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EMG SOLUTIONS NEWSLETTER

THE SYNAPSE

Editor : Cathy Digiacomo

In this Issue:

Comparing Electrodiagnostics (EMG/NCS) to Magnetic Resonance Imaging for the Evaluation of Lumbosacral Rediculopathy

By Daniel Trapp PT, DPT, Board Eligible

Low back pain and lumbar radiculopathy are common conditions affecting the general population. Low back pain has a prevalence of 10%-30%, and lumbar radiculopathy, with a prevalence of 3%-5% [1].

Differentiating between low back pain and lumbar radiculopathy can be tricky as low back pain is often used to describe a variety of conditions from acute low back discomfort, referred pain, radicular pain, discogenic pain, mechanical low back pain, and radiculopathies [1,2]. Sorting through these various ailments can be tricky as multiple muscles and structures can contribute to both low back pain and lower extremity pain (piriformis syndrome, psoas syndrome, greater trochanteric pain syndrome and others) with a patient's subjective report resembling lumbar radiculopathy [1].

Diagnostically, lumbosacral radicular pain is characterized by a radiating pain in one or more lumbar or sacral dermatomes. It may or may not be accompanied by other radicular irritation symptoms and/or symptoms of decreased function [3]. Due to the complexities and broad nature of the low back pain diagnosis, accurate methods for identifying a true lumbar radiculopathy are an integral part of the diagnosis and treatment process. Magnetic Resonance Imaging (MRI) and Electrodiagnostic assessment (EDX) are two key tests that can aid in the assessment of nerve damage to allow for a definitive lumbar radiculopathy diagnosis. Patients are often referred to physical therapy and may undergo a course of corticosteroids to treat the initial inflammatory response to allow for the patient to participate in exercise that will facilitate return to function. However, if these conservative methods do not work the patient may be a candidate for surgery.

MRI vs Electrodiagnostic Testing for Lumbar Radiculopathy

In order to assess where the lesion is located and the severity of injury, physicians will often order MRI and electrodiagnostic testing before deciding to refer for surgical intervention. However, is one test better than the other or should they be used together when building a differential diagnosis?

Mutaza et al. (2023) assessed 96 patients with complaints consistent with lumbar radiculopathy. They found that while MRI has been shown to be very sensitive (75% sensitivity) to disc herniations and anatomic abnormalities, it is not as specific (25% specificity) and not all findings are considered pathologic and may not be the cause of the patient's current symptoms [4]. MRIs are primarily ordered to assess any physical compression of a nerve. It does not allow for an assessment of the function of a given nerve that has been compressed, or whether that compression is significant enough to cause the symptoms the patient is having.

Similarly, EDX is also very sensitive (75% sensitivity) to abnormalities of active and chronic nerve injuries but is not very specific (25% specificity). The main difference between the two tests is that MRI has been shown to have a higher false negative (says its ok when its not) and EDX has a higher false positive (says there is damage when there is not) [4].

Yousif et al. (2020) examined 30 patients to assess any correlation between subjective symptoms with MRI and EDX findings. They found 23 of the 30 patients examined were found to have nerve root compression on MRI, with 20 patients (66%) having an abnormal physical exam, and 3 (10% having no symptoms). Similarly, 22 of the 30 patients examined by NCS were found to have positive findings (prolonged H-Reflex, prolonged F-waves, as well as changed in amplitudes and/or conduction velocities in the tibial and fibular nerves). 17 (56%) of those tested with EDX had an abnormal physical exam and 5 (17%) had a normal physical exam.

These findings agree with several previous and current studies [3-8]. The current consensus is that there is no statistically significant association between MRI and EDX findings with patient complaints individually, but they are both tools that should be used as supporting evidence when building a differential diagnosis. EDX appears to give a higher false positive for lumbar radiculopathy when compared to MRI [3,5] and can in part be explained by the different nature of each test. MRI assesses structural abnormalities that can affect the nerve while EDX examines the physiological function of the nerve, with EMG being more sensitive to past injuries that may not be symptomatic at this time. Overall, EDX continues to be more specific and less sensitive when compared to MRI. In conclusion, both EDX and MRI should be used together to assess the presence of a lesion (MRI) and the severity of physiologic compromise (EDX) that may explain the patients' current physical limitations/complaints.

Daniel Trapp, PT DPT
EMG Solutions Resident

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Daniel Trapp
PT, DPT, Board Eligible

THANK YOU!

Thank you, Daniel, for sharing your expertise and Trending Topic with us!

Daniel, affectionately known as "Trapp," holds a Bachelor of Science in Kinesiology and a Doctorate in Physical Therapy from the University of Puget Sound. He joined the EMGS Residency in 2024, and ever since, his jokes have kept us laughing. We are incredibly proud to have him on our team and sincerely appreciate his many years of service in the Army as a Combat Trainer.

MEET THE MENTOR

Mark Simmons
PT, DPT, DSc, ECS

VP of Clinical Education and Residency Development, Mentor, Board Certified – Doctor of Science in Clinical Electrophysiology

Nashville, TN

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

During physical therapy school we had a brief introduction into the specialty by a guest lecturer. This lecture was placed early in the program curriculum just after completing our Neuroscience class. The therapist came and did two 1-hour lectures and I recall leaving the last lecture thinking, "*Who the heck would want to do that?! It makes no sense!*" Fast forward 1-2 years to the start of our clinical rotations. At our school we had the ability to try to request new clinical sites and I was fortunate to do just that. My father worked as a hospital administrator in Philadelphia, PA and I was able to set up an inpatient rotation. During my time in PT school the thought of electrodiagnostic testing stayed on my mind. I knew that I wanted to find a niche area and not become one of the masses of PTs. Due to my interest in electrodiagnostic testing my father set up a meeting with the head of neurology to discuss the possibility of doing some training under her. Unfortunately, she had requirements and duties to the Residents and Fellows of the medical school attached to the hospital, however she did get me in touch with Rick Read, PT, DSc, ECS who performed all the EMG/NCV testing for the Philadelphia Hand Center. I was given the 'ok' from my CI to shadow Dr. Read for 3 days. These 3 days were challenging. We did a lot of traveling between clinics in DE and PA but during our car rides Dr. Read would quiz me on EVERYTHING. I came out of the experience knowing that Clinical Electrophysiology was the specialty I wanted to pursue.

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

After graduating physical therapy school, I accepted an outpatient physical therapist position with the North Little Rock Veterans Affairs Hospital. At that time there were really only 3 options to becoming trained in Clinical Electrophysiology. 1) Find a mentor who is willing to train you - which was difficult to the small number of ECS PTs, plus I was in need of a paycheck, so finding someone to pay you and train you was impossible. 2) Join the military and request to be trained in EMG or 3) Attend Rocky Mountain University Basic and Intermediate EMG courses, however this option did not provide mentorship. I chose option 3 and attended the basic course. It was during my time at RMU that I was given the contact information for Quinn Millington, DPT, ECS, OCS. Dr. Millington was the founder of EMG Solutions and was looking to mentor someone. After spending 16 years in Arkansas, I left for central Alabama and joined Dr. Millington and EMG Solutions. Over the next year, Dr. Millington instilled his 20 year knowledge of the specialty into me, showing me the best books to study. After 1-2 years of hard work I was able to successfully pass the ABPTS ECS examination. Looking back at my educational journey I am eternally grateful for the time and energy that Dr. Millington poured into me - but also envious that new physical therapists have the opportunity to join a residency program.

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

  In September 2025 I will be starting my 14th year with Dr. Millington and EMG Solutions. Together with Dr. Millington and Dr. Darin White, PT, DPT, ECS, we created the ABPTRFE accredited EMG Solutions Residency in Clinical Electrophysiology and I currently serve as the Residency Director.

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

  I love the autonomy you have on a daily basis and the relationship you develop with your referral sources. It is stressful knowing that the surgeons who send you patients are making surgical decisions based on your findings. I love that I have the ability to work with multiple clinics and multiple doctors throughout multiple states. I also really enjoy watching my residents and students grow into independent board certified clinical electromyographers.

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

  I am not sure I have anything specifically I would want to change. Sure, every field has its small issues, but Clinical Electrophysiology is such a unique animal, its very hard to compare it to the other specialties. Those with ECS board certification are highly trained individuals whose reimbursement depends on their board certification, and we are the only specialty in the world PT in which this is required.

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

  Absolutely, while being, I believe, the oldest specialty, it is still one of the smallest. We only have 269 board certified individuals. We need more ECSers to join the ranks. The demand for trained individuals has exponentially grown since the start of my ECS journey.

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

  Go for it! ECS is a challenging feat to obtain but it is so incredibly rewarding! You need to be somewhat of a nerd at heart to love EMG!

- **Any additional thoughts or comments?**

  Have to include my shameless plug of the EMG Solutions' Residency in Clinical Electrophysiology. I am incredibly proud of what Dr. Millington, Dr. White, and I created. The family we have here at EMG Solutions is amazing and the success we have had with our Residency program would not be possible without each individual who makes up that family!

Thank you, Mark, for your time and the excellence you provide to the EMG Solutions family. We are so grateful to have you leading our students and residents to make the specialty of clinical electrophysiology a strong foundation among the profession of Physical Therapy!

Resident Spotlight

WELCOME
Tim Dau and Megan Gold
to the EMG Solutions Residency

This quarter EMG Solutions welcomed Tim Dau and Megan Gold who are graduates from Rocky Mountain University. Both were able to complete clinical rotations with us this past Spring. Ben Wynn will be joining us from Mercer University in the October cohort. Each resident is a 2025 DPT graduate!

Congratulations!! We are thrilled to have you joining the EMG Solutions Family!!

Timothy Dau PT, DPT

1. **Where did you receive your DPT degree and what led you to the PT profession?**
   I received my DPT at Rocky Mountain University of Health Professions in Provo, Utah. I came to the PT profession because I have a passion for how the human body works. I love anatomy and physiology.

2. **When did you first learn about clinical electrophysiology offered as a specialty for Physical Therapists and at what point did you decide EMG was the direction you wanted to take your career?**

I learned about the specialty while in physical therapy school. Dr. Richard P Nielsen came and presented about electrodiagnostic testing in our first semester of PT school. I was fascinated by it and decided to shadow him throughout my time at RMU. That led to doing a student rotation with EMG solutions and the rest is history.

3. What made you decide to go the Residency route vs. independently completing study and earning mentor hours?

Since I was a student with EMG Solutions I got to see firsthand what the mentorship looked like within the residency program. I think the volume of studies we are able to do, as well as the consistent feedback from mentors, is what led me to choose this path. I think it is the most accelerated way to become an expert in the specialty.

4. What have you loved most about the residency?

I enjoy the mentorship. There are so many smart minds in our company, and bouncing ideas back and forth with people is a great way to learn.

5. Is there anything you have disliked about the residency?

I dislike the timing of not being able to take the ECS exam this upcoming spring or even in the fall, but that is not the fault of the residency. Just poor timing. Sometimes I think I should have had more time before I was fully independent but I also value the "figuring it out" that is required when you are on your own.

6. What is the most interesting case you have tested so far and what did you learn?

I had a day recently that had two of the most interesting cases I have seen so far. The first was polyneuropathy that had really complex EMG findings and potentially a motor neuron disease. The second case was a patient that had an incomplete spinal cord injury and he had a lot of difficulty with activating certain muscles. With both, I learned that there is not a whole lot in electrodiagnostic testing that is black and white; you have to read between the lines often and best interpret the data you are able to collect.

7. What are words of advice you would like to share with potential or future residents?

I would say keep learning, stay humble about what you know. There is a vast amount of information to learn and that is not going to stop with the residency. Keep learning.

8. Has the residency met your expectations? How?

The residency is about what I expected. I think I became a little faster than what I was comfortable with initially, but I also kind of expected that to happen. I think the caseload that I have in Asheville has a lot more pathology than I encountered in Huntsville, which was surprising, but I am excited to gain more experience with complex patients and continue learning.

9. If you previously completed a clinical rotation in the EMG field, what benefits did you discover if any, before deciding to join the residency?

As I mentioned above, the mentorship is a great thing to have.

10. Is there anything else you would like to share with potential residents or those considering the EMG Solutions Residency?

I would say it is important to dive right in and learn as much as you can. It is overwhelming at first, but you start to get the hang of it. I am still learning so it feels weird to give advice at this point but just keep on getting after it.

Megan Gold PT, DPT

1. Where did you receive your DPT degree and what led you to the PT profession?
I received my Doctor of Physical Therapy degree from Rocky Mountain University of Health Professions in Provo, Utah. I was drawn to the field of physical therapy because it combines science, problem-solving, and human connection. I've always been fascinated by how movement and the nervous system work together, and physical therapy allows me to help people regain function and independence through evidence-based care. I'm especially motivated by the opportunity to empower patients—guiding them from a place of uncertainty or limitation toward confidence and improved quality of life.

2. When did you first learn about clinical electrophysiology offered as a specialty for Physical Therapists and at what point did you decide EMG was the direction you wanted to take your career?

Two years ago, during the start of my physical therapy education, I was introduced to electrodiagnostic testing by Dr. Richard Nielsen, a guest lecturer, clinical electrophysiologist, and the President and Founder of Rocky Mountain University. His passion for this specialty immediately captured my attention. At that time, I had never heard of EDX testing, and after doing some research, I realized how complex and intricate it was—almost like an unsolved puzzle. That challenge intrigued me. I reached out to Dr. Nielsen and accepted his invitation to shadow him, which became a turning point in my career.

Over the next 16 months, I immersed myself in EDX under his mentorship—studying neurophysiology, refining my clinical examination skills, and gaining a deep appreciation for the problem-solving and critical thinking required in this field. My exposure continued during a 12-week clinical rotation with EMG Solutions, where I practiced electrodiagnostic testing, interpreted electrophysiology assessments, and integrated those findings into treatment plans. These experiences helped me see how EDX provides objective, meaningful data that connects symptoms to solutions for patients with neuromuscular conditions. It was during this time that I knew this was the direction I wanted to take my career.

3. What made you decide to go the Residency route vs. independently completing study and earning mentor hours?

I chose to pursue a residency because I value structured mentorship, guided growth, and the opportunity to be immersed in a rigorous, collaborative learning environment. While self-directed study is possible, I believe that formal residency training offers the highest standard of professional and clinical development, especially in a complex and detail-oriented specialty like clinical electrophysiology.
Through residency, I can learn directly from experienced clinicians, receive consistent feedback, and refine my technical and analytical skills in a setting designed for growth. I wanted to develop competence, and I knew that structured residency training would give me the foundation, accountability, and mentorship to achieve that.

4. What have you loved most about the residency?

What I've loved most about the residency is the variety of patients I get to see every day. Each case presents a unique challenge that pushes me to problem-solve and think critically, which keeps my work both engaging and rewarding. I really enjoy being part of a healthcare team—collaborating with other professionals to provide the best possible care and answers for patients who are often seeking clarity and hope.
Beyond the technical side, I've loved the human connection that comes with this role. Being able to sit one-on-one with patients, share meaningful conversations, and see their relief or gratitude when they finally have answers is incredibly fulfilling. This experience has reinforced why I chose this profession in the first place—to serve others and make a genuine difference in their lives.

5. Is there anything you have disliked about the residency?

If I had to identify one thing I've disliked, it would be being away from my family. The residency opportunity is in the southeastern region, and while that distance has been challenging at times, the experience itself was too valuable to turn down.
Being away from home has pushed me to grow both personally and professionally. It's helped me become more independent, adaptable, and focused on achieving my long-term goals. I've learned to build new connections and create a strong support network within my professional community, which has made the transition easier. While the distance has been difficult, I'm thankful for the opportunity to grow through this experience and to pursue training that truly advances my career and skill set.

6. What is the most interesting case you have tested so far and what did you learn?
One of the most interesting cases I have tested was during my clinical rotation, when I assisted my now colleague in evaluating a patient with a lumbar plexopathy. The patient was a woman in her mid-30s who had a history of ovarian and uterine cancer requiring both internal and external radiation treatments. As a result of the extensive cancer therapy, she developed a radiation-induced lumbar plexopathy, which manifested as difficulty lifting her hip during gait, mild foot slap, and intermittent knee buckling that required the use of a brace.
This case was particularly memorable because it highlighted how complex and multifactorial nerve pathologies can be. I learned that nerve dysfunction is not always caused by direct trauma or compression—it can also result from metabolic changes, inflammatory processes, or systemic conditions. Factors such as repetitive motion (like prolonged typing or poor ergonomic positioning), uncontrolled diabetes, traumatic injuries, chronic alcohol use, viral infections, chemotherapy, and radiation exposure can all contribute to peripheral nerve damage. Overall, this case reinforced the

importance of a comprehensive patient history, critical analysis, and clinical correlation. It reminded me that as clinicians, we must always look beyond the immediate symptoms to uncover the underlying mechanisms affecting the nervous system.

7. What are words of advice you would like to share with potential or future residents?

My advice to future residents is to remember that EMG and NCS testing are extensions of the clinical examination. We are physical therapists first, and critical thinking must remain at the core of what we do every day. Developing a deep understanding of anatomy, especially the brachial and lumbar plexuses and nerve-to-muscle innervation, will make you a stronger clinician, not only in clinical electrophysiology but in any area of practice.
Ellen Johnson Sirleaf once said, “The size of your dreams must always exceed your current capacity to achieve them. If your dreams do not scare you, they are not big enough.” In the short term, the fascination of clinical electrophysiology has shaped my career goals, and I am committed to consistent excellence both clinically and academically. I would encourage future residents to pursue this specialty with that same mindset—embracing the challenge, trusting the process, and striving for excellence even when the path feels daunting.

8. Has the residency met your expectations? How?

Yes, the residency has absolutely met my expectations. I’ve received exceptional mentorship from my colleagues, and the didactic coursework combined with the onsite clinical training has been invaluable in deepening my understanding of pathology and refining my hands-on testing skills. The small, supportive nature of our team fosters open communication, individualized feedback, and a collaborative learning environment. I truly feel that this program has elevated both my clinical reasoning and technical proficiency.

9. If you previously completed a clinical rotation in the EMG field, what benefits did you discover if any, before deciding to join the residency?

During my 12-week clinical rotation with EMG Solutions, I gained firsthand exposure to the real-world application of electrodiagnostic testing. I learned how to integrate clinical examination findings with EMG and NCS results to form comprehensive, evidence-based assessments. That experience strengthened my appreciation for how electrophysiological data can clarify diagnoses, guide treatment planning, and ultimately improve patient outcomes. It also confirmed my desire to pursue this specialty further through residency training, where I could continue developing those skills under structured mentorship.

10. Is there anything else you would like to share with potential residents or those considering the EMG Solutions Residency?

I would encourage anyone considering the EMG Solutions Residency to embrace the challenge and trust the process. This program offers an incredible opportunity to grow in a highly specialized field while working alongside knowledgeable and supportive mentors. It’s a journey that demands precision, curiosity, and persistence—but the reward is the ability to make a meaningful difference for patients who often come to us seeking clarity and answers. If you have a passion for neuroanatomy, problem-solving, and lifelong learning, this residency will be an immensely fulfilling experience

Thank you Tim and Megan for taking the time out of your busy learning schedules to share your thoughts! EMG Solutions is excited to help you grow and reach your professional goals!!

APTA CSM 2026

Come see us in Anaheim California February 12-14, 2026!!

EMG Solutions has two sister companies Gulf *Coast Integrative Health and Eufaula Physical Therapy and Wellness*, that are **HIRING** for **outpatient positions** for **Physical Therapists and Physical Therapists Assistant** roles!!

These positions are offering **Student Loan Repayment Assistance**, in addition to competitive salaries and benefits.
If you or someone you know is interested please feel free to contact me at **cathy.digiacomo@emgsolutions.com**

GULF COAST INTEGRATIVE HEALTH

Gulf Coast Integrative Health is hiring for multiple positions in New Iberia and Franklin, Louisiana. These are outpatient roles and provide services ranging from Vestibular care, Sports Medicine, and Pelvic Health. If you or someone you know is interested in a PT or PTA position, please contact me at the email address above.

GULF COAST
INTEGRATIVE HEALTH

Eufaula Physical Therapy and Wellness 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! **AND close proximity to the BEACH!** This outpatient clinic is the physical therapy hub of this great community and provides quality services ranging 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.digiacomo@emgsolutions.com

Learn more about the EMG Solutions Residency Here!

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.digiacomo@emgsolutions.com.

I am here to help you reach your goals!

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