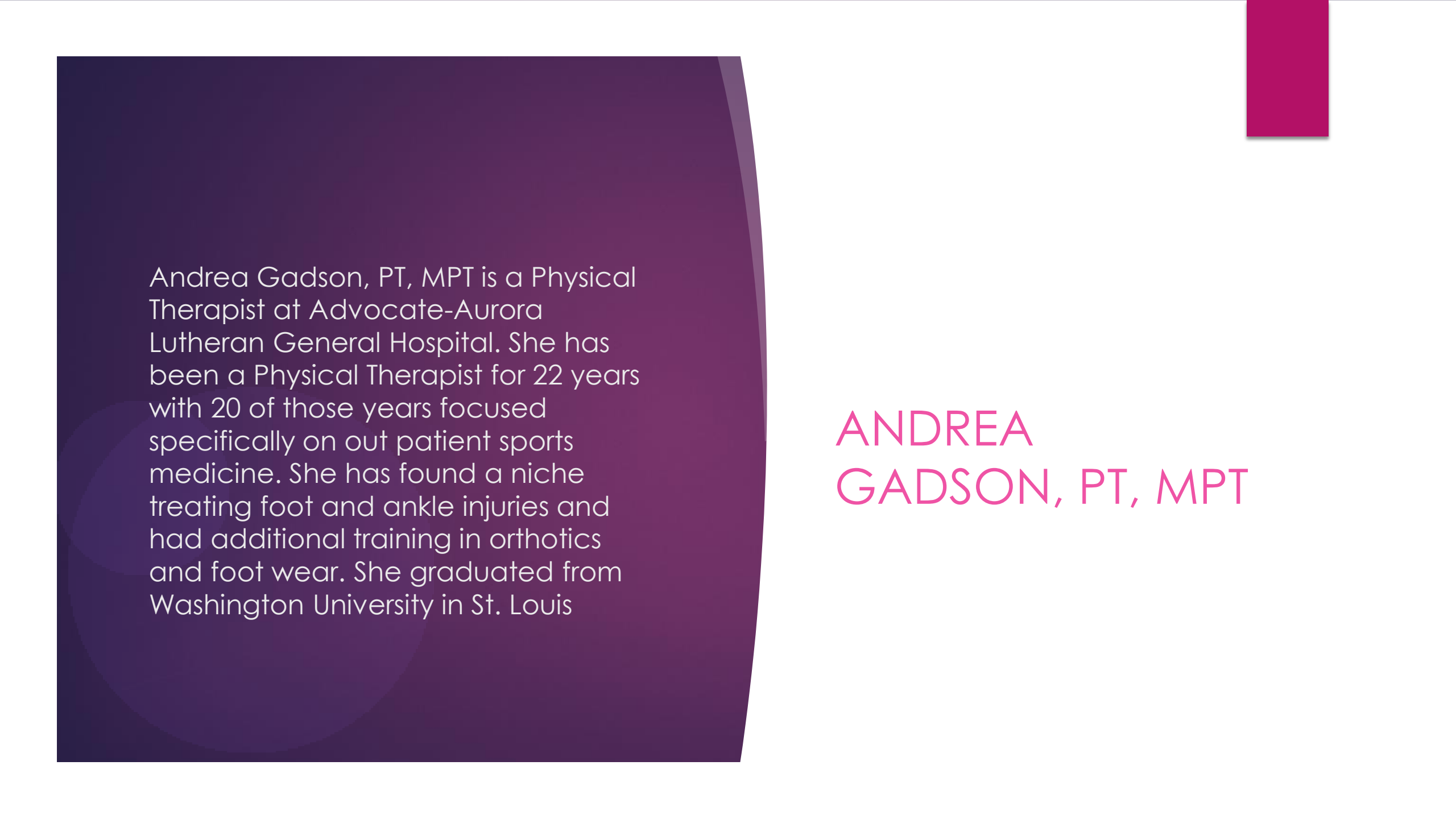


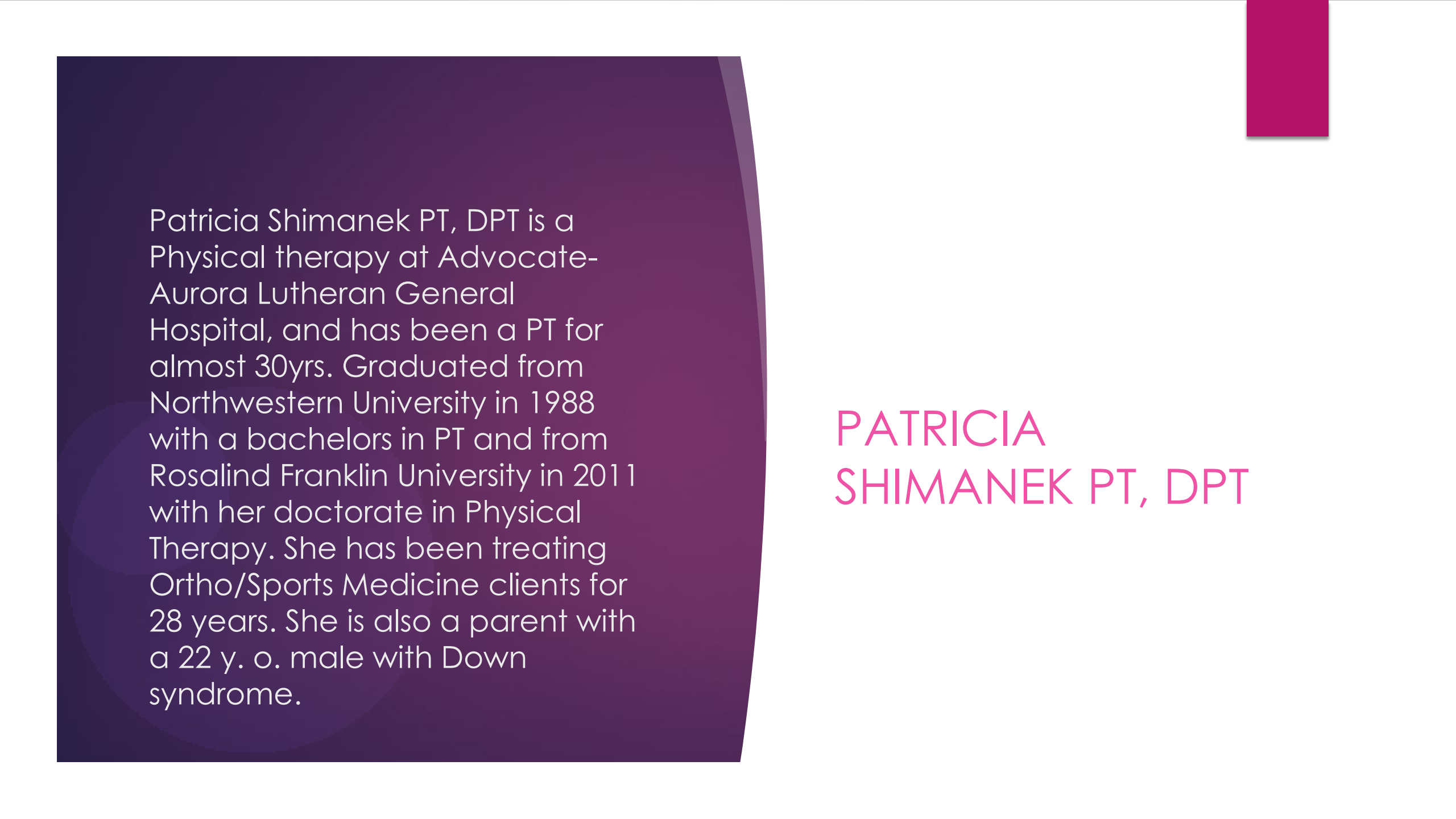
Physical Therapy for Adolescents thru Adulthood with Down syndrome

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Patricia Shimanek PT, DPT is a Physical therapy at Advocate-Aurora Lutheran General Hospital, and has been a PT for almost 30yrs. Graduated from Northwestern University in 1988 with a bachelors in PT and from Rosalind Franklin University in 2011 with her doctorate in Physical Therapy. She has been treating Ortho/Sports Medicine clients for 28 years. She is also a parent with a 22 y. o. male with Down syndrome.

PATRICIA
SHIMANEK PT, DPT

Objectives

- ▶ 1. Understanding Medical issues in a person with Down syndrome
- ▶ 2. Understanding physical characteristics of a person with Down syndrome
- ▶ 3. Understanding gait tendencies, shoe wear and orthotics
- ▶ 4. Understanding why exercise/Physical Therapy is important
- ▶ 5. Functional Physical Therapy Goals

Medical Issues

► There are multiple medical issues related to Down syndrome:

- | | |
|------------------------------|------------------------------------|
| 1. Heart Problems(50%) | 2. Gastrointestinal Issues 12% |
| 3. Umbilical hernias | 4. Epilepsy |
| 5. Orthopedic Issues | 6. Ears, nose, and throat issues |
| 7. Blood problems | 8. Thyroid issues 4-18% |
| 9. Eye Issues | 10. Skin/dermatology concerns |
| 11. Dental issues | 12. Alzheimer's |
| 13. Obesity | 14. Obstructive sleep apnea 50-79% |
| 15. Pelvic floor dysfunction | |

Heart Issues

- ▶ Approximately 40-60% of infants have some type of heart issue
- ▶ These are mostly correctable
- ▶ As the children age, periodic rechecks with the cardiologists are still important
- ▶ Coronary Artery disease is not common in Down syndrome, but risk can increased with obesity and sedentary lifestyle as age.
- ▶ Valvular heart disease: mitral and aortic valve regurgitation, and aortic and pulmonic stenosis is higher

Gastrointestinal Issues

- ▶ Celiac disease: sensitivity to gluten
- ▶ Lactose Intolerance
- ▶ Irritable Bowel Disease (IBS)
- ▶ Gastrointestinal Reflux Disease (GERD)
- ▶ Constipation

Hernias

- **Defect in the abdominal wall:**
 - 1. Inguinal: in the groin
 - 2. Umbilical: at the belly button
 - 3. Epigastric: above the belly button
 - 4. Site of previous abdominal surgery

Orthopedic Issues

2 types that involve bones, joints, ligaments, or tendons

- ▶ **1. Problems caused by ligament laxity**

- a. Atlantoaxial instability (AAI) 15%
- b. Hallux Valgus (bunions)
- c. Over pronation of the ankles
- d. Subluxation of the patella 5-9%
- e. scoliosis 50%
- f. hip instability 5-8%/Subluxations 12%

- ▶ **2. Problems associated with aging**

- a. Osteoarthritis at a young age
- b. Spinal stenosis
- c. Osteoporosis

Alzheimer's disease

- ▶ Is a progressive degenerative neurological condition that affects the brain
- ▶ In the general population, the incidence of Alzheimer's is 10% of people in their 60's, 20% in the 70's, 40% in the 80's and 50% above 85
- ▶ It appears that the incidence of AD is the same in the Down syndrome world, but starts 20 years earlier

Physical Characteristics

- ▶ Hypotonia
- ▶ Decreased strength
- ▶ Increased joint flexibility/hypermobility
- ▶ Short arms and legs
- ▶ Stature
- ▶ Facial features: nose, eyes, mouth, ears, teeth and head shape
- ▶ Hands and feet

Hypotonia

- ▶ Decreased or low tone
- ▶ Muscle tone is different than strength
 1. Tone is the resting tension of the muscle.
 2. Muscles feel more “floppy” or relaxed
- ▶ This is determined by the lack or decreased resistance, stiffness or tension of the muscle when passively moved
- ▶ Usually affects all the muscles, but can be different in various locations in the body: L side may be less than R, Uppers more than Lower extremities.
- ▶ Predominant in infants, and slowly reduces with age

Decreased strength

- ▶ Muscle strength is defined as the force needed to overcome resistance
- ▶ With time, repetition and practice, strength can be improved
- ▶ As gross motor movements are learned, strength needs to be developed in the desired movements
 - * With the baby's own movements, compensatory patterns may develop and then stay thru adulthood

Increased Joint Flexibility/Ligamentous Laxity

- ▶ Ligaments' role is to hold bones together
- ▶ They are looser in people with Down syndrome
- ▶ This allows excess movement in the joints
- ▶ Joints most laxity seen in: hips, shoulders and neck
- ▶ What to do:
 1. teach gross motor skill
 2. prevent further stretching
 3. strengthen muscles around the joints
 4. lift carefully

Examples



Short Arms and Legs

- ▶ Children with Down syndrome have short arms and legs in relation to their torsos
- ▶ This will make it more difficult to learn to:
 1. Sit since cannot reach hands to floor
 2. Climb onto sofa, stairs and curbs
 3. Pedal or steer a bike; may need to wait till older or look for more proportioned equipment

Stature

- ▶ Babies with Down syndrome are usually born with typical heights/weights
 - ▶ They do not grow as fast as children without Down syndrome
- *Average height for males with DS is 5 feet, 2 inches
- *Average height for females with DS is 4feet, 9 inches
- (these are from most recent studies for the United States)

Examples of short arms/legs and stature



Facial Features

- ▶ Nose: may be broader and flatter and smaller nasal passages
 - *easier to get congested and last longer
- ▶ Eyes: May slant upward and have small extra fold of skin in the corners
- ▶ Mouth: may be small and roof shallow
 - * tongue may protrude, especially with low tone
- ▶ Teeth: May come in late, different order or not at all
- ▶ Ears: Small, tops fold over, small passages
 - * easily blocked by wax, cause hearing loss, increased infections
- ▶ Head shape: smaller than normal, flatter back of head and shorter neck

Hands and Feet

► Hands:

1. smaller
2. shorter fingers

► Feet:

1. Gap between 1st and 2nd toe
2. Flat feet

Example



Examples





Gait, Posture, Shoe wear and Orthotics

Gait Tendencies

Heavy footed pattern

Flat arches, primary weight bearing on inside border of foot

Walk with feet turned out

Complaints of foot pain and significant callousing

Tight heel cords/resulting in rigidity at the ankles

Benefit of good shoe wear

Improves posture- not just at the feet but up the chain

Foot alignment-improved mechanics at the feet/endurance

Improves balance-uneven ground/reducing risk of ankle/knee instability

Examples of good vs poor shoe wear

Good

- ▶ Athletic shoes- New Balance, Asics, Brooks
- ▶ Dress shoes- Merrills, Clarks,
- ▶ Sandal-built in arch support/heel strap

Poor

- ▶ Athletic shoes- with no support- Nike free, Sketchers
- ▶ Canvas shoe with no support- Converse, Toms
- ▶ Flip flops, high heels/wedge
- ▶ Ugg

Benefit and limitations of inserts/orthotics

Extension of the shoe

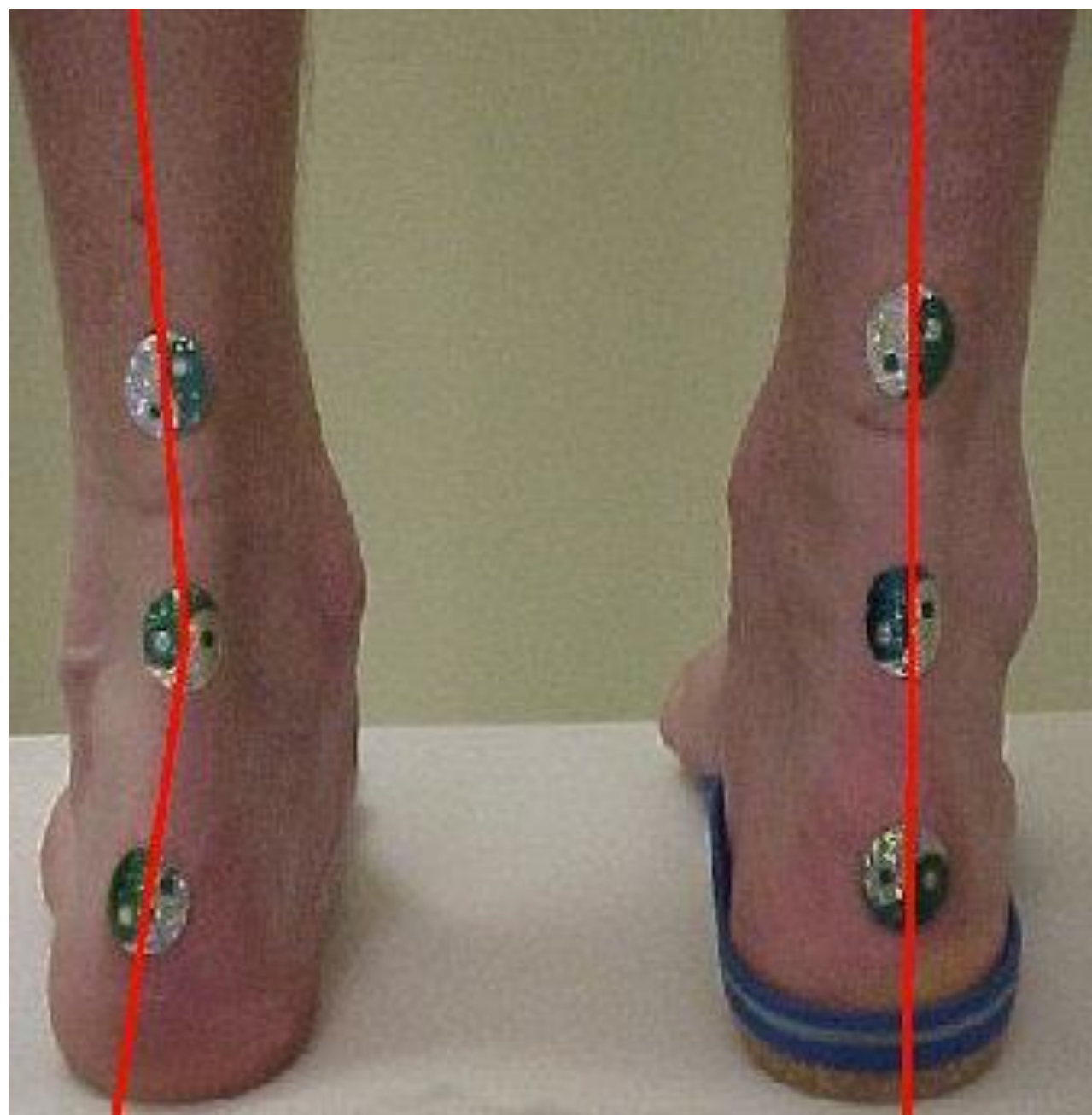
All of the benefits for that you get shoe but more of it

Does not fit in every shoe

Helps if you are able to take out the insole

Does not work with a sandal but some can have them built into them-Birkenstock/Langer





Differences between devices

Inserts/over the counter

Arch support-no posting
Vary in stiffness from gel to harder plastic
Found in many stores- Walgreens, Dicks, Running shoe stores
Last a few months to a few years
Least expensive

Semicustom orthotics

Prefab orthotics- Vasyli
Sizing-small, medium, large
Density-low, med, high
Post built in-heat out or add to it
Take home same day
Less expensive than a custom
Last 1-3 years

Custom Orthotics

Casted- to exact size and shape of foot
Customize the material
Can tailor to shoe type and activity-dress shoe, soccer cleat
Can add lift, first ray cut out, flanges, deepen heel seat
Cast is sent out so a delay to receiving
Most expensive
Last 3-5 years

Why is Physical Therapy important for my person with Down syndrome?

- ▶ “Physical therapy is a critical service, not because it will accelerate a child’s rate of development, but because it will improve a child’s long-term functional outcome” Patricia Winders, PT
- ▶ “The goal is to minimize the development of Abnormal compensatory movement patterns that children with Down syndrome are prone to develop” Patricia Winders

Four critical areas to improve

1. Normalized gait pattern:

- a. walk with feet and knees pointing straight ahead
- b. a narrow base of support
- c. a long stride
- d. to be able to toe off

2. Postural alignment

Optimal alignment of hips, knees and ankles to support this walking pattern

Four critical areas continued

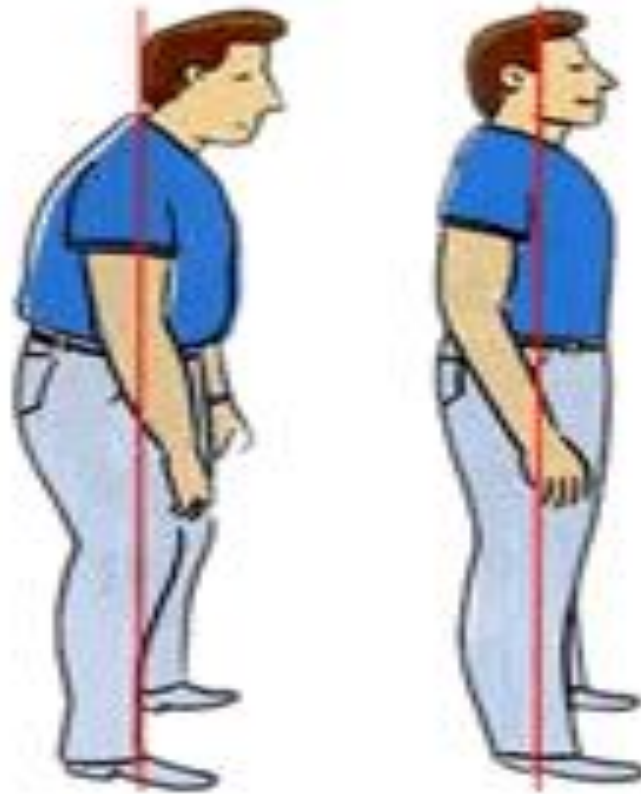
3. Postural strength

- a. Strong, upright trunk
- b. Balanced strength between back and abdominal muscles

4. Extremity strength

- a. Strong arms/shoulders
- b. Shoulders should be in middle of side view not forward

Postural alignment



Why is it important to correct these?

- ▶ **When these four areas are achieved:**
- ▶ 1. The child can develop a body with a solid foundation
- ▶ 2. This will support exercise and fitness throughout their life span

*Typical children develop naturally, but a child with Down syndrome is prone to develop compensations

*Therefore, developing physical problems as they grow

So...Why need Physical Therapy and exercise

Decrease CAD (coronary artery disease)

Exercise has shown decrease risk in development of CAD

Decrease obesity

Less weight to carry around

Ease of movements

Less strain/pressure on joints

Improved posture

Decrease OA(osteoarthritis)

Decrease sedentary life style

Decrease osteoporosis risk

Become a more functioning part of society

Why Physical Therapy and exercise continued

Improve overall mobility/function

- Less wear and tear on joints

- Participation in general physical education

- More active in home, school and community activities

- Normalize movement patterns

- Improved gait patterns

- Improve postural alignment

Physical therapy and exercise continued

Improve muscle strength

- allow improved ability to walk, sit, stand
- dress independently
- balance activities
- overall wellness
- improved postural alignment
- Improved control of ligament laxity

Physical therapy and exercise

Decrease constipation

- increased core strength

- increased exercise can promote improved digestion/motility

Decrease/slow down Alzheimer's symptoms

- Physical activities may improve cognition

Decrease Osteoarthritis/osteoporosis

- Improved activity level

- Increase strength around joints/dec. ligament laxity movements

- Maintain ideal body weight

Functional Physical Therapy Goals

1. Improve muscle strength to allow standing for 3-4 hours in the home, community/work
2. Improve balance to allow independent gait on level/unlevel surfaces
3. Increase balance to allow independent dressing at home, school and in the community
4. Increase balance to allow stair climbing
5. Improve foot positioning to improve gait mechanics

Functional goals continued

6. Improve foot positioning to allow longer standing /walking in the community/work/school
7. Improve lower extremity (LE) posturing to return to more normalized loading thru joints
8. Increase LE/core strength to help support posture to normalize load thru joints
9. Restore normal movement patterns to decrease wear and tear on joints

Resources

- ▶ 1. Special Olympics: have exercise videos on line
- ▶ 2. Local SRA have exercises classes, sports activities, nutritional classes, etc.
- ▶ 3. Adult Down syndrome clinic: has videos and classes
- ▶ 4. Physical therapy locations
- ▶ 5. Local fitness centers and workout clubs: some specific to people with special needs

Any
questions?

Thank you
for letting us
present to
you today!!!



References

1. Winders, P.C. (2014). Gross motor skills for children with down syndrome: a guide for parents and professionals. Bethesda, Maryland, Woodbine House.
2. Skallerup, S.J. (2008). Babies with down syndrome: a new parents' guide. Bethesda, Maryland, Woodbine House.
3. Chicoine, B and McGuire, D. (2006). Mental wellness in adults with down syndrome: a guide to emotional and behavioral strengths and challenges. Bethesda, Maryland, Woodbine House.
4. Cohen, W. I., Nadel, L., Madnick, M.E. (2002). Down syndrome: Visions for the 21st century. New York, New York, Wiley-Liss, Inc.
5. Chicoine, B and McGuire, D. (2010). The guide to good health for teens and adults with down syndrome. Bethesda, Maryland, Woodbine House

References

- ▶ 6. Mann, S. (2017, December 5). Get moving, be awesome! Physical therapy for adolescents and adults with Down syndrome. Global Down syndrome foundation's webinar series
- ▶ 7. Bull MJ, Committee on G. Health supervision for children with Down syndrome. Pediatrics. 2011;128(2): 393-406
- ▶ 8. Mahy J, Shields N, Taylor NF, Dodd KJ. Identifying facilitators and barriers to physical activity for adults with Down syndrome. Journal of intellectual disability research: JIDR. 2010;54(9):795-805
- ▶ 9. Ptomey LT et al. Changed in cognitive function after a 12-week exercise intervention in adults with Down syndrome. Disability Health J. 2018

References

10. Ngandu, T et al. A 2 year multidomain intervention of diet, exercise, cognitive training, and vascular risk monitoring versus control to prevent decline in at-risk elderly people (FINGER): a randomized controlled study. The Lancet. 2015;vol 385
11. Moris JK et al. Aerobic exercise for Alzheimer's disease: A randomized controlled pilot trial. PLoS ONE 12(2): e0170547.
<https://doi.org/10.1371/journal.pone.0170547>
12. Roig, M, Neilsen J B. The effects of cardiovascular exercise on human memory: A review with meta-analysis. <http://doi.org/10.1016/j.neubiorev.2013.06.012>