Functional Fitness: How Exercise Plays a Critical Role in Supporting Common Conditions that Affect Development and Independence

SCOTT QUAIFE, NSCA – CPT, PNL1

HEALTH AND WELLNESS COORDINATOR

DOWN SYNDROME INNOVATIONS

DISCLAIMER

This information is provided for general information and educational purposes only. You should not rely on this information as a substitute for, nor does it replace, professional medical advice, diagnosis, or treatment. We encourage you to consult with your health care professional.

DOWN SYNDROME INNOVATIONS

KEY QUESTIONS TO BE ADDRESSED

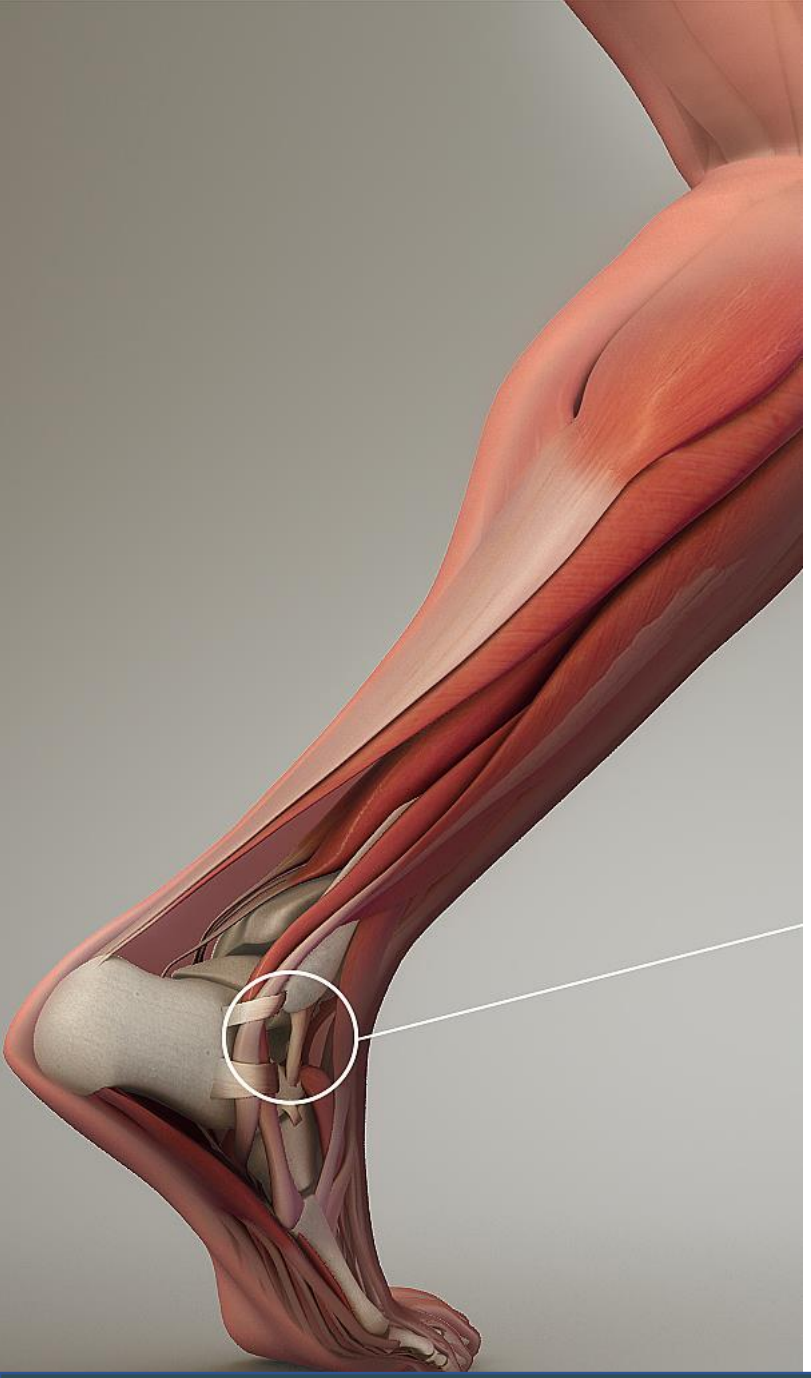
How Down syndrome affects physical activity specifically?

What are methodologies to address these issues?

HEALTH CONDITIONS AFFECTING DOWN SYNDROME

Ligamentous Laxity	Hypotonia	Reduced Muscle Strength	Pes Planus (Flat feet)
Low V02 Max	Sleep Apnea	Atlantoaxial Instability	Low Bone Density

DOWN SYNDROME INNOVATIONS



LIGAMENTOUS LAXITY

- Also known as hypermobility or joint laxity
  - Loose ligaments
- Kinetic chain energy leakage
- Coordination/Dislocations
- Compounds other DS issues

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HYPOTONIA (LOW MUSCLE TONE)

- Nearly universal at birth
- Muscles in relaxed state
- Muscles slow to contract
- Affects movement, reflexes, speech, digestion
- Cannot be cured but improved

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REDUCED MUSCLE STRENGTH

- Muscle strength – 50% in DS
- Due in part to:
  - Low muscle tone
  - Joint laxity
  - Limb length/bone mechanics

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PES PLANUS (FLAT FEET)

- Found in 91% of 503 DS children
- Joint laxity factor
- Arch collapses, foot widens
- Leads to overpronation

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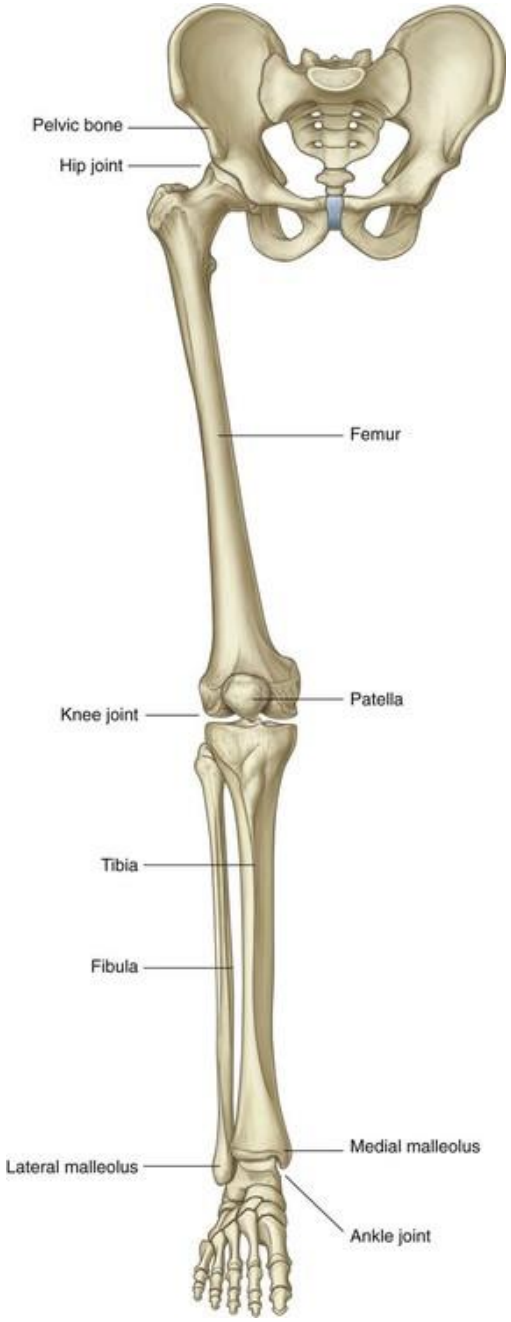
OVERPRONATION

- Foundation of body
- Trickle up effect
- Risk of musculoskeletal injuries
- Interferes with daily life – Balance/Walking



OVERPRONATION

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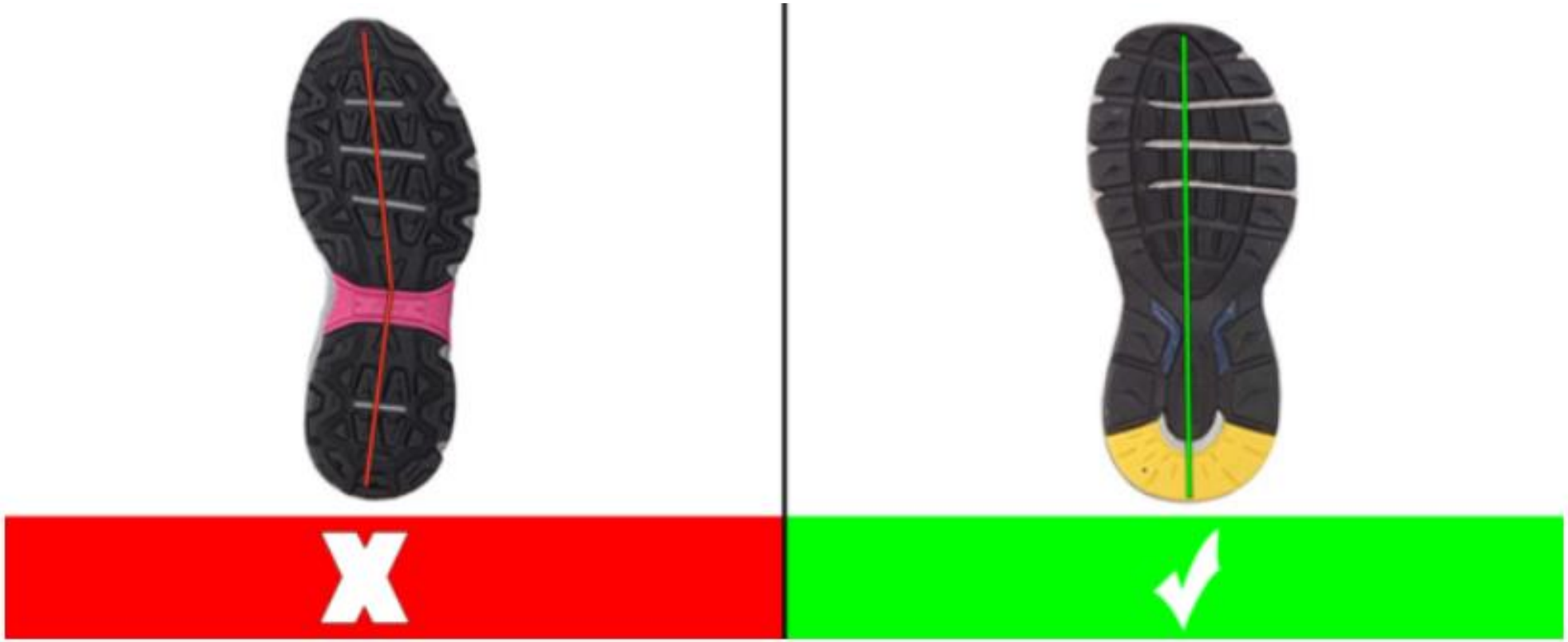
Images courtesy of fittingchildrenshoes.com

OVERPRONATION



Straight Lasts

Images courtesy of fittingchildrenshoes.com

DOWN SYNDROME INNOVATIONS

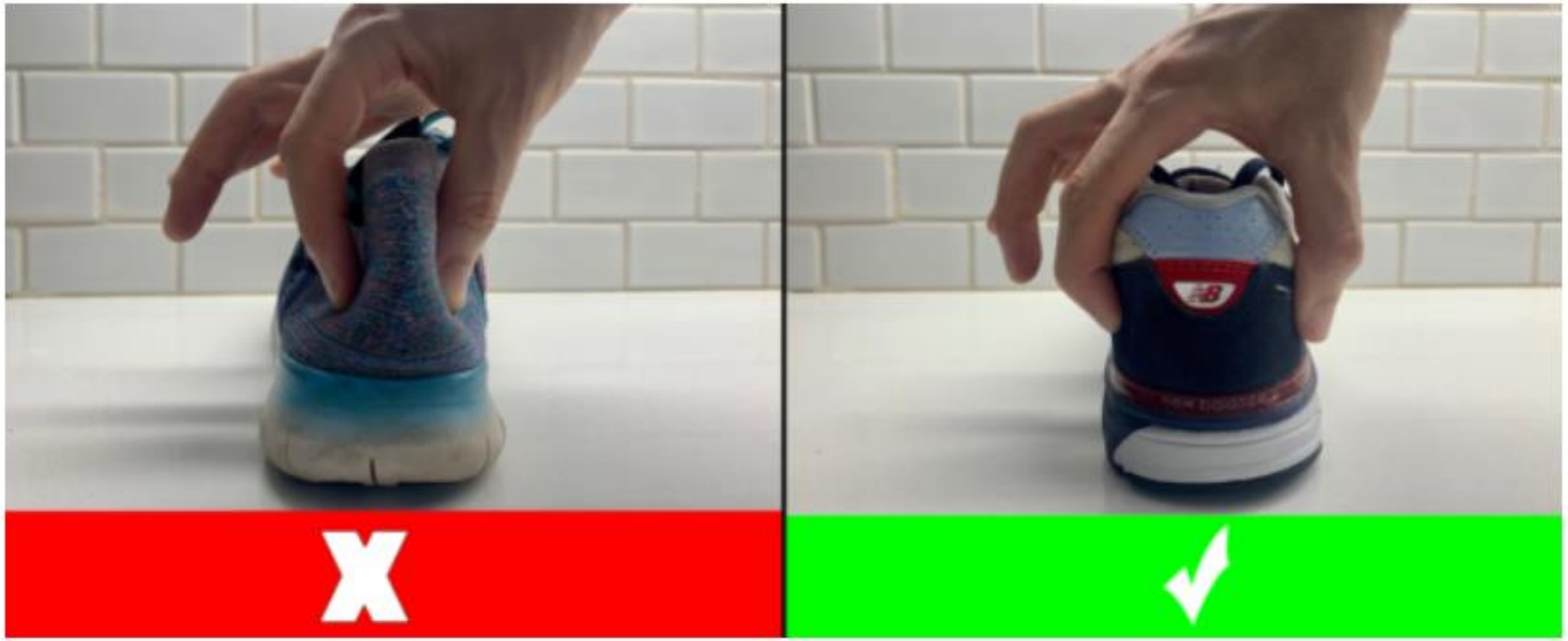
OVERPRONATION

Supportive Outsoles

Images courtesy of fittingchildrenshoes.com

DOWN SYNDROME INNOVATIONS

OVERPRONATION



Firm Heel Counters

Images courtesy of fittingchildrenshoes.com

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OVERPRONATION

- Remedies:
  - Shoes designed for overpronation
  - Shoe inserts
  - Custom orthotics
- Cost now vs later

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LOW VO2 MAX

- V02 Max = measure of maximum oxygen uptake
- Young adults with DS V02 = 60 yr. old w/ heart disease
- Low muscle tone/Joint laxity compounds

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SLEEP APNEA

- Obstructive Sleep Apnea
- Muscles relax too much during sleep
- Brief bouts of wakefulness
- Affects memory/Energy levels

ATLANTOAXIAL INSTABILITY

- Motion between cervical bone – Joint laxity
- 15% of individuals under 21 / 1-2% symptomatic
- Often incidentally found
- X-Ray not foolproof

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ATLANTOAXIAL INSTABILITY

- Symptoms include:
  - Difficulties in walking
  - Abnormal gait
  - Neck pain
  - Limited neck mobility
  - Torticollis
  - Incoordination and clumsiness
  - Sensory deficits, spasticity, hyperreflexia
- Symptoms stable, rarely to critical
- Treatment options

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ATLANTOAXIAL INSTABILITY

- No Special Olympics cases
- Only 41 well-documented cases, 3 from sports
- Anesthesia risks

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LOW BONE DENSITY

- Lower bone density
- Decreases more rapidly
- Issue as lifespan increases
  - Risk of osteoporosis/Fractures
- Vitamin D deficiency

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LOW BONE DENSITY

- PA improves bone density
  - Accelerometer research
  - Full body, esp. hips
- Strength training benefits
  - Hips/Spine/Wrists

DOWN SYNDROME INNOVATIONS

Functional Fitness

FUNCTIONAL FITNESS

Key Concepts:

1. Fundamental Movement Patterns
2. **S**pecific **A**daptations to **I**mposed **D**emands (SAID Principle)

DOWN SYNDROME INNOVATIONS

1. Fundamental Movement Patterns

DOWN SYNDROME INNOVATIONS

HIP HINGE

SQUAT

PUSH

LUNGE

CARRY

CORE ACTIVATION

FUNDAMENTAL MOVEMENT PATTERNS

- Time-efficient
- Compound movements
- Functional
- Realistic
  - Farmers walks
    - Increase leg strength
    - Build hip/shoulder stability
    - Improve core strength

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FUNDAMENTAL MOVEMENT PATTERNS

- Functional fitness in nutshell
  - Exercise entire body through natural movement
- Concept is same – application individual

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2. SAID Principle

SAID PRINCIPLE

- The body naturally adapts
  - Lifting weights/running
- You improve at exactly what you practice
  - Tennis player
  - Weightlifter

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SAID PRINCIPLE

- Not all exercise needs to be specific
  - General strength/endurance increase versatility
- Purposeful exercise selection
- More specific = less application

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SAID PRINCIPLE

- When is specific beneficial?
  - Exercise mirrors daily/weekly PA
- When is specific not beneficial?
  - Exercise trains for unencountered situations
- What's the why behind the exercise?

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FUNCTIONAL FITNESS RECAP

- Fundamental Movement Patterns
  - Functional
  - Time Efficient
  - Engage whole body
- Well-designed programs include FMP
- Specific exercises for regular PA
- General training of FMP improves overall fitness

DOWN SYNDROME INNOVATIONS

3 KEY ATTRIBUTES TO ADDRESS

- Muscular Strength
- Cardiovascular Endurance
- Proprioception

THREE ELEMENTS OF FITNESS

DOWN SYNDROME INNOVATIONS

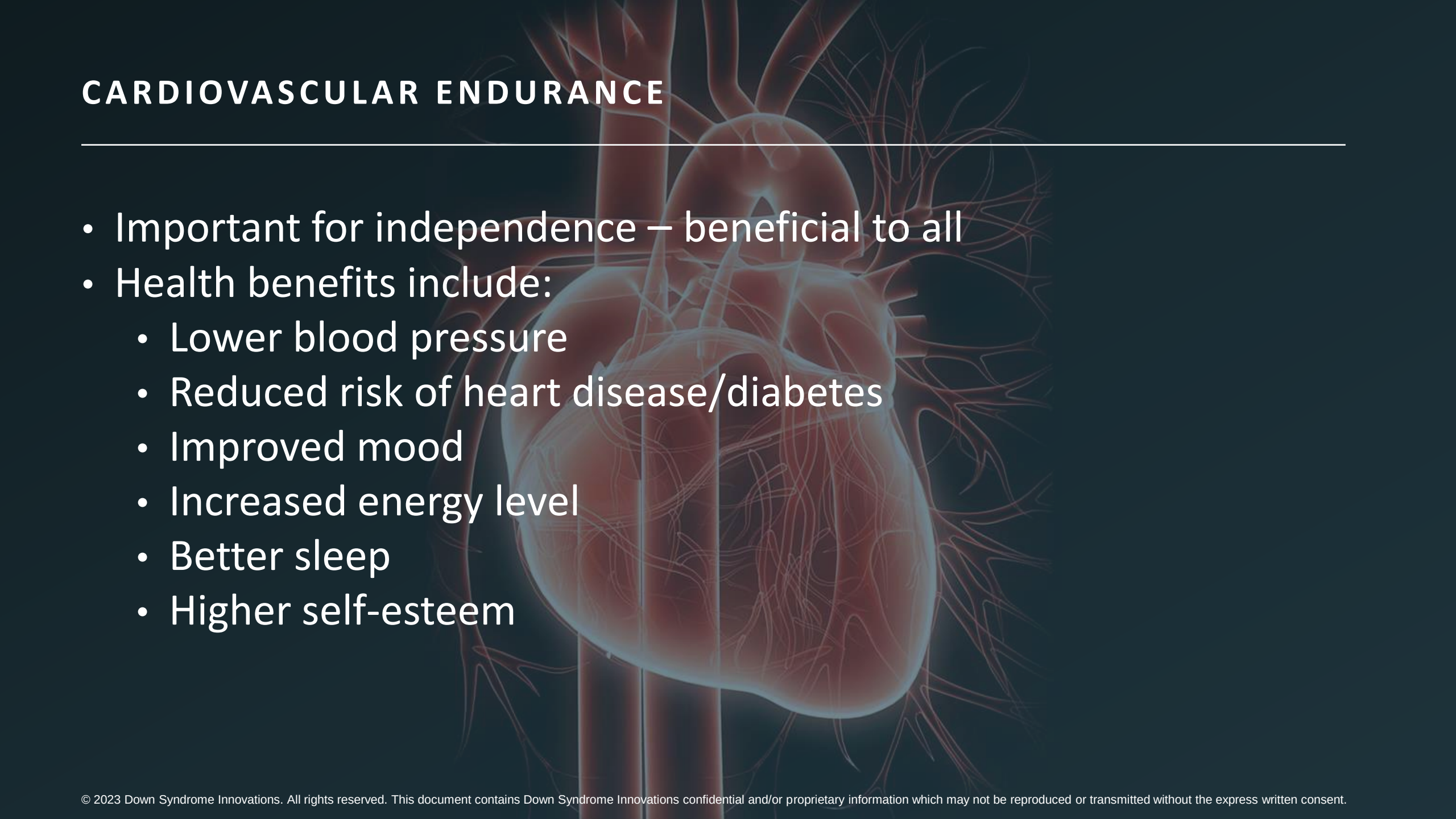
MUSCULAR STRENGTH

- Priority on core/lower body
  - Upper body of lower importance
- Large muscle group movements
  - Fundamental movements

MUSCULAR STRENGTH

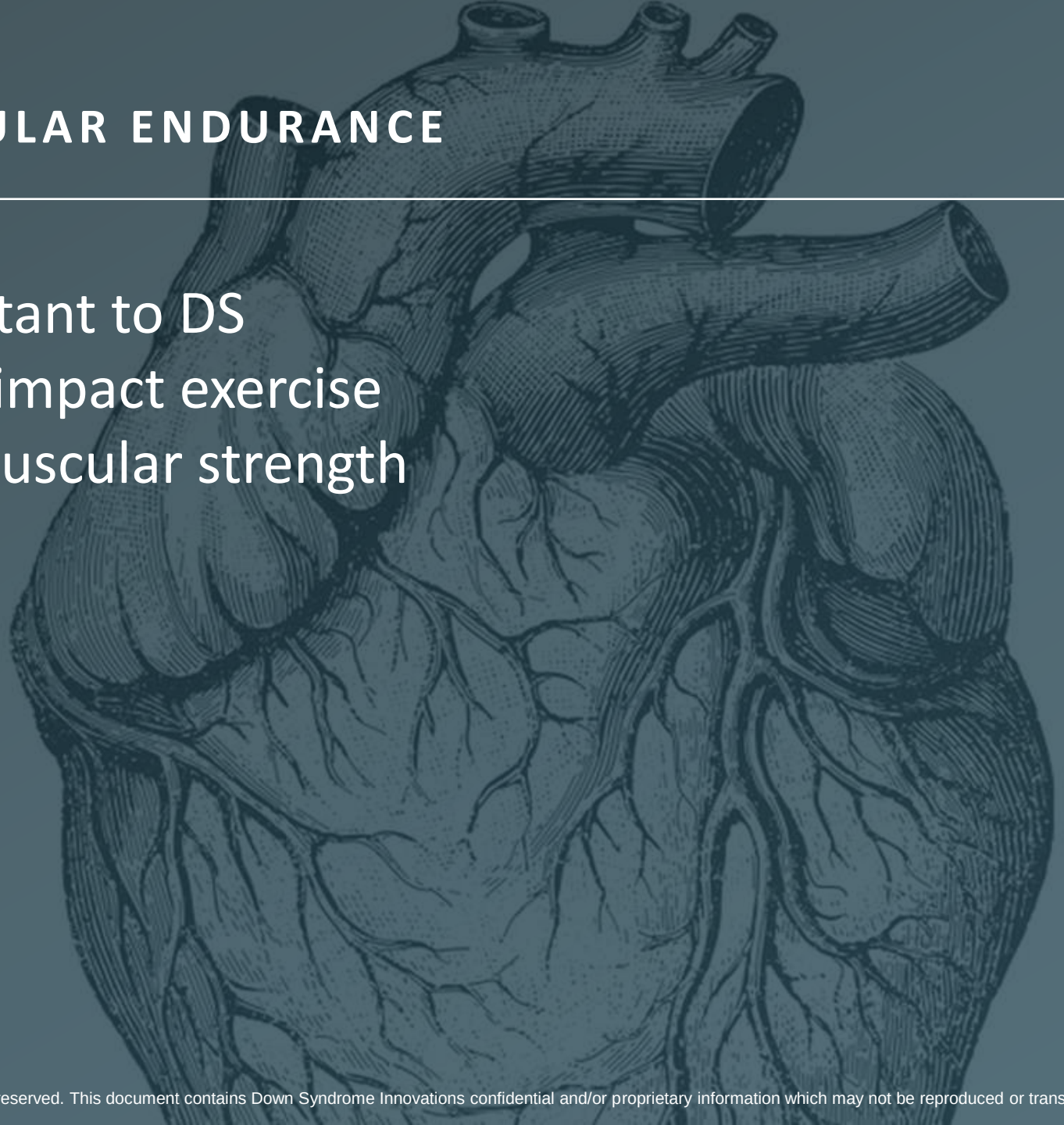
- Key for employment/independent living
- Progressive resistance training
  - Variety of rep ranges
- Functional fitness guides programming

CARDIOVASCULAR ENDURANCE



- Important for independence – beneficial to all
- Health benefits include:
  - Lower blood pressure
  - Reduced risk of heart disease/diabetes
  - Improved mood
  - Increased energy level
  - Better sleep
  - Higher self-esteem

CARDIOVASCULAR ENDURANCE



- More important to DS
- Steady, low impact exercise
- Pairs with muscular strength

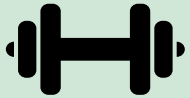
PROPRIOCEPTION

PROPRIOCEPTION

- Constant feedback between brain/body
- Skin/Joints/Muscles
- Poor proprioception = poor balance, uncoordinated movements, using too much force

MIDLINE CROSSING MOVEMENTS

IMPROVED BY INCORPORATING EXERCISES THAT REQUIRE BALANCING



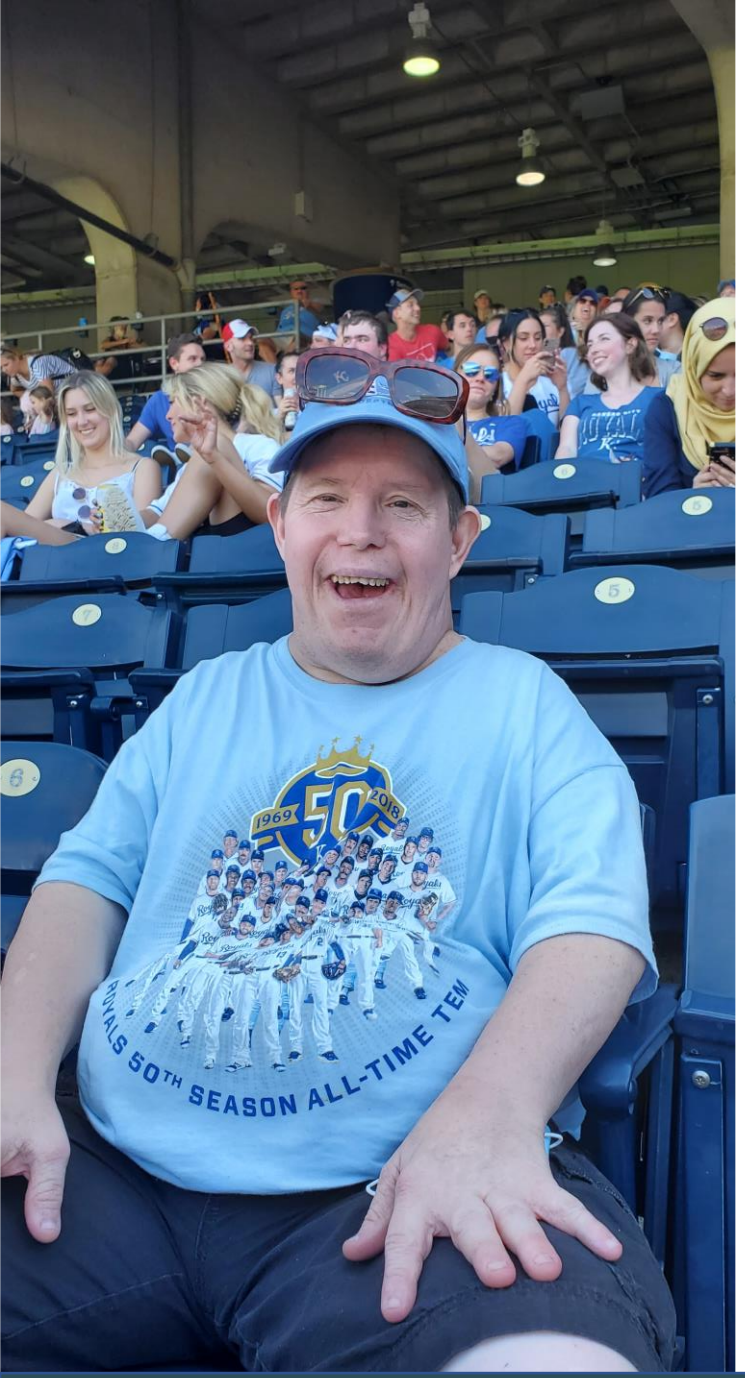
STRENGTH TRAINING

REPETITION/ MUSCLE MEMORY

BODY – BRAIN CONNECTION

- Obesity → Type 2 diabetes → Alzheimer's
- Poor cardio health = decreased life satisfaction
- Low levels of activity in DS vs typical developing youth
- Exercise early in life matters

DOWN SYNDROME INNOVATIONS



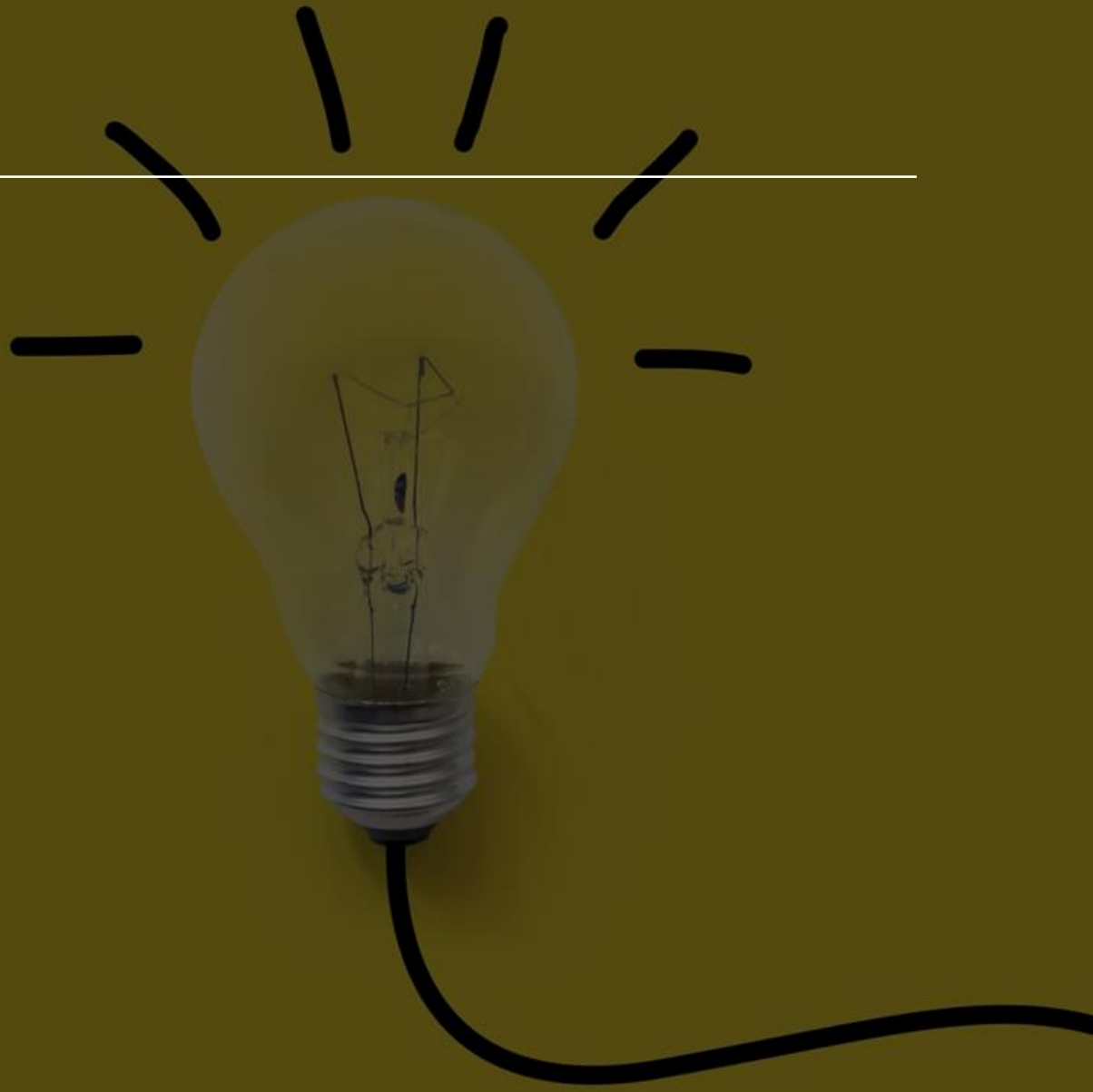
BODY – BRAIN CONNECTION

- Aging population
- Maintaining is improving
- Task complexity/Socialization
- Pioneering the field

DOWN SYNDROME INNOVATIONS

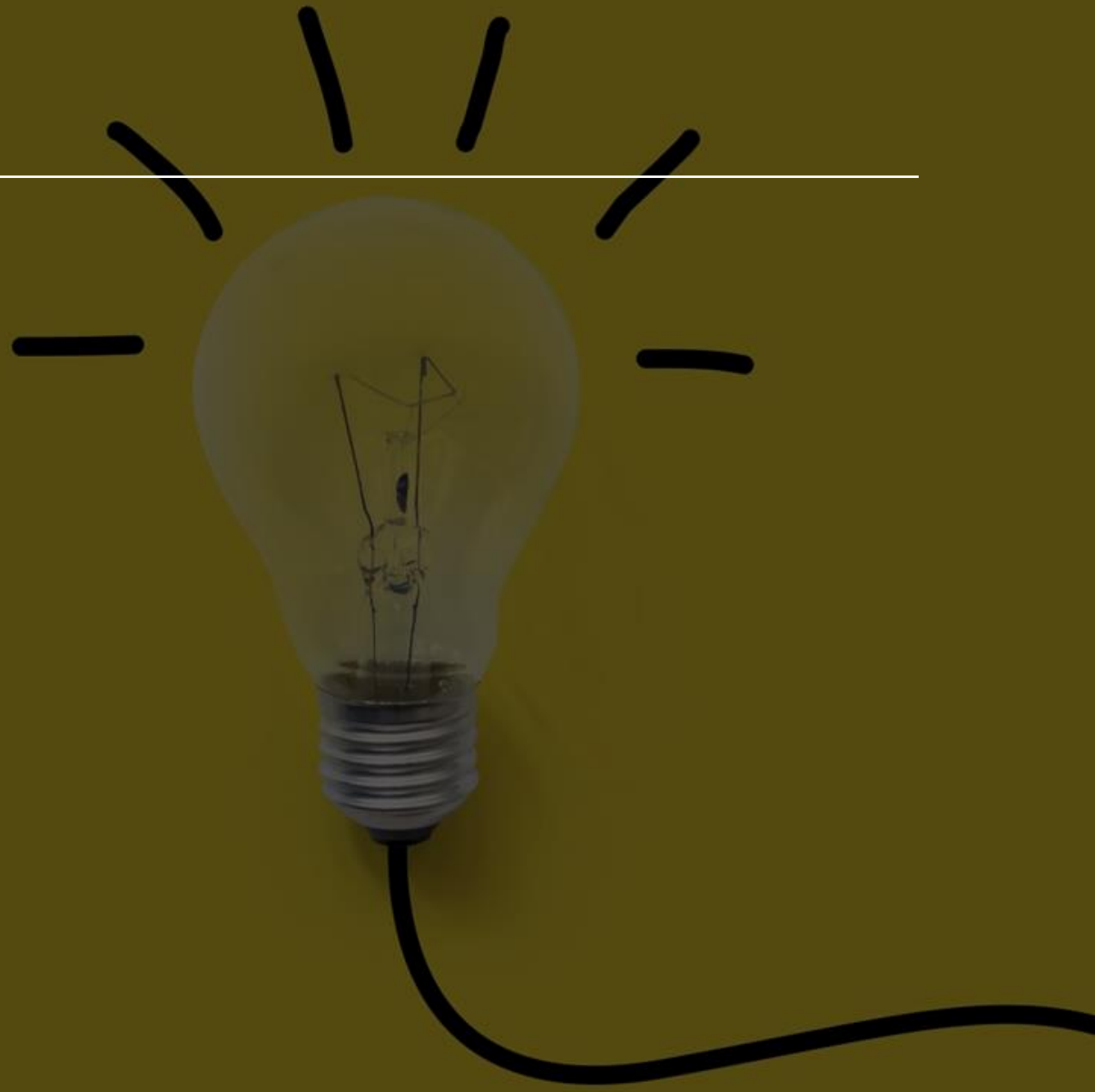
SHARING HOW

- Make it fun – overcoming barriers:
  - Physical
  - Mental
- Engaging
  - Make it a game
  - Name the exercises
- Social
  - Exercise with the family/friends



SHARING HOW

- Age Appropriate
  - Squats = Frog Jumps
  - Planks = Animal Crawls
  - Proprioception = Balance Beam
  - Cardio = Dance Party/Games
- Keep it simple
  - Equipment not necessary
- Anything is possible now



Questions?

Scott Quaife
Health & Wellness Coordinator
Down Syndrome Innovations
scott@kcdsi.org
913-222-5101

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