: Combined treatment modalities in acute and chronic stroke patients will improve functional recovery

- Visual training to improve field of vision in patients with cortical blindness (Huxlin)
- Drugs to promote learning
- Drugs to promote neuroplasticity
- Gait training to improve walking with brain-machine interface, using biosensors to stimulate spinal motor interneurons

3.5 URNI: Integrative Medicine

Integrative medicine approaches to improve pain PPG

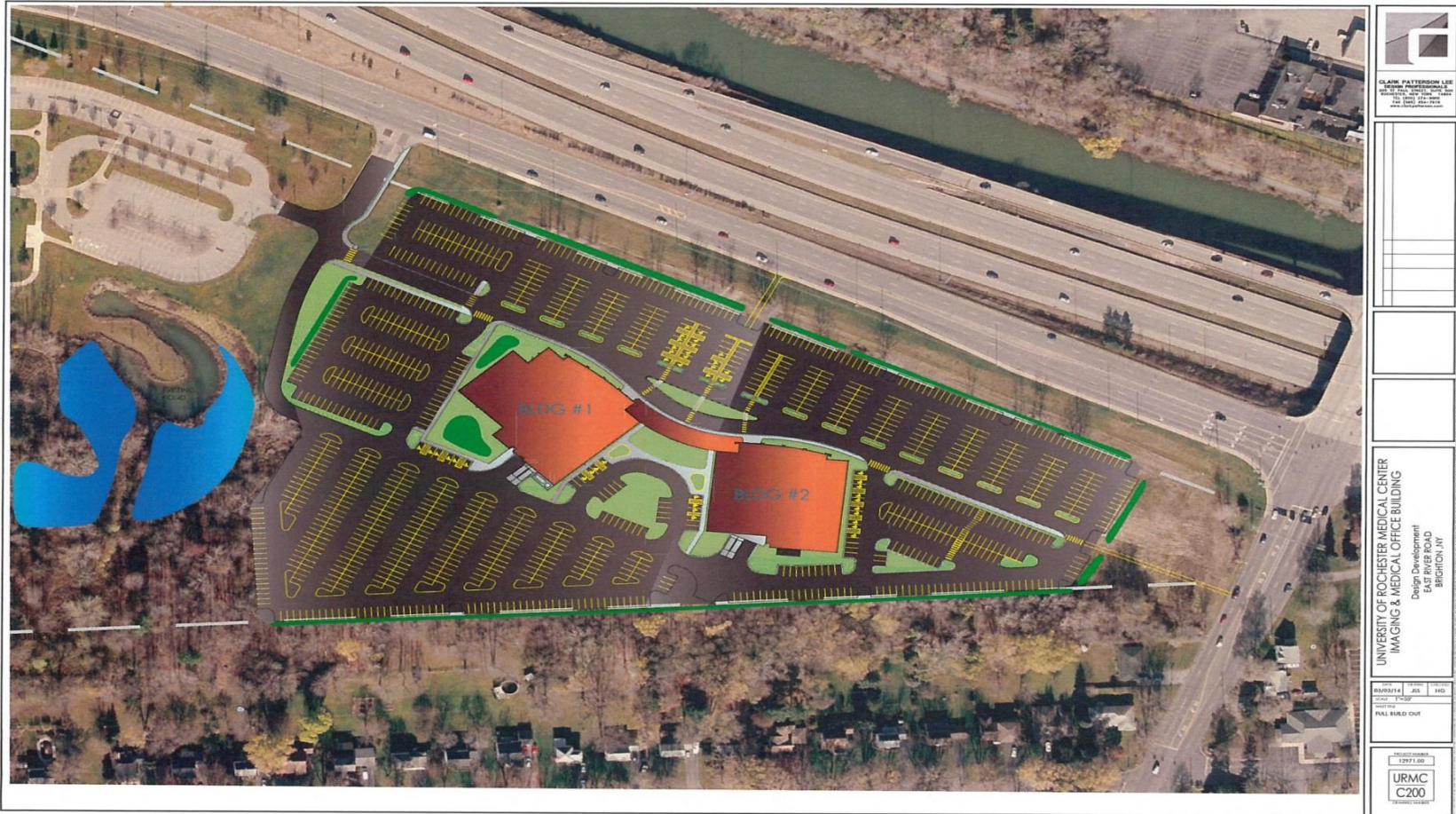
Hypothesis: Combined treatment modalities in acute and chronic stroke patients will improve functional recovery

- Focus on mind healing brain and body:
 - Acupuncture, learning, meditation, mindfulness, and yoga
- Combine with PPGs on pain, neuroplasticity and devices

4. Ambulatory Neuromedicine Building

- Preliminary size estimate - 90,000 gross sq.ft. (3 floors)
 - URNI
 - Neurosurgery
 - Neurology
 - Physical Medicine and rehabilitation
- Lobby linked to Imaging and Pediatrics Building
- 500-600 parking spaces
- 2 1/2 years to Design and Build

4. South Campus Ambulatory Buildings



4. East River Road View



Imaging/Peds Building for illustration



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