AOPT SIG
ACADEMY OF ORTHOPAEDIC PHYSICAL THERAPY, APTA
FOOT & ANKLE
FASIG

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Foot & Ankle SIG News & Updates

The FA SIG is sending out our support to all of our membership. We hope that you are well and navigating so many new challenges that have become such a part of daily life – from telehealth to remote learning to life changes.

Student Team Update: Congratulations to student team members Josh Holland, Zach Klemmer, and Mike Stroud, as they finish their DPT training and transition to clinical practice. Thank you for your contribution to the SIG, and wishing you so much luck as go on to new adventures!

Welcome to Ethan DuClos who joins the FA SIG student team! Ethan is a student physical therapist at Maryville University of St. Louis. Originally from Red Bud, Illinois, Ethan is interested in outpatient orthopedics. In his free time, Ethan enjoys running and being outdoors.

FASIG Practice Committee Update: The FASIG Practice Committee is working on creating infographics for PTs on common and uncommon foot and ankle pathologies to be used as a reference tool for practicing clinicians. This project will also include a patient-friendly version for each condition that will be available through the FASIG. Any questions, or if you would like to help with the initiative, can be directed to the Practice Chair – Megan Peach

Development of a Foot and Ankle Fellowship Update: The Academy of Orthopedic Physical Therapy - Foot and Ankle SIG co-leaders and task force have been working on the development of a description of fellowship practice for the foot/ankle. The group met at the Combined Sections Meeting this past February in Denver, Colorado to discuss details of the project and to refine the description of practice document. The meeting was very productive in reviewing the item responses for the upcoming practice analysis survey. Co-lead investigators Kris Porter and Marcey Keefer Hutchison along with project consultant Ed Mulligan utilized the results of the meeting to finalize the plan document for submission to ABPTRFE. In early April, the plan to evaluate the foot/ankle sub-specialty practice area was submitted to ABPTRFE for consideration. The plan is slated for review in May 2020. A huge thanks to all the dedicated people working on this initiative and specifically our co-leaders who are available for questions or comments about the project: Kris Porter at kporter@thejacksonclinics.com or Marcey Keefer Hutchison at mkeeferhutchison@georgefox.edu.

American Orthopaedic Foot and Ankle Society Annual meeting: This year's AOFAS annual meeting is in San Antonio, TX September 9-11th. FASIG has again been working with the programming committee to develop interdisciplinary programming for Wednesday September 9th – check it out and hope to see you there! https://www.aofas.org/annual-meeting

For more information about the Foot and Ankle SIG including contact information for the FA SIG officers, visit us online at https://www.orthopt.org/content/special-interest-groups/foot-ankle

Member Spotlight
Featuring David Sinacore, PT, PhD, FAPTA

Where are you originally from?

I am originally from upstate New York; from Endicott, NY.

What type of setting do you work in?

I work in academic Physical Therapy Dept at High Point University in High Point, North Carolina. Prior to relocating to High Point University, I worked at Washington University School of Medicine in St. Louis, MO from 1979 to 2018 where I did research, teaching and clinical practice in the area of foot and ankle with special emphasis in diabetic foot impairments.

What sparked your interest in the foot and ankle?

My interest in the foot and ankle emerged from my clinical practice. In the late '70's and early 80's I was seeing a lot of patients with plantar fasciitis and metatarsalgia, mostly middle age men and women who were becoming more active with exercising like running. As my practice grew with a reputation for an interest in foot and ankle impairments, I began to be referred more chronic impairments like tibial tendon insufficiency and Achilles tendinopathies and finally diabetic patients with foot ulcers and Charcot deformities. Diabetic foot impairments became the focus of one of my research interests.

What is your current research interest?

My current research interest remains diabetic foot impairments. Specifically, I am researching progressive diabetic foot impairments that occur across all 5 stages of chronic kidney disease (CKD). Stage 5 CKD or end-stage CKD has the highest rates of non-traumatic lower extremity amputation in our nation. I want physical therapist F&A specialists to understand the connection between CKD and diabetic foot impairments so we can prevent LEA and preserve patient functioning.

How did you become involved in research/academics?

I became involved in research/academics primarily through my mentor Dr. Steven J. Rose PT, PhD, FAPTA. Dr. Rose was my chairman of our undergraduate BS program in Physical Therapy at SUNY at Buffalo in 1979. Shortly after my graduating, Dr. Rose became the Director of the Program in Physical Therapy at Washington University School of Medicine in St. Louis MO. Dr. Rose recruited me to work at the Irene Walter Johnson Institute of Rehabilitation as a PT clinician and lab assist in courses taught in the academic physical therapy program. Dr. Rose instilled in me the need and passion for research that demonstrates the impact of physical therapy interventions. Dr. Rose used to tell many of us, that "our (PT) practice needs more research !!… and our (PT) research needs more practice.!!" I remember his quip and try to implement his sage advice in my teaching, research and clinical practice to this day.

What other activities/hobbies do you enjoy outside of physical therapy?

Other activities I enjoy are cycling… I mainly like road bikes but occasionally enjoy mountain biking in Colorado when on family vacations. I am a passionate baseball (Yankee) fan and enjoy reading and talking baseball history with other colleagues. I like to read biographies of historical figures like our early founding fathers and I love spending time with my family and especially my granddaughter when she visits. ☺

- Ethan DuClos, SPT

Foot and Ankle in Cerebral Palsy

The interaction of neurological conditions and foot and ankle orthopaedics is a consideration across the lifespan – from children to adults. The foot and ankle can substantially impact the ambulation ability of children with cerebral palsy (CP). CP describes an umbrella of static neurological lesion sites in the brain that largely effect the person's motor ability and often sensory abilities.[1] There are classically 3 types of CP including Spastic (pyramidal) with the majority of damage in the motor and sensory cortices, internal capsule, and white matter projections; Dyskinetic, where the lesions are extrapyramidal and most commonly found in the basal ganglia; and Ataxic, also extrapyramidal where lesions are commonly located in the cerebellum.[1] In this feature article, we focus on children with CP and higher levels of function, with General Motor Function Classification System (GMFCS) levels of primarily level-1, level-2, and to a lesser extent level-3. The GMFCS scores children with CP in functional abilities such walking and sitting, considering use of assistive devices, with level-1 being the highest.[2]

The foot and ankle play a large role in our ability to move and participate in our environment, and foot and ankle function is especially important in children with CP. The physical therapist may have a particularly important role, assessing patient functional performance to help guide treatment decision-making. A study by DeLuca et al. showed that using clinical measurements and biomechanical gait analysis have modified 52% of surgical recommendations made by experienced physicians.[3] Studies that have compared clinically measured ROM and strength for correlation to biomechanical gait analysis data, reporting weak correlations,[4] even when compared with age-matched healthy participants.[5] Desloovere et al also found that dynamic clinical measurements such as spasticity, strength, and selectivity of joint movement did not strongly relate with gait analysis data.[7] Taken together, it seems that clinical measurements along with, rather than in lieu of, biomechanical gait analysis is useful in informing clinical decision-making.

When treating a child with CP, it is important to consider that each child's gait has unique presentation with a combination of contributing factors. Two commonly described gait patterns are toe-walking and crouch gait. Both of these patterns use a limited ROM and decreased ankle power during push off, resulting in a mechanically inefficient gait.[7,8]

Gait pattern also contributes to alterations in movement of the center of mass. Massaad et al found that center of mass was strongly associated with gait pattern compared to differences in topographical lesions and motor involvements in people with CP.[6]

Even though CP is considered a static disorder, the effects maybe be progressively more noticeable as the child ages. As children mature, their gait often changes and they can decline in their GMFCS levels by a full level.[9] Noorkoiv et al found that younger participants tended to toe-walk while adolescent subjects had a tendency to walk with a crouch gait.[8] Additionally, maturation brings new problems including an increase in body mass and high prevalence of obesity.[10] Weight gain increases the energy cost to continue walking and can bring on earlier fatigue, along with a reported increase in pain to with continued ambulation[11] – resulting in a decline of ambulatory function with some individuals stopping ambulating completely. This is concerning, given that the leading causes of death in CP are related to respiratory and cardiovascular problems.[12]

In conclusion, patient-centered care is important to address the unique presentation and challenges of people with spastic CP. When available, especially in children, clinical decision-making should be informed by kinematic and kinetic gait analysis. Gait analysis data has been shown to heavily influence the interventions recommended by physicians[3] and cannot be accurately predicted by clinical measures alone.[4,5,7] The foot and ankle play a large role in gait, with differences in presentation both between individuals as well as within a given individual as a child's gait adapts over time. Physical therapy should be used across the lifespan and should be directed towards promoting an individual's ability to participate in their environment, mechanical efficiency, and cardiovascular capacity.

- Mike Stroud, SPT

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Citation Blast – Foot and Ankle Considerations for Neurological Disease (Charcot-Marie-Tooth)

Charcot-Marie-Tooth is a hereditary disease that impacts peripheral nerves. The demyelinating disease is characterized by distal muscle weakness, sensory loss, and joint deformities. This progressive neurological disease impacts pediatric, adult, and geriatric patient populations causing severe disability and reduced function. This citation blast aims to unpack recent, relevant literature regarding a common neurological disease that impacts the foot and ankle. These resources provide a review of the literature that presents potential treatment options relevant for a foot and ankle specialist.

1. Kennedy RA, McGinley JL, Paterson KL, Ryan MM, Carroll K. Gait and footwear in children and adolescents with Charcot-Marie-Tooth disease: a cross-sectional, case-controlled study. *Gait Posture.* May 2018; 62: 262-267.

The authors aimed to investigate differences in gait between typically developing children and those with Charcot-Marie-Tooth disease. The cross-sectional study included 30 children with Charcot-Marie-Tooth and 30 gender and age-matched typically developing children aged 4-18 years. Gait was assessed at a self-selected speed while wearing no shoes, athletic-type shoes, and suboptimal footwear (i.e. flip-flops). The study found gait to be slower with shorter and wider steps in children with Charcot-Marie-Tooth. Suboptimal footwear negatively affected all children in the study.

2. Burns J, Sman AD, Cornett KM, Wojciechowski E, Walker T, Menezes M. *Lancet Child Adolesc Health.* Oct 2017; 1(2): 106-113

This 2016 within subject study examined the effects of foot strike and step frequency on Achilles tendon stress during running. A rearfoot strike pattern had significantly lower Achilles tendon stress compared with forefoot strike pattern. Additionally, a change in cadence of +5% was reported to have decreased Achilles tendon loading regardless of strike pattern.

3. Lencioni T, Rabuffetti M, Piscosquito G, et al. Postural stabilization and balance assessment in Charcot-Marie Tooth 1A subjects. *Gait Posture.* 2014;40(4):481-486.

The aim of the study was to assess postural stabilization skill in adults with type 1A Charcot-Marie-Tooth disease. The study included 47 adults with Charcot-Marie-Tooth, and 41 gender and age-matched healthy subjects. The study showed that subjects with Charcot-Marie-Tooth have greater difficulty with quiet stance associated with plantar flexor muscle weakness, rather than impaired proprioception. The conclusions made within the study highlight the importance of distal muscle weakness on postural control impairments that are experienced by patients with Charcot-Marie-Tooth disease.

4. Randharry GM, Day BL, Reilly MM, Marsden JF. Foot drop splints improve proximal as well as distal leg control during gait in Charcot-Marie-Tooth disease. *Muscle Nerve.* Oct 2012; 46(4):512-519.

The authors focused on the impact of distal muscle weakness on compensatory proximal muscle use during gait for patients with Charcot-Marie-Tooth disease. Specifically, the study investigated the effect of 3 different types of AFOs on distal leg control compared to the use of shoes alone. The results assessed ankle stiffness, foot clearance, and force generation, as well as hip flexion amplitude. The results indicate that AFOs reduce foot drop and decrease the amount of compensation from proximal musculature in subjects with Charcot-Marie-Tooth disease.

5. Knak KL, Andersen LK, Vissing J. Aerobic anti-gravity exercise in patients with Charcot-Marie-Tooth disease types 1A and X: a pilot study. *Brain Behav.* Dec 2017; 7(12): e00794.

This study assessed the effect of aerobic anti-gravity exercise for patients with Charcot-Marie-Tooth 1A and X. The authors noted that many patients with Charcot-Marie-Tooth experience impaired walking capacity due to lower extremity weakness. The study showed significant positive difference in Berg balance scale and postural stability between tests. The study also found that subjects were able to increase 6-minute walk test distances with anti-gravity support. Though the subject size is small, the study indicates benefits from the use of anti-gravity aerobic training for individuals that are unable to tolerate gravity-based training due to distal weakness associated with Charcot-Marie-Tooth.

6. Mori L, Signori A, Prada V, Pareyson D, Piscosquito G, Padua L, Pazzaglia C, Fabrizi GM, Picelli A, Schenone A. Treadmill training in patients affected by Charcot-Marie-Tooth neuropathy: results of a multicenter, prospective, randomized, single-blind, controlled study. *Eur J Neurol.* Feb 2020; 27(2): 280-287.

The study investigated the utility of mechanical vibration to influence the somatosensory system to improve functional balance for subjects with Charcot-Marie-Tooth 1A disease. The Berg Balance Scale, Dynamic Gait Index, 6 Minute Walk Test, lower extremity strength test, and Quality of Life questionnaire were used as primary outcome measures. The results indicate significant improvement on the Berg Balance Scale and Dynamic Gait Index in the presence of focal mechanical vibration on the quadriceps and triceps surae. The study acknowledges the results are limited by a small sample size (n=12) and indicate the need for further studies to confirm the findings.

- Madi Engel, SPT