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EDITION 7

EMG SOLUTIONS NEWSLETTER

THE SYNAPSE



The Mysterious Foot Drop (AKA, When the Fibular Nerve Throws a Fit)

Let's walk through a case that came through the clinic recently. It's a great example of how electrodiagnostic (EDX) testing helps narrow down differentials and gives us clarity when the presentation isn't totally textbook.

Presenting Symptoms

A 37 yo female came in with an 8-day history of right foot weakness - mainly dorsiflexion and eversion. She also described a numb, "heavy" sensation over the top of her right foot. No

By Drayton Perkins
PT, DPT, ECS

Editor : Cathy Digiacomo

In this Issue:

- Case Study - By Drayton Perkins PT, DPT, ECS
- Meet our Mentors - Kyle Martinos PT, DPT, ECS
- Student POV and highlights- POV provided by Hailey Pedersen, SPT and Hamid Hadipour, SPT
- Hiring News
- Residency Insight

traumatic onset, no recent injury, and interestingly, no back or lateral knee pain at the beginning. Of note, she had only developed lateral leg pain about three days prior to our visit and stated that it was likely due to her attempting to use kinesiotape to provide dorsiflexion assist.

She has a mild steppage gait on the right, and while her reflexes were absent at the patella and Achilles bilaterally, muscle bulk looked normal—no visible atrophy or fasciculations. Manual muscle testing showed decreased strength (3/5) with right ankle dorsiflexion, eversion, and EHL extension. Sensation to light touch was patchy and diminished across the right lateral and medial lower leg and lateral foot. Provocative testing was negative with clonus and Babinski, but positive with Tinel's test at the left fibular head.

She denied any worsening of her usual low-level back pain, had no symptoms in the left leg, and no history of systemic conditions like diabetes, thyroid issues, or prior exposure to chemotherapy.

Differential Diagnosis

At this point, my brain was buzzing with possibilities. Here's the short list I was working through:

- **Fibular (peroneal) neuropathy at the fibular head**
- **L5 radiculopathy**
- **Motor neuron disease (unlikely but always on the radar with foot drop)**
- **Peripheral polyneuropathy**

So how do we figure it out?

What was Tested (and Why)

This is where EDX shines. We ran a full nerve conduction study (NCS) and needle EMG of the bilateral lower extremities.

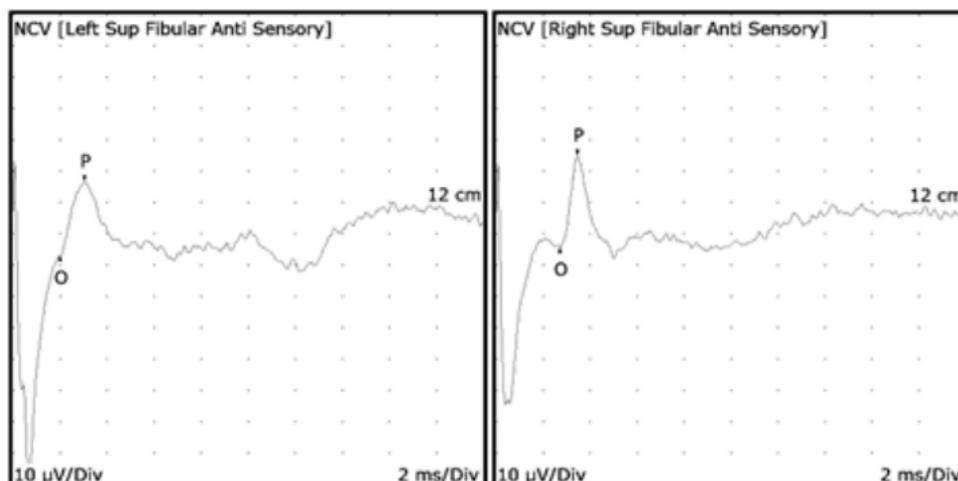
Sensory Clues: Pre-Ganglionic vs. Post-Ganglionic... and Timing Matters

One of the early questions to answer: Is this problem coming from the **nerve root (pre-ganglionic)** or the **peripheral nerve (post-ganglionic)**?

Sensory nerve action potentials (SNAPs) can help. If the lesion is **pre-ganglionic**, like in an L5 radiculopathy, the dorsal root ganglion remains intact, so the sensory responses are often normal—even if the patient reports numbness or tingling. In contrast, **post-ganglionic lesions** (like a mononeuropathy) usually cause abnormal sensory responses because the lesion is distal to the ganglion, and the sensory axon itself is damaged.

In this case:

- The superficial fibular sensory responses were normal and comparable bilaterally.

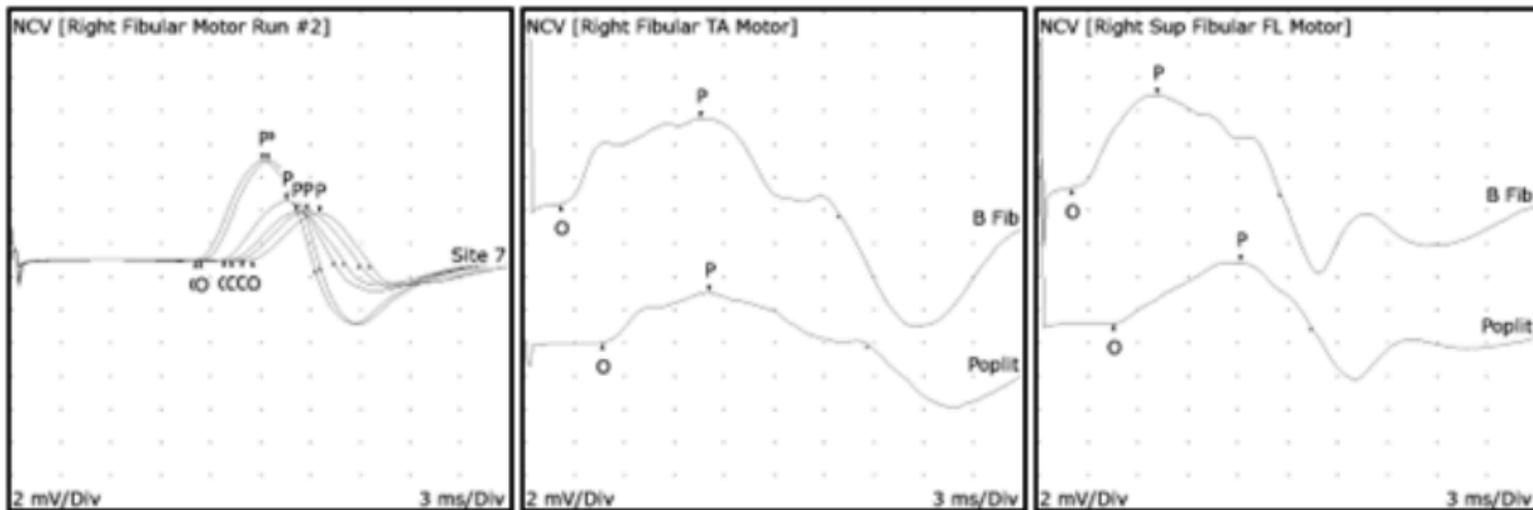


At first glance, that might seem inconsistent with her symptoms. But here's the key: it had only been 8 days since symptom onset, and sensory nerve changes—especially in distal recordings—can take time to manifest following a proximal nerve injury. The axonal damage has to travel distally (Wallerian degeneration), and it can take 10–14 days or longer for that change to be reflected in the sensory study. So, the normal response here doesn't rule out a common fibular neuropathy; it may simply be too early to show up.

Likewise, the normal sensory responses didn't rule in or rule out an L5 radiculopathy either—because of that same short timeline. So, while sensory studies are helpful, they need to be interpreted in the context of timing and location of the lesion.

Other Key Findings:

- **Significant partial conduction block** of the right fibular nerve across the fibular head (54% drop in CMAP amplitude). This partial conduction block was present when recording from the deep fibular branch (tibialis anterior, extensor digitorum brevis) and from the superficial fibular branch (fibularis longus) – suggesting a compromise of the **COMMON FIBULAR** nerve at or near the fibular head. See Figure #1 below, the X is the likely area of compromise.



- **Slowed conduction velocity** of the fibular motor nerve across the fibular head segment when recording from the extensor digitorum brevis muscle.
- **Abnormal spontaneous activity** in the right tibialis anterior muscle. With the new onset of symptoms (8-days) it is common to only see axonal findings in the muscles closest to the area of compromise. As time progresses, more distal muscles may begin showing abnormal spontaneous activity.

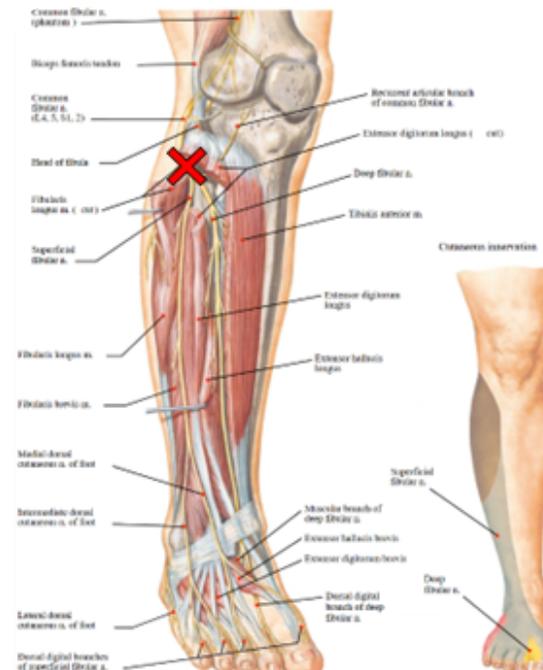


Figure 1. Fibular Nerve. Copyright © Elsevier Inc. www.netterimages.com Netter, Atlas of Human Anatomy, 8e

- **All other motor and sensory nerves** (the bilateral tibial, bilateral sural, the bilateral superficial fibular sensory, and the left fibular motor nerves) were otherwise normal, ruling out the presence of a polyneuropathy or lumbosacral plexopathy.
- **Needle EMG** ruled out a radiculopathy or myopathy—the other muscles tested looked clean and within normal limits.

This pattern—focal slowing, conduction block, and spontaneous activity in the right anterior compartment—screamed **common fibular neuropathy at the fibular head**.

Final Diagnosis:

Right common fibular neuropathy at or near the fibular head, with both demyelinating and axonal features.

Clinical Takeaway:

Don't be fooled if your patient doesn't present with the "classic" pain at the fibular head or obvious mechanism of compression. Foot drop without back pain doesn't always mean radiculopathy. In this case, sensory testing hadn't yet caught up to the motor findings because of how early we saw her—but the conduction block and needle EMG findings sealed the deal.

The timing of testing matters. Understanding how fast (or slow) abnormal findings show up on EDX testing in different parts of the nervous system can help you make sense of what you're seeing—and avoid jumping to conclusions too soon.

THANK YOU!

Thank you Drayton, for sharing your knowledge and case study with us! This is a great birds eye view into the daily practice of a physical therapist specialized in EDX.

Drayton is a graduate of Mercer University and has been practicing as a Physical Therapist since 2014. Drayton completed the EMG Solutions Electromyography Residency Program in 2023 and joined an elite group when receiving full Board Certification in June 2024.

Drayton now practices in the Mobile area and serves as a Mentor for the EMG Solutions Residency.

We are so grateful for your leadership and excellence!



Drayton Perkins
PT, DPT, ECS

MEET OUR MENTOR

Kyle Martinos
PT, DPT, ECS

VP of Clinical Operations
Mentor
Board Certified – Clinical
Electrophysiology

Columbus, GA



- **How did you become interested in electrodiagnostic testing?**

I was introduced to NCV/EMG testing as a physical therapy student through a 2-day course/lab at Rocky Mountain University of Health Professions. I was intrigued and began shadowing, the then president of RMU Richard Nielsen. This is what launched my desire to pursue the ECS specialty. I worked in an outpatient orthopedic physical therapy clinic for about 1.5 years after graduating from physical therapy school.

- **What was your learning process to become certified in clinical electrophysiology? How long did this take you to complete to achieve ECS?**

I started with the beginner ENMG course through RMU in the spring of 2018 and then joined the EMG Solutions team in June of 2018, where I began training under Quinn Millington and Darin White. I trained from June 2018 until I took the ECS board exam in March of 2020. I was officially board-certified as ECS on 7/1/2020. So, the process of when I started to when I was board certified was roughly 2 years.

- **How many years of experience do you have as an ECS Physical Therapist?**

Roughly 2 years of training and 4.5 years after becoming board certified, thus 6.5 years in all

- **What do you love most about this specialty practice?**

I love the puzzle of it all. It is very fun to gather all of the puzzle pieces and go through the analytical process to understand what may be wrong with each patient.

- **If there is one thing that you would change within the specialty of EDX, what would that be?**

I would love to be able to use medical terminology/jargon in the report writing instead of purely descriptive terms. It's not a huge deal it would just be more convenient.

- **Do you see Physical Therapists specializing in EDX as a growing need?**

Yes, there are so few of us out there, and our extensive knowledge of the musculoskeletal and nervous systems goes to good use when aiding in the diagnostic process of nerve and muscle injury/disease processes.

- **What would be your words of advice/wisdom/inspiration to PTs who are interested in becoming certified in clinical electrophysiology?**

I think pursuing a specialty of any kind in the physical therapy sphere is important. The Clinical Electrodiagnostic specialty is a great way to further your physical therapy career. It is more mentally exhausting than physically and is an area where you could theoretically work in until the day you die, if you'd like.

- **Any additional thoughts or comments?**

I love mentoring the new, up n' coming therapists. I truly enjoy teaching and watching each of my pupils/colleagues grow.



Kyle became a valued member of the EMG Solutions family in 2018 and has thrived both as a clinician and a mentor in the residency program. He consistently demonstrates leadership within the EMGS team as the Vice President of Operations, as well as in the broader field of Physical Therapy. Over the years, he has presented at the APTA CSM and recently received the Award of Excellence in Clinical Education at the APTA Combined Sections Meeting in Boston 2024.

THANK YOU KYLE, FOR YOUR DEDICATION TO THE PERSUIT OF EXCELLENCE AND THE STRENGTH YOU BRING TO THE TEAM!!

THE STUDENT POV

In this quarter, we had the pleasure of welcoming three DPT students from Rocky Mountain University and Hamid Hadipour from Tennessee State University, to undertake one of their clinical rotations with us. . We are excited to share some feedback gathered from these students, especially for those considering a clinical rotation with EMG Solutions or thinking about applying for the residency.



*Rocky Mountain University
Physical Therapy Program*

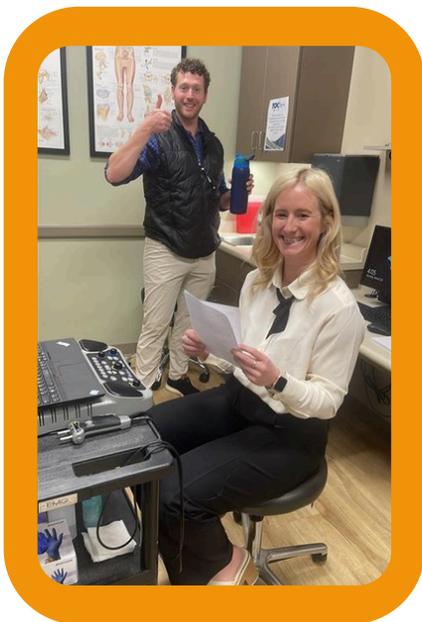
*TIM DAU, SPT
MEGAN GOLD, SPT
HAILEY PEDERSEN, SPT*

**Congratulations! Tim Dau, Megan Gold and Hailey Pedersen
Rocky Mountain University Graduates 2025!!**

- **How would you rate your clinical experience; provide any feedback for future students.**
 - I would rate my experience as 10/10. This clinical rotation provided an excellent opportunity to explore the EMG Specialty and determine if it aligns with my career aspirations. My mentors, Kyle Martinos and John Lugo, were incredibly knowledgeable and supportive. They play a crucial role in enhancing my understanding of EMG testing and in building my confidence to perform assessments independently.
- **Do you feel that the material you learned helped you to be successful? was it too much or too little?**
 - The material was extremely helpful in preparing me for success. The amount of information provided was well-balanced, not overwhelming, yet comprehensive enough to serve as a strong refresher. The content was broken down into digestible sections, and the opportunity to practice between lessons was instrumental in building my confidence.



- **Do you feel the information you learned in your clinical is applicable to Physical Therapy? Will it help you in your practice as a PT?**
 - Absolutely. The knowledge and hands-on experience gained in this rotation are directly applicable to Physical Therapy practice. Understanding EMG testing enhances clinical decision-making, differential diagnosis, and patient management skills, all of which are valuable in the PT profession.
- **What was the best part of the clinical rotation for you?**
 - Seeing my confidence and efficiency improve over time with EMG testing, was the most rewarding aspect of this experience.
- **What was the most difficult aspect of the clinical rotation? What did you learn from this?**
 - The most challenging aspect was not being at the same clinic everyday. However, this experience taught me how to build rapport quickly with new teams and adapt to different clinic environments. I also discovered that I enjoy the variety of working in different settings, as it keeps the routine engaging while still providing structure.
- **What was the most important thing you learned in your clinical rotation?**
 - Consistency is key - performing each step the same way every time is essential for accuracy and efficiency. Additionally, precise measurement is critical in EMG testing, and developing meticulous measurement habits ensures reliable results.
- **What would you say to future students considering a clinical rotation with EMG Solutions?**
 - I highly recommend this rotation! It is unique and invaluable learning experience that many students do not have the opportunity to pursue. The mentors at EMG Solutions are exceptional educators who meet students at their current level of knowledge and build upon their skills, regardless of prior experience with EMG.
- **Additional comments are welcome.**
 - EMG Solutions provides an outstanding clinical experience, and I am truly grateful for the opportunity to learn from such knowledgeable mentors.

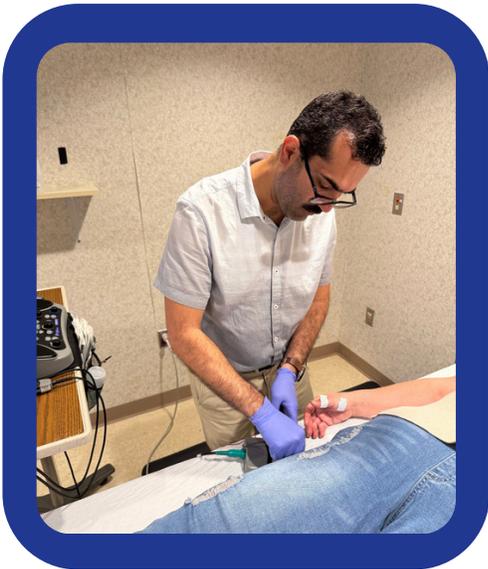


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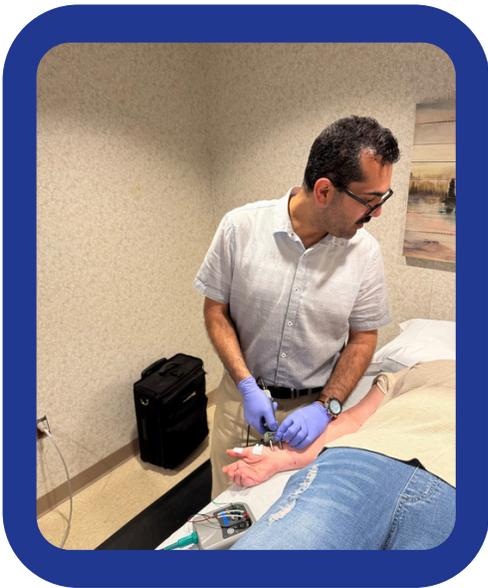
Hailey Pedersen, SPT



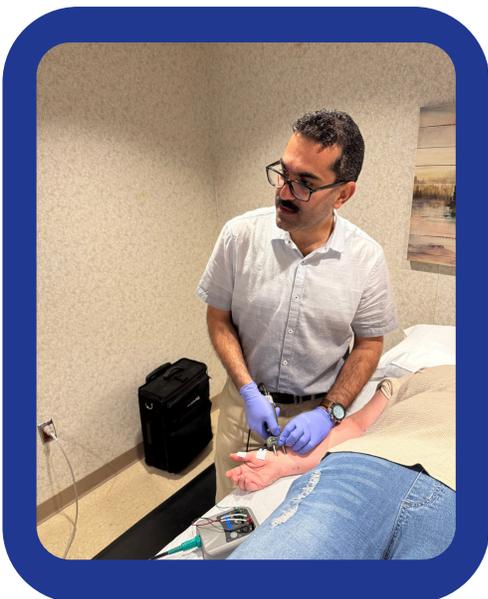
Hamid Hadipour, SPT Tennessee State University



I was fortunate enough to get a teleconference interview with Hamid, so it was nice to hear and see his enthusiasm as well as getting great answers to my questions. I learned that Hamid lived in Iraq until 2015, and he had previously completed his BS in business, where upon he spent most of that time working in an administrative role. While Hamid has been enrolled at Tennessee State University, he has maintained a full-time job, Friday through Monday. I think it is safe to say Hamid has had his hands full! We greatly enjoyed Hamid's time with us and getting to learn more about him and his goals!



Hamid reports he has mostly positive feedback from his experience with us and would place an "8 and higher out of 10" rating. He stated that he feels the felt as though his neuroanatomy knowledge was not adequate to meet the level of demand coming into this clinical. However, he goes on to say that this experience has not only improved that knowledge but gave him the tools to dig deeper for future reference when he has a question. "I know that this clinical has definitely helped me to prepare for the NPTE."



When asked if he felt that the material he learned helped him to be successful and was it too much or too little information. Hamid shared a comparison from his previous clinical experience, stating that his previous CI was excellent and challenged him to formulate his plan of care from the evaluative findings to best treat the pathology, however, in this rotation, he was challenged to dig deeper into

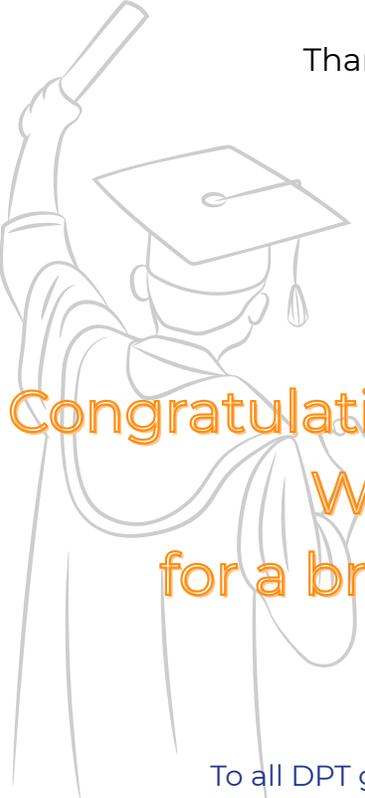
Hamid Hadipour, SPT Tennessee State University

pathology and make a better connection for differential diagnosis. Dr. Trapp challenged him daily by asking the questions, why is this pathology here? Why is it related to what I am finding or the results on the test? And then he asked him to explain the results and reasons. Hamid states that this was the hardest part of his clinical, but the best part. "This process helped me to understand the neuroanatomy better and gain more confidence in my understanding and findings."

When asked if he recommends this clinical rotation to other students, Hamid responded, "it depends on the student," going on to explain that it was a good experience for him because it aligned with his goals and his personal experience, but suggests that a student that does not have a strong desire to pursue neuroanatomy may not be the best fit. Hamid reports his desire is to join the EMG Solutions residency when space becomes available in Nashville.

Hamid specifically asked that I thank his clinical instructors and express his appreciation to John Lugo, DPT, ECS, and Mark Simmons, PT, DSc, ECS and for the time with Daniel Trapp, DPT who is currently completing his residency in the Nashville location.

Thank you for your time Hamid! We enjoyed having you.
We look forward to seeing you again soon!



Congratulations to all the DPT Graduates!!
Wishing you the best
for a bright and fulfilling future!

To all DPT grads: Please send us your graduation pictures
we would love to celebrate with you in the newsletter!

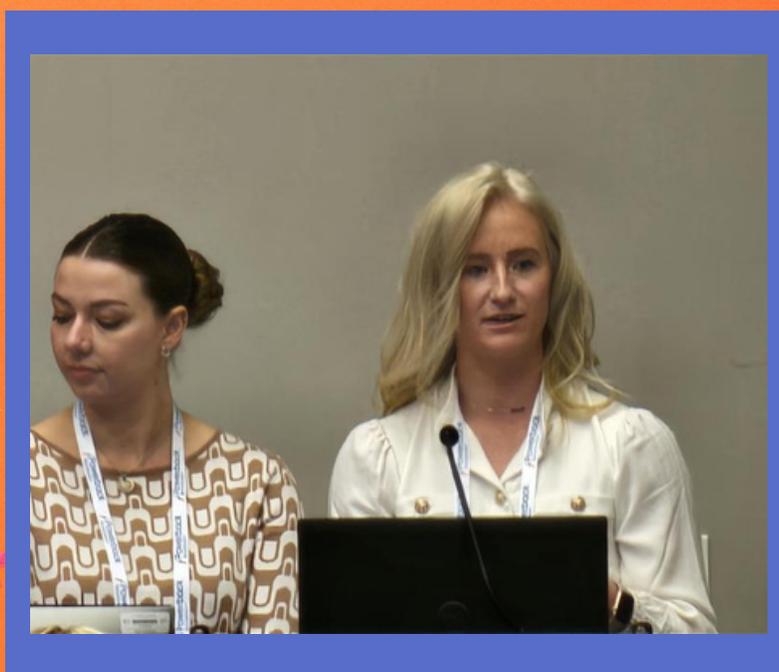
Announcing!!

Following their clinical rotations, we are excited to announce that Megan Gold, Tim Dau, and Hailey Pedersen applied and have been conditionally accepted into the 2025 EMG Residency, pending state licensure requirements. We continue to review applicants for the remaining spots in Residency for 2025.



MEGAN GOLD, SPT

Megan Gold, SPT and her fellow classmate Ashley Adcock, SPT from Rocky Mountain University were presenters at **this years APTA combined sections meeting**. They presented on women's pelvic health titled, "Test-Retest Reliability, Concurrent Validity and Clinical Responsiveness of the ICIQSF and Mpfq in Postpartum Women."



Great presentation Ashley and Megan!

APTA CSM 2025



EMG Solutions' Providers Kyle Martinos PT, DPT, ECS and Austin Andrus, PT, DPT, ECS present at APTA CSM National Conference

Thank you to those who stopped by the booth!



Even the wives of these two had a little fun! Haha!

WE ARE HIRING!!



“A great place to recover from any surgery or injury. The whole staff is more than competent to get you back to enjoying life without pain. They truly care about their patients and caregivers.”

Tammy Dyer Shelly
Physical Therapy Patient



A sister company of EMG Solutions is hiring for an Outpatient Physical Therapist position in beautiful Eufaula, Alabama. If you love the outdoors and lake living, this is the place for you!

This outpatient clinic is the physical therapy hub of this great community and provides quality services from Sports Medicine to Certified Hand Therapy. Other services include:

Vestibular Care, Amputee care, MSK US, EMG/NCS, manual therapy, and more!

Contact me if you or someone you know may be interested in this position.

My email: cathy.digiacom@emgsolutions.com

Read More on our website



EMG Solutions is committed to research and continuing education for professional development. Visit our Residency page to check out our BLOG and learn more about the residency details.

Use the QR code above to visit the residency page.



• Do you have questions?

If you have any questions or need direction with submitting residency applications, please contact me at: cathy.digiacom@emgsolutions.com.

I am here to help you reach your goals!

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