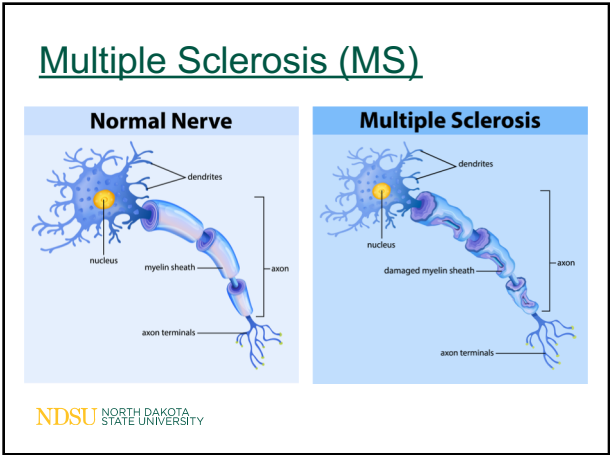
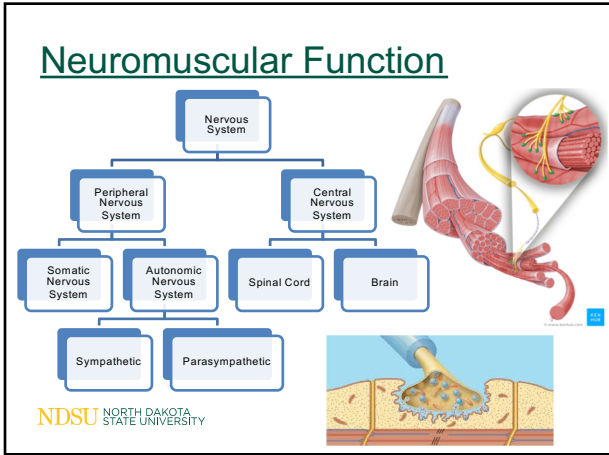




2023 PATH Intl. Region 6 Conference

## Neuromuscular Disorders and Physical Activity

Marty Douglas, PhD  
marty.douglas@ndsu.edu



### Multiple Sclerosis: Physiological Considerations

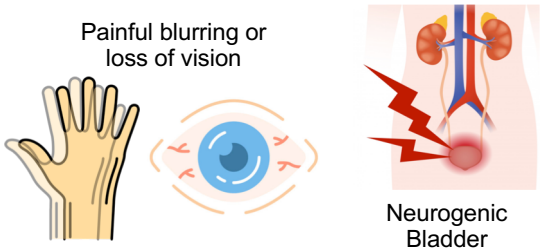
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### Multiple Sclerosis: Physiological Considerations

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### Multiple Sclerosis: Physiological Considerations

Painful blurring or loss of vision



Neurogenic Bladder

\*Variability throughout each day and day-to-day

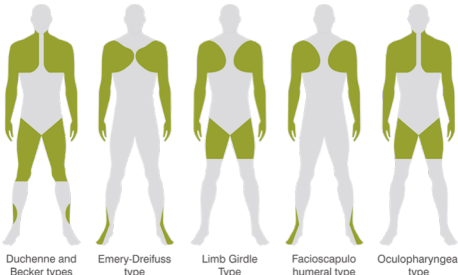
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### Multiple Sclerosis: Physical Activity Guidelines

Type of Exercise	Frequency	Intensity	Volume
<b>Resistance Training</b>			
- Weights - Bodyweight - Resistance Bands	- 1 - 2 sessions per week - ▲2 or 3 as tolerated	- 4 - 8 exercises at 15RM - Multi-joint - ▲to 8 - 10RM - Recovery 2 - 4 mins	- 1 - 3 sets of 10 - 12 reps per exercise - Potentially▲to 3 - 4 sets per exercise
<b>Cardiovascular Training</b>			
- Treadmill - Cycling - Arm & Leg Cycling - Rowing - Aquatics	- 1 session per week - Progress to 2 - 3 days per week	- Light to moderate - 30 - 60% VO <sub>2</sub> - 55 - 75% MHR - RPE of 9 - 13 - Increase intensity gradually	- 10 - 20 min sessions - Gradually▲to 30 - 40 min sessions

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### Muscular Dystrophy (MD)



Duchenne and Becker types    Emery-Dreifuss type    Limb Girdle Type    Facioscapulo humeral type    Oculopharyngeal type

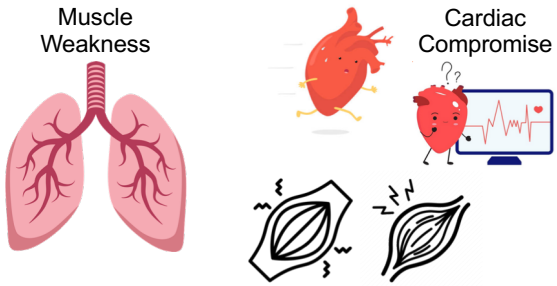
Main areas of muscle weakness in different types of dystrophy

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### Muscular Dystrophy: Physiological Considerations

Muscle Weakness

Cardiac Compromise



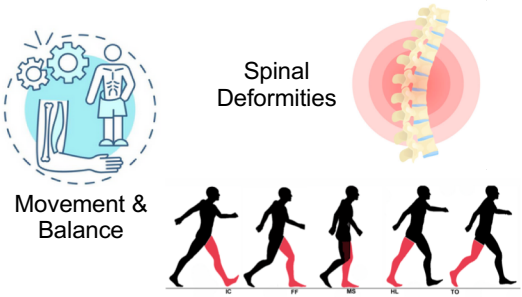
Spasticity

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### Muscular Dystrophy: Physiological Considerations

Movement & Balance

Spinal Deformities



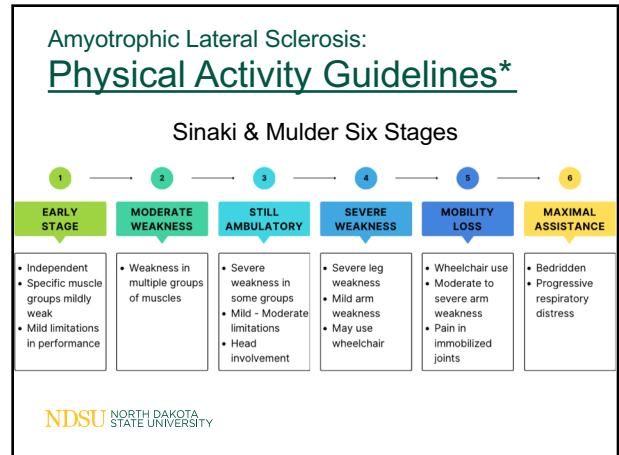
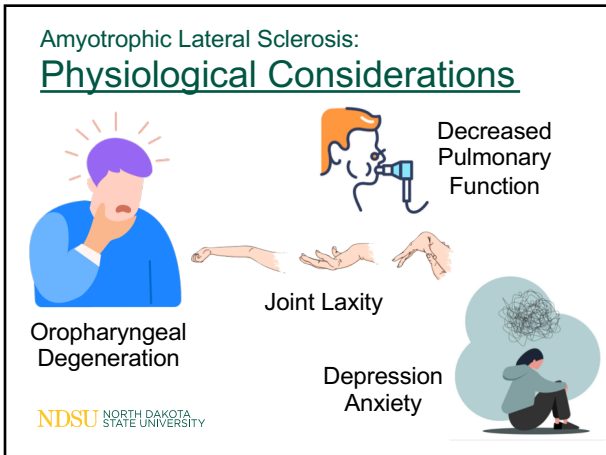
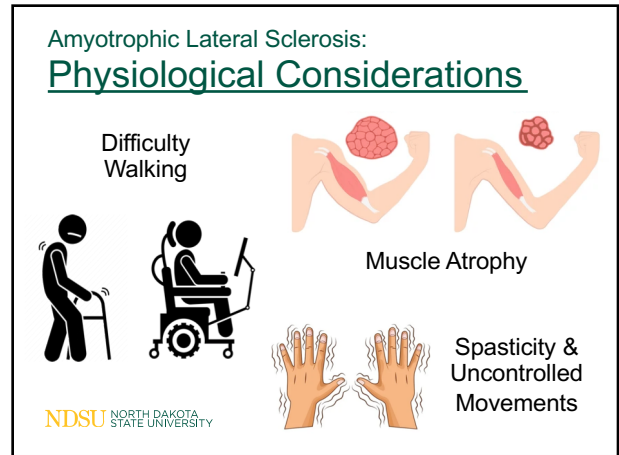
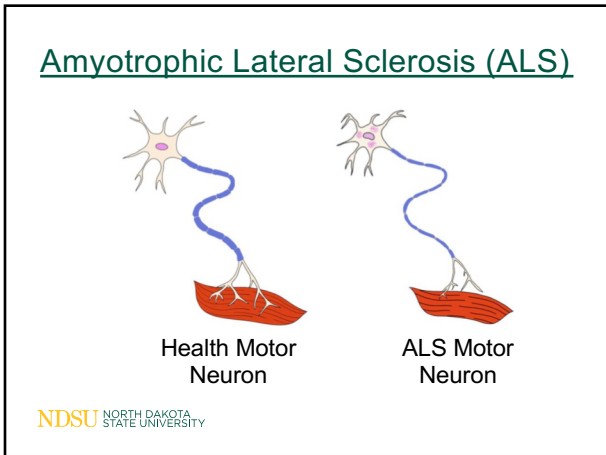
Altered Gait Pattern

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### Muscular Dystrophy: Physical Activity Guidelines

Type of Exercise	Frequency	Intensity	Volume
<b>Resistance Training</b>			
- Weight Machines - Resistance Bands	- 1 session per week - ▲to 4 days per week as tolerated	- 8 - 10 exercises - 40 - 60% of 1RM - Multi-joint	- 1 set of 10 - 12 reps per exercise - Potentially▲to 1 - 2 sets per exercise
<b>Cardiovascular Training</b>			
- Walking - Cycling - Rowing	- 1 session per week - Progress to 2 - 3 days per week	- Light to moderate - 30 - 60% VO <sub>2</sub> - 55 - 75% MHR - RPE of 9 - 13 - Increase intensity gradually	- 15 - 20 min sessions - Gradually▲to 30 min sessions

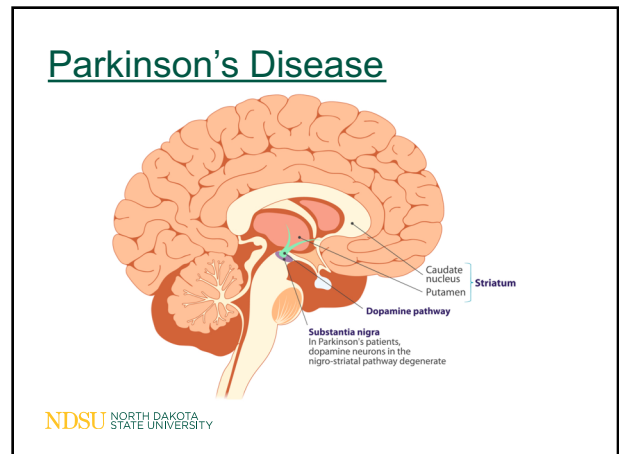
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### Amyotrophic Lateral Sclerosis: Physical Activity Guidelines\*

Type of Exercise	Frequency	Intensity	Volume
<b>Resistance Training</b>			
<ul style="list-style-type: none"> <li>Weights</li> <li>Resistance Bands</li> </ul>	<ul style="list-style-type: none"> <li>1 session per week</li> <li>Progress only under medical supervision</li> </ul>	<ul style="list-style-type: none"> <li>Very Light</li> <li>1 - 4 exercises</li> <li>10 - 30% of 10RM</li> <li>Non-affected joints</li> </ul>	<ul style="list-style-type: none"> <li>1 set of 3 - 8 reps per exercise</li> <li>Do NOT overload</li> </ul>
<b>Cardiovascular Training</b>			
<ul style="list-style-type: none"> <li>Walking</li> <li>Cycling</li> <li>Aquatics</li> </ul>	<ul style="list-style-type: none"> <li>1 session per week</li> <li>Progress only under medical supervision</li> </ul>	<ul style="list-style-type: none"> <li>Very Light</li> <li>RPE of 6 - 10</li> <li>Increase intensity gradually under medical supervision</li> </ul>	<ul style="list-style-type: none"> <li>5 - 10 min sessions</li> <li>Possibly gradually <math>\blacktriangle</math> to 15 min sessions</li> </ul>

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### Parkinson's Disease: Physiological Considerations

**Bradykinesia**

**Tremors & Rigidity**

**Gait Alterations**

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### Parkinson's Disease: Physiological Considerations

**Dystonia**

**Dyskinesia**

**Postural Instability**

**Medication Impacts**

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### Parkinson's Disease: Physical Activity Guidelines

Type of Exercise	Frequency	Intensity	Volume
<b>Resistance Training</b>			
- Weights - Bodyweight - Resistance Bands	- 1 - 2 sessions per week - ▲ to 4 days per week, split routine	- 8 - 10 exercises - 40 - 60% of 1RM - Multi-joint - Progress to 60 - 80% of 1RM	- 1 set of 10 - 12 reps per exercise - Potentially ▲ to 2 - 3 sets per exercise
<b>Cardiovascular Training</b>			
- Walking - Cycling - Rowing	- 1 session per week - Progress to 4 or more days per week as tolerated	- Light to moderate - 30 - 60% VO <sub>2</sub> - 55 - 75% MHR - RPE of 9 - 13 - Increase intensity gradually	- 15 - 20 min sessions - Gradually ▲ to 30 min sessions

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### Myasthenia Gravis

**Normal neuromuscular junction**

**Neuromuscular junction in myasthenia gravis**

Acetylcholine, Neuron, Nerve, Ach receptor, Muscle, Normal muscle contraction

Receptors blocked by antibodies, Impaired muscle contraction

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### Myasthenia Gravis: Physiological Considerations

**Muscle Fatigue & Weakness**

**Eye Issues**

**Neck & Limb Muscles**

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### Myasthenia Gravis: Physiological Considerations

**Difficulty Swallowing & Chewing**

**Impaired Speaking**

**Altered Facial Expressions**

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## Myasthenia Gravis: Physical Activity Guidelines\*

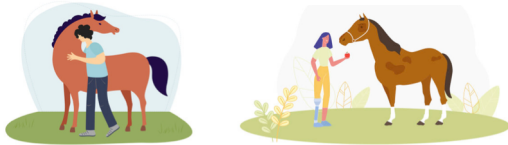
Type of Exercise	Frequency	Intensity	Volume
<b>Resistance Training</b>			
<ul style="list-style-type: none"> <li>- Begin with ROM</li> <li>- Weights</li> <li>- Resistance Bands</li> </ul>	<ul style="list-style-type: none"> <li>- 1 - 2 sessions per week</li> <li>- Progress under medical supervision</li> </ul>	<ul style="list-style-type: none"> <li>- 8 - 10 exercises</li> <li>- 40 - 60% of 1RM</li> <li>- Multi-joint</li> </ul>	<ul style="list-style-type: none"> <li>- 2 - 3 sets of 5 reps per exercise</li> <li>- Gradually ▲ to 3 sets of 10 reps</li> </ul>
<b>Cardiovascular Training</b>			
<ul style="list-style-type: none"> <li>- Walking</li> <li>- Jogging</li> <li>- Aquatics</li> <li>- Recreational sports</li> </ul>	<ul style="list-style-type: none"> <li>- 150 minutes per week</li> <li>- Progress based on individual</li> </ul>	<ul style="list-style-type: none"> <li>- Light to moderate</li> <li>- RPE of 8 – 12</li> <li>- Increase intensity gradually under medical supervision</li> </ul>	<ul style="list-style-type: none"> <li>- 15 - 20 min sessions</li> <li>- Gradually ▲ to 30 min sessions</li> </ul>

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## Implications



thank you



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