


The Importance of Physical Activity in Neuropathies and Neuropathic Joint Disorders: A Practical Approach

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Learning Objectives

- Learn how to assess a patient's readiness to engage in physical activities
- Learn safe and effective physical activities for patients with peripheral and autonomic neuropathies
- Learn which types of activities are beneficial for patients with neuropathic joint disorders

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- Notice of Requirements For Successful Completion
 - Please refer to learning goals and objectives
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Learning Objectives

- Learn how to motivate and empower people with diabetes to become active
- Learn specific techniques to teach people with diabetes how to increase strength and endurance in order to stay active, perform ADLs, and prevent further complications from diabetes

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The doctor asked me to spend at least one hour per day on the treadmill.



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Assessment

- Cardiopulmonary limitations
- Orthopedic limitations
- Metabolic dysfunctions – liver, kidney, thyroid
- Laboratory data
- Medications

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Smart Goals

- Specific (simple, significant)
- Measurable (meaningful, motivating)
- Achievable (agreed, attainable)
- Relevant (reasonable, realistic)
- Time bound (time-based)

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Assessment

- Exercise stress test results for:
 - Healthy adults > age 45
 - People with diabetes > age 35 and
 - Previously inactive
 - Diabetes duration > 10 years
 - Desire to participate in high intensity interval training (HIIT)

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Assessment

- Balance
- Strength
- Pain
- Motivation
- Preferences
- Support system
- Current activity level

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Assessment

BARRIERS to Engaging in Activity



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Disuse Syndrome

- Disruption of the normal balance between rest and physical activity
- A decrease in optimal functional capacity of an individual
- Inactivity = > muscle contractions and < influence of gravity on weight-bearing bones

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Physiological and Biochemical Changes

- Decreased physical work capacity
- Muscle atrophy
- Negative nitrogen and protein balance
- Contracture of connective tissue
- Osteoporosis

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Disuse Syndrome

- Can develop within 3 days of immobilization
- Glucose intolerance in people **WITHOUT** diabetes begins within 72 hours of absolute bedrest

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Physiological and Biochemical Changes

- Renal lithiasis
- Cardiovascular deconditioning
- Pulmonary restrictions
- Decubitus ulcers
- Mental depression

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Disuse + Diabetes

- Increased disability
- Increased cost of medical care
- Increased cost of home health programs

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Diabetes Educator's Role

- Educate patients regarding the deleterious effects of disuse syndrome
- Assess the patient for readiness to change
- Assess the patient's knowledge and experiences regarding physical activity
- Assess the patient's preferences

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Diabetes Educator's Role

- Use motivational interview techniques to set **SMART** goals **WITH** the patient
- Teach the patient specific exercises they can safely engage in
- Use demonstrations and reinforce new activities with handouts

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Activities for Peripheral Neuropathy

- Tai Chi
- Elliptical
- Rowing
- Non-weight bearing activities

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Peripheral Neuropathy

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Autonomic Neuropathies

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Activities for Peripheral Neuropathy

- Swimming/water aerobics
- Walking
- Cycling – stationary/outdoors
- Yoga – alternatives
- Chair exercises

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Autonomic Neuropathies

- Gastroparesis
- Cardiac Neuropathy
- Hyperhidrosis/Anhidrosis
- Adrenergic nervous system

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Autonomic Neuropathies

- Cardiac Neuropathy
 - Orthostatic hypotension
 - Fixed tachycardia
 - Stationary cycle
 - Water exercises
 - BORG scale – RPE

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Retinopathy and Activity

*NO Valsalva

- Contraindications
 - Arm cycle ergometry
 - Jogging/Running
 - Parachuting
 - Scuba diving
 - Some yoga positions

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Activities for Cardiac Neuropathy

- Stationary cycle
- Elliptical
- Water exercises

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Neuropathic Joint Disorders

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Peripheral Vascular Disease

- Avoid weight training and calisthenics
- Avoid Valsalva maneuvers
- Caution in weight bearing exercises
- Caution due to inadequate muscle perfusion due to lack of blood flow to the exercising muscle

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Neuropathic Joint Disorders

- Studies are lacking
- Poor glycemic control = altered bone quality
- Affected by severity and duration of diabetes
- Brittle bones in the setting a normal bone density
- It's the quality of the bone, NOT the mass of the bone that's abnormal

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Neuropathic Joint Disorders

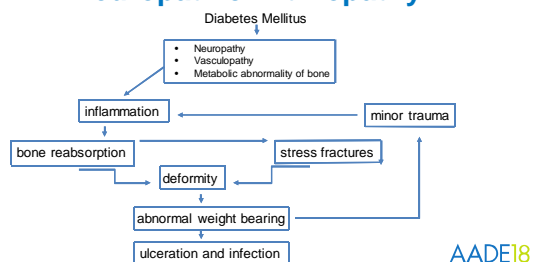
- Prolonged hyperglycemia + hypercholesterolemia:
 - vascular changes that affect the bones
 - neuropathic changes
- Future studies:
 - the role of inflammation in adipose tissue
 - effects of microbiome on bone
 - effect of hyperglycemia on bone health

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Hand and Shoulder Disorders
are
Correlated with the
DURATION
of Diabetes, not the Type of
Diabetes

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Neuropathic Arthropathy



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Pathological Changes

- Microvasculature
- Connective tissue
- Peripheral nerves

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Nephropathy and Activity

Individualize goals:

- Comorbidities
- Balance
- Mobility
- Fall risk
- Current injuries/healing stage
- Weight
- Coordination

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Hand Disorders

- Carpal Tunnel Syndrome
- Dupuytren's Contracture
- Flexor Tenosynovitis
- Cheiroanthropathy (stiff hand syndrome)
- Diabetic Sclerodactyly

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Clinical Features

- Stiffness
- Contractures
- Decreased grip strength
- Decreased ability to do fine movements
- Difficulties with hand function

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Lower Limb Disorders

- Neuropathic Arthropathy (foot and ankle)
- Diabetic Muscle Infarction (thigh and calf)
- Osteoarthritis (knee)

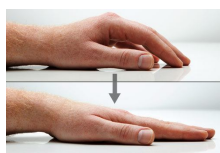
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Tests

Prayer Sign

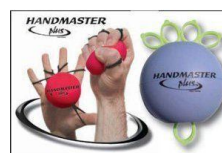


Table Top Test



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Activities for Neuropathies and Neuropathic Joint Disorders



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Shoulder Disorders

- Adhesive Capsulitis
- Calcific Periarthritis
- Limited Joint Mobility

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Carpal Tunnel Syndrome Exercises

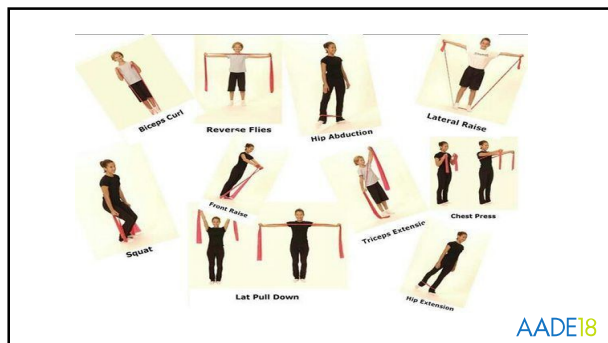


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Anaerobic Activity

- Thera-Bands
- Free Weights
- Weight Circuit
- Yoga
- Pilates

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Resistance Training

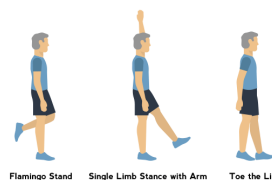
muscle contraction-induced increase in insulin-dependent glucose transporters

facilitates and increases glucose uptake

increased muscle mass which increases glycogen storage potential

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Balance



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Thera-Band Resistance Levels

- Tan --> very light
- Yellow --> light
- Red --> medium
- Green --> heavy
- Blue --> extra heavy
- Black --> special heavy
- Silver --> super heavy
- Gold --> max

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Yoga

The protective benefits of yoga remain unknown

- Increases parasympathetic/vagal control of the heart
- Decreases sympathetic activation
- Reduces systemic inflammation
- Enhances feelings of well-being
- Reduces stress levels
- Increase in skeletal muscle activation increases glucose metabolism

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Alternative Yoga

- Chair
- Hatha (beginners)
- Yin (beginners)
- Restorative (relaxation)
- Kundalini (intense)
- Bikram (hot)
- Ariel (difficult)

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Tai Chi

Study results are not conclusive

- May improve vascular function via similar mechanisms as cardiovascular endurance training
- Depends on the intensity level

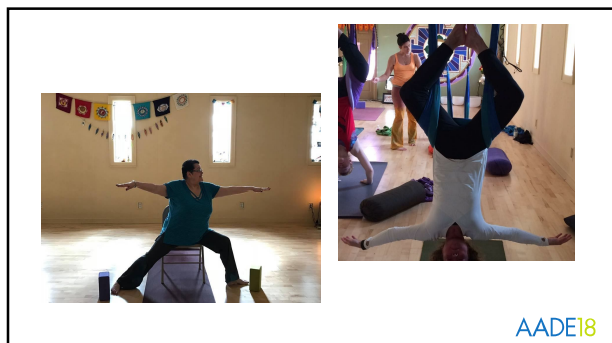
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Pilates

Gentle fluid movements using one's own body weight

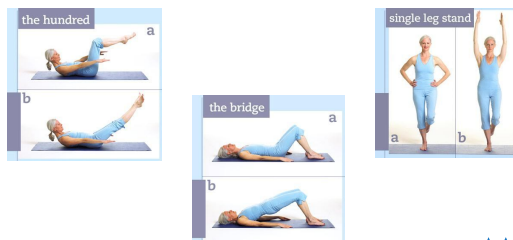
- Flexibility
- Balance
- Strength

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Pilates Exercises



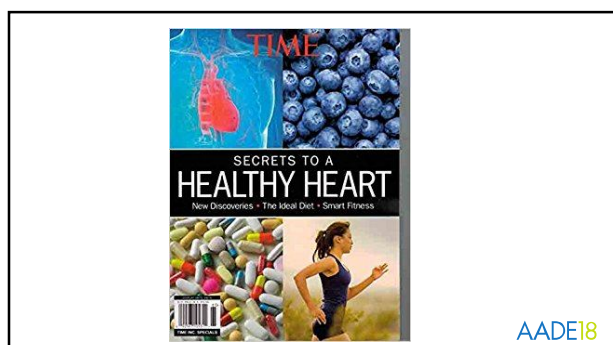
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Thank You

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Remember:

- Set SMART goals WITH the patient
- Use your assessment of readiness to change to guide the goal setting
- Diabetes is SELF-MANAGED...we are the support team
- Utilize your motivational interviewing skills
- Empower your patients to make healthy lifestyle choices

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