



# Paralysis and Exercise

## Cutting Edge Fitness for Wheelchair Users

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## Want to Ask a Question?



Questions

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## Objectives



- Importance of Exercise
- Rehabilitation vs. Fitness
- Options for people with mobility impairments
- Technology integration
- Resource to learn more

## Disclaimer page



- *The information presented in this webinar is not meant to replace the advice from a medical professional. You should consult a health care professional familiar with your specific case, concerns and condition.*
- *Neurotech Network and its representatives do not endorse, rate, sell, distribute, prescribe, administer or recommend any products, procedures or services. We highly suggest for you to take information to a trained medical professional familiar with your case to discuss options that are best for you.*



### *Helping people regain life thru neurotechnology*

Focus on education of and advocacy to access neurotechnology devices, therapies and treatments for people living with impairments, their care-givers and medical professionals.

[www.NeurotechNetwork.org](http://www.NeurotechNetwork.org)

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## What is Neurotechnology?



The application of medical electronics and engineering to restore or improve the function of the human nervous system.

Potential Health and Economic Impact:

- Reduced long term care costs
- Increased independence
- Accelerate rehabilitation
- Improve quality of life
- More self-reliance
- Decreased health management costs

*Impact varies depending on device, therapy or treatment and specific user circumstances.*



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## Why is exercise important for people with paralysis?



- High incidences of:
  - Obesity
  - Cardiovascular disease
  - Diabetes
  - Low metabolic rates
  - Pulmonary disorders
  - Osteoporosis
  - Pressure Sores

### Key Take Away:

Exercise same impact as able bodies.

Can't maintain gains if stop exercising

## Rehabilitation vs Fitness



- Medical Definition:  
Rehabilitation is a treatment or treatments designed to facilitate the process of recovery from injury, illness, or disease to as normal a condition as possible.
- Focus is
  - Restoration/recovery
  - Compensation
  - Limitations/adjustment
  - Independence
- Medical Definition:  
Exercise is physical activity that is planned, structured, and repetitive for the purpose of conditioning any part of the body.
- Focus is
  - Improve health condition,
  - Maintain or improve fitness and
  - Prevention/performance

# Pinwheel of Exercise



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# No Need for High Tech



- Theraband
- Weights
- Yoga
- Dance
- Ropes
- Resources
  - United Spinal Association Tech Guide
  - Fitness Zones



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## Resources gather more

- Wheelchair exercise and fitness  
<http://www.disabled-world.com/fitness/exercise/wheelchair-exercises.php>
- Sit and Be Fit:  
[http://www.sitandbenefit.org/chair\\_exercises\\_for\\_seniors](http://www.sitandbenefit.org/chair_exercises_for_seniors)



# Technology Integration



## Video Games/Virtual Reality No Couch Potato



- Physical Benefits
  - Fine Motor Skills
  - Hand Eye Coordination
  - Endurance
  - Range of Motion
  - Bilateral Coordination
  - Balance
  - Physical Outlet
  - Increase Metabolic Rate
- Social/Psychological
  - Inclusion
  - Sense of 'normal'
  - Equalizing
  - Peer Interaction
  - Improved Self-Esteem
  - Increased Leisure activity

Source: Katie Murphy, CTRS, Shepherd Center  
Gaffurini, P., et al. (2012).

## Video Games/Virtual Reality



- Physical Activity Games
  - Tennis
  - Boxing
  - Dance
- ActivityAdapted  
Controllers
- Group/Team Play
- Adaptive Devices
  - Gloves
  - Head Gear
  - Asst. Tech



## Resources Adapted Gaming



- <http://benheck.com>
- <http://quadcontrol.com>
- <http://www.robertflorio.com>
- <http://www.broadenedhorizons.com>
- <http://www.eDimensional.com>
- <http://www.gimpgear.us>

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## Repetitive & Range of Motion *Clinical Based*



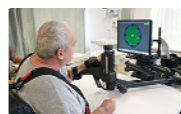
Hocoma Upper Extremity Motion

<http://www.hocoma.com/patients/upper-extremities/>



InMotion Upper Extremity Interaction

<http://interactive-motion.com/patients/>



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## Repetitive & Range of Motion Home Based



Kinetic Muscles Hand Therapy

<http://www.kineticmuscles.com/>



Quadriciser Range of Motion

<http://www.quadriciser.com/>



Theracycle Movement Therapy

<http://www.theracycle.com/>



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## Movement systems



- Cyberdyne

<http://www.cyberdyne.jp/english/>

- Ekso Bionics

<http://www.eksobionics.com/>



- REX Bionics

<http://www.rexbionics.com/>

- Parker Hannifin

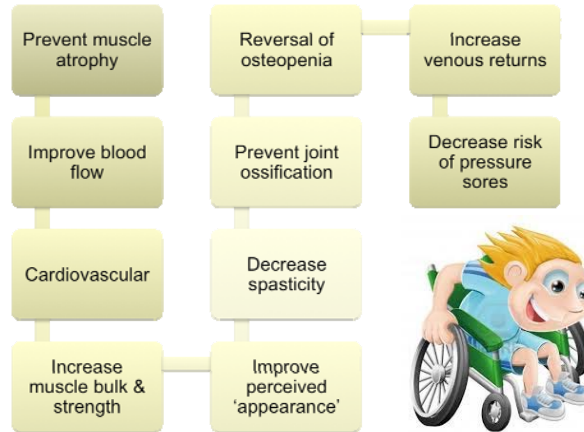
<http://indego.parker.com>



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## Electrical Stimulation for Exercise



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## NeuroMuscular Electrical Stimulation



- Bio-medical Research

<http://www.neurotechgroup.com/>



- Empi

<http://empi.com/>



- RS Medical

<http://www.rsmedical.com/>



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# Biofeedback

## EMG with NMES



**Biomove**  
<http://www.biomove.com/>



**Care Rehab**  
<http://www.carerehab.com/>



**Zynex Medical**  
<http://www.zynexmed.com>



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# Functional Electrical Stimulation



Axibionics/Wearable Therapies  
[www.wearabletherapy.com](http://www.wearabletherapy.com)



Restorative Therapies  
[www.restorative-therapies.com](http://www.restorative-therapies.com)



RECK Motomed & Hasomed  
[www.ri-llc.com](http://www.ri-llc.com)



Therapeutic Alliances  
[www.musclepower.com](http://www.musclepower.com)



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## Considerations to Participating in any FES program



- Not all programs are appropriate for all populations
- Fitness Goals
- Variety of exercises, potential benefit of 'mixing it up'
- Commitments of self, family/caregiver
  - Time
  - Out of pocket cost and/or reimbursement
- Medical Professional Monitoring
  - Peripheral nerve damage or skin damage
  - Over-stress or fatigue the stimulated muscles

## Resources



- National Center on Health, Physical Activity and Disability: <http://ncpad.org/>
- Exercise for Older Adults with a Disability: [www.agerrtc.org](http://www.agerrtc.org), University of Washington
- Neurotech Network, Fact Sheet Exercise Weak or Paralyzed Muscles: [http://www.neurotechnetwork.org/educate\\_exercise.htm](http://www.neurotechnetwork.org/educate_exercise.htm)



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