Webinar title: SCI and Osteoporosis

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Want to Ask a Question?
www.themiamiproject.org

The Miami Project is dedicated to finding more effective treatments and, ultimately, a cure for paralysis resulting from spinal cord injury.

www.NeurotechNetwork.org

Helping people regain life thru neurotechnology

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

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.
Webinar Agenda

• What is Osteoporosis
• What happens after SCI?
• Treatments currently available
  • Supplements
  • Medications
  • Technology
• Under investigation
  • Clinical Trials
• Prevention
• Resources to learn more
What is Osteoporosis?

It is a bone disease when the body loses bone, does not make enough bone, or both. Osteoporosis means “porous bone”, which makes bone weak and brittle.
Osteoporosis increases the risk of fracture
Why does this matter?

Fractures → Loss of independence → Need caregiver → Need additional equipment
Diagnosis

• X-ray – the whole bone
• DXA Scanning – the bone mineral density
  • Gives a score relative to a health person in the 20’s
  • Osteoporosis is diagnosed based how far below your density is compared to the ideal healthy score
What happens after SCI?

- Bone loss occurs rapidly in the acute phase of the injury and slows two to three years after injury.
  - Loss occurs below the level of injury.
- About 80% of individuals with chronic SCI have either osteopenia or osteoporosis.
- Studies vary, but generally there is about 30% to 40% decrease in bone density in the legs after SCI.
- Individuals with complete SCI are twice as likely to experience fractures compared to healthy controls, and as many as 40% of the individuals with chronic SCI experience fractures.

Why does this happen after SCI?

- Lack of weight bearing
- Altered blood flow to the limbs
- Poor nutrition
- Altered hormone regulation due to SCI
- Altered metabolism due to SCI
- Autonomic dysregulation due to SCI
TREATMENTS CURRENTLY AVAILABLE

Pharmacologic and Non-pharmacologic
Importance of Nutrition

Figure 7-1  How To Use the Nutrition Facts Panel on Food Labels for Calcium

Note: The Nutrition Facts panel on food labels can help individuals choose foods high in calcium. To convert the % Daily Value (DV) for calcium into milligrams (mg) multiply by 10 or add a 0. As an example, a container of yogurt might list 30% DV for calcium. To convert this to milligrams, multiply by 10 or add a 0, which equals 300 mg of calcium for the serving size of 1 cup of yogurt. A food with 20% DV or more contributes a lot of calcium to the daily total, while one with 5% DV or less contributes a little.

https://www.ncbi.nlm.nih.gov/books/NBK45523/
Supplements

• Calcium
  - 1000-1500 mg/day
  - Possible side effects if take too much

• Vitamin D
  - 400-800 IU/day
  - Possible side effects

• Take in combination under the guidance of your doctor
Medications

**Bisphosphonates**

- These are drugs that stop bone reabsorption and keep the bone from breaking down.
  - Examples are alendronate, risedronate, ibandronate, zoledronate (common names are Fosamax, Actonel, Boniva)

- Study results in SCI are variable:
  - Some show bone mass maintenance or even increases
  - Others have shown bone loss or no effect

- Any improvements reverse when the drug is stopped.

- We don’t know how safe it is for individuals with SCI to use these drugs for the long-term.
Technology & Exercise

• Physical exercise can reduce, prevent, and even reverse SCI-related osteoporosis.
• Physical exercise may promote bone blood flow, alleviate the bone vascular dysfunction due to neural denervation, and facilitate bone metabolism and growth in SCI.
• Loading the bones through muscular contractions initiated by FES has yielded positive results.
• Electrical stimulation exercise and standing together.

Devices for loading the bone – Standing Frames
Devices for loading the bone –
Standing Wheelchairs
Devices for loading the bone - Exoskeletons

- ReWalk
- Ekso Bionics
- Bioniks Labs
- REX Bionics
- Indego
- Cyberdyne
Devices – Electrical Stimulation

Axibionics/Wearable Therapies
www.wearabletherapy.com

Restorative Therapies
www.restorative-therapies.com

RECK Motomed & Hasomed
www.ri-llc.com

Myolyn
www.myolyn.com

Therapeutic Alliances
www.musclepower.com

FES and Bone Health Therapy: https://www.ncbi.nlm.nih.gov/pubmed/28078075
FES cycling and bone loss: https://www.ncbi.nlm.nih.gov/pubmed/20140411
Devices – Other Exercise devices
UNDER INVESTIGATION

Clinical trials
Research medications

- Simvastatin to Prevent SCI-Induced Bone Loss [NCT02946424]
- Statin Monotherapy for Treatment of Endocrine Metabolic Disease Risk (RoBaCO) [NCT03113994]
- Zoledronic Acid in Acute Spinal Cord Injury [NCT01642901]
- Prevention of Bone Loss After Acute SCI by Zoledronic Acid [NCT02325414]
- Denosumab Administration After Spinal Cord Injury [NCT01983475]
- The Efficacy of Denosumab in Incomplete Patients Spinal Cord Injury [NCT03029442]
Research non-medication

- Early Intervention to Reduce Bone Loss After Spinal Cord Injury [NCT02334410](https://clinicaltrials.gov/ct2/show/NCT02334410) – Whole body vibration
- FES Rowing for Skeletal Health After SCI (FES-R) [NCT02008149](https://clinicaltrials.gov/ct2/show/NCT02008149)
Research combinations

- **TRT in Combination With Electrical Stimulation and Standing: Effect on Muscle and Bone in Spinal Cord Injured Males**
  [NCT02317640](https://ClinicalTrials.gov) – Testosterone replacement therapy, plus body weight support stand training, plus electrical stimulation

- **Activity Dependent Rehabilitation Model to Improve Bone and Muscle Outcomes**
  [NCT02309983](https://ClinicalTrials.gov) – Stand retraining plus neuromuscular stimulation
Ounce of Prevention

• Quit smoking
• Limit alcohol consumption
• Stay physically and mentally active
• Avoid falls
  • Be careful during transfers
• Be aware of where your feet are in relation to walls/doorways
• Healthy diet
You may find devices in development at Clinical Trials. There are many clinical trials being conducted in this area, including sacral nerve stimulation, fecal incontinence, bowel management to name a few. Visit ClinicalTrials.gov.


Northwest Region SCI System: http://sci.washington.edu/info/forums/reports/osteoporosis.asp

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