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THE SPINE ISSUE

An Interview with Spine Surgeon Daniel Burval, MD

The Lumbar Spine: "What's Normal?"

Case Law: Proving Aggravation of a Preexisting Condition

In This Issue of AdMIRable Review

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What's Normal?—Part 2:
Lumbar Spine, Diagnostic Imaging

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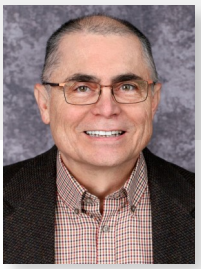


The Summer 2023 issue of the *AdMIRable Review* published our article, "What's Normal? Part 1: Shoulders." In this issue, we will review published science on the imaging findings and the changes in the human lumbar spine (low back) as we age. This will highlight the difficulty in evaluating requests for lumbar surgery and other invasive procedures that insurance adjusters, utilization review physicians, the Tennessee Bureau of Workers' Compensation medical directors, and Court of Workers' Compensation Claims judges face.

Low back pain is very common, and its proper diagnosis and potential treatments are made more difficult by issues of biases and reliability (reproducibility) in the reporting of diagnostic imaging. In 2019, 39% of U.S. adults had back pain in the past three months (Lucas 2021), so there is a large pool of individuals who may be exposed to potentially inaccurate diagnoses that lead to the possibility of unwarranted, unnecessary, and potentially harmful interventions. To conclude, we will discuss age as it relates to diagnostic imaging.

Biases

A 2021 study of "Cognitive Biases in Orthopaedic Surgery" (Janssen, 2021) concluded that cognitive biases affect decision-making and reasoning in orthopaedic surgeons, just as they do in all humans (Saposnik, 2016; Joint Commission, 2016; O'Sullivan, 2018; Korteling, 2022). Two common biases that affect diagnosis and surgical recommendations are base rate neglect and confirmation bias. Both biases may affect how care is provided.

Base rate neglect refers to ignoring the incidence of a condition when interpreting new information. For example, a worker presents to a physician with the onset of back pain without leg pain during the worker's normal light-work activities. The physician obtains a lumbar MRI that demonstrates a single disc herniation or degenerative (aging) changes in a disc. The physician concludes the MRI finding must be the cause of the worker's symptoms, without considering how often asymptomatic disc herniations and disc degeneration occur when adults without symptoms are imaged. Published studies of lumbar imaging in asymptomatic individuals are available to learn what are normal aging changes.

Confirmation bias is interpreting new evidence as confirmation of one's preexisting beliefs. In this example, it is the physician interpreting the disc herniation or the disc degeneration on MRI as painful in this patient based on his preconception. This reinforces his bias that all disc herniations or degenerative disc "disease" changes are painful. Such a bias may also affect the care given to the next worker presenting for low-back pain care.

Reliability

As with the shoulder article, we will first consider the reliability of MRI assessment of specific lumbar spine findings. There is consensus on the definitions should be used for the specific MRI findings in the lumbar spine (Fardon,2014) – *public domain article and free to download.* Reliability is commonly assessed by the Kappa statistic first proposed in 1960 by Cohen. While Kappa is a number, it has varying definitions to describe reliability in medical studies. Most definitions use words that are similar. A common set of language definitions in spine studies is described by statisticians Dettori and Norvell (2020).

Kappa	Words Describing Agreement
≤ 0.20	Poor
0.21 – 0.40	Fair
0.41 - 0.60	Moderate
0.61 – 0.80	Good
0.81 – 1.00	Very Good

Inter-rater Reliability (*do two radiologists "see" the same findings on a single MRI?*) was best raised as an issue by Herzog in 2017. The authors used a single patient, a 63-year-old with spinal stenosis and right L5 nerve root symptoms. Their MRI center performed two "reference" lumbar MRIs three weeks apart, and the two neuroradiologist authors agreed on the MRI interpretations (*no change occurred over the three weeks*). The patient had 10 other MRIs at imaging centers in New York City in the three weeks between the two reference MRIs. The 10 additional MRI reports listed a cumulative total of 49 potential findings, with NO single finding reported by all 10 MRI centers. The overall kappa for agreement was 0.2, or poor reliability, with an average of 1.6 false positive findings per MRI report (*findings reported by the "other 10" radiologists that were not actually present*) and an average false negative findings of 11.7 per MRI report (*findings on both of the "reference" MRI exams that were not reported by the "other" MRI centers*).

The MRI units in this study were 1.5 Tesla MRI units. The higher the MRI magnet strength (larger Tesla number) is roughly equivalent to an increased number of pixels per inch on your television, giving greater image quality, and hopefully better agreement on findings (Herzog, 2015). Herzog's 2017 premise is that the common insurance practice of directing the patient to the MRI center offering the cheapest price, while assuming all imaging centers and all radiologists provide equal quality reports, is NOT correct.

Reliability (*can two radiologists agree, or can a surgeon and a radiologist agree*) has been reported in some relatively recent studies. The United States "SPORT" (Spine Patient Outcomes Research Trial) was prospectively conducted at 13 Academic Medical Centers. Nearly 400 lumbar disc herniation patients were assessed for potential lumbar spine surgery (Luri, 2009). Despite the clear definition of "protrusion," "extrusion," and "sequestration," (Fardon, 2014), *and the radiologists' and surgeons' earlier consensus publication with the same disc herniation definitions,* (Fardon, 2001) in 42% of the radiology reports the authors could not determine which of these herniation types the radiologists were describing.

Both of these consensus statements by radiologists and surgeons state that disc herniation, annular fissure (NOT annular tear), and bulging disc describe anatomy,

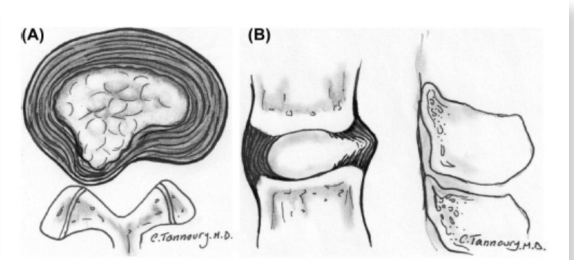


Figure 4. Herniated disc: protrusion. Axial (**A**) and sagittal (**B**) images demonstrate displaced disc material extending beyond less than 25% of the disc space, with the greatest measure, in any plane, of the displaced disc material being less than the measure of the base of displaced disc material at the disc space of origin, measured in the same plane.

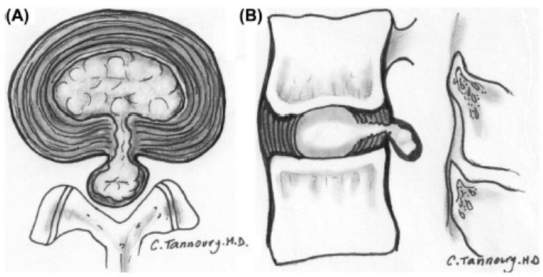


Figure 5. Herniated disc: extrusion. Axial (**A**) and sagittal (**B**) images demonstrate that the greatest measure of the displaced disc material is greater than the base of the displaced disc material at the disc space of origin, when measured in the same plane.

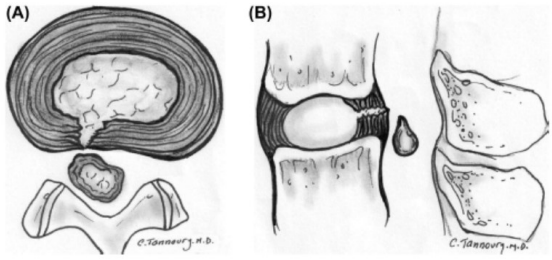


Figure 6. Herniated disc: sequestration. Axial (**A**) and sagittal (**B**) images show that a sequestrated disc is an extruded disc in which the displaced disc material has lost all connection with the disc of origin.

(Fardon, 2014.)

and have no implication as to current symptoms or etiology (no intended correlation with injury or trauma) (Fardon, 2001; Fardon, 2014).

When the radiologist's report and an experienced spine surgeon's review of the MRI images were compared, the spinal level involved (*example, disc herniation at L4-5*) had good agreement (kappa 0.81), and the side (left or right) of the herniation had excellent agreement (kappa 0.93 – 3.3% of cases with disagreement). The kappa for agreement on what degree of herniation was only "fair" at 0.24. In 3.3% of the cases in which the surgeon saw a herniation, the radiologist reported no herniation.

A similar study from the SPORT trial (Carrino, 2009) again looked at the actual 1.5 Tesla MRI images initially, and three neuroradiologists and a spine surgeon (*four observers for inter-rater reliability*) looked at a subset of the same images 30 days later (*intra-rater reliability*). For intra-rater reliability the kappa for the overall assessment by the four observers was between 0.50 and 0.74 for spondylolisthesis, disc degeneration, Modic endplate changes, a posterior disc high intensity zone (*a.k.a. annular fissure*), and facet arthropathy. For inter-rater reliability, the overall kappa for these same features was 0.43 to 0.66.

A three-radiologist reliability study of MRI for facet degeneration (Little, 2020) found kappa values of:

Finding	Intra-Rater Reliability	Inter-Rater Reliability
Facet cartilage loss	K = 0.54	K = 0.44
Facet subchondral sclerosis	K = 0.32	K = 0.10
Facet osteophytes	K = 0.26	K = 0.26

Tawa 2016 reported a systematic review of the four studies on MRI reliability for nerve root compromise, which is the main potential "surgical target" of interest to spine surgeons. Sensitivity was very low at 0.25 (*documenting numerous false negative studies*), but specificity was high at 0.92 (*documenting few false positive studies*).

This review of reliability highlights the difficulty in evaluating requests for invasive treatment, especially if the treating physician and the radiologist have reviewed the same images and yet have different opinions on the findings.

MRI validity is hard to evaluate (*are the reported findings actually present, or are false positive and false negative MRI findings an issue?*). The only modern systematic review) concludes: "The diagnostic accuracy of CT, myelography and MRI of today is unknown, as we found no studies evaluating today's more advanced imaging techniques. Concerning the older techniques we found moderate diagnostic accuracy for all CT, myelography and MRI, indicating a large proportion of false positives and negatives" (Kim, 2018).

None of the 14 studies published from 1982 to 1994 had a low risk of bias. More recent studies are unavailable, so again the validity of modern spinal imaging has not been documented.

What's normal based on AGE?

Disc herniations are considered a degenerative pathology – a fatigue failure for the engineers reading this. A common erroneous epidemiologic perception is that disc degeneration and disc herniation occur primarily in those over the age of 35.

Two Systematic Reviews of asymptomatic **pediatric** populations (≤18 years old) reporting on MRI findings have been published: Ramadorai (2014) reviewed seven studies, and van den Heuvel reviewed 31 studies (2020). Not all published studies reported on every MRI finding, but the authors pooled the results and reported:

MRI Finding PREVALENCE: Systematic Reviews of **Asymptomatic** Pediatric Populations			
Publication	Disc Degeneration	Disc Herniation	Decreased Disc Height
Ramadorai 2014	20% - 7 studies	3% - 4 studies	34% - 2 studies
van den Heuvel 2020 **Non**-athlete Children	22%	1%	-
van den Heuvel 2020 **Athletic** Children	22%	13%	-

In addition to van den Heuvel's pooling of studies on athletic children, other studies looked at whether high ergonomic stress activity is compatible with asymptomatic MRIs recognized spinal "pathology." Carmody 2022 reported on 18 asymptomatic 17- to 18-year-old military academy "footballers" (soccer players – British study). "Abnormal" MRI were present in 83%, 17% had bilateral facet joint effusions, and

22% had pars injuries (a.k.a. spondylolysis). In addition, 38% had disc degeneration, and 27% had a disc herniation.

Romeo 2019 reported on 350 asymptomatic young (18- to 22-year-old) applicants to the Italian Air Force Academy. They each had a required screening lumbar MRI due to the known high forces on the spines of Air Force pilots. Two hundred seventy of 350 subjects (77%) had an "abnormal" MRI, 30% had disc desiccation, 13% had decreased disc height, 49% had disc bulging, 18% had disc protrusion, and 8% had disc extrusion. Thus, these MRI findings are not necessarily incompatible with asymptomatic performance of high ergonomic stress physical activity.

Brinjikji 2015 published a systematic review of 33 published studies on lumbar MRIs in asymptomatic adults. As expected, "abnormalities" were common and increased with age. The MRI findings were reported by decade of age, and here is a condensed version of the MRI findings in Brinjikji:

	AGE IN YEARS			
Imaging Finding	20s	40s	60s	80s
Disc Degeneration	37%	68%	88%	96%
Disc Bulge	30%	50%	69%	84%
Disc Protrusion	29%	33%	38%	43%
Annular Fissure	19%	22%	25%	29%
Facet Degeneration	4%	18%	50%	83%
Spondylolisthesis	3%	8%	23%	50%

The full Table 2 in Brinjikji 2015 lists other MRI findings and also documents all findings at the decades of the thirties, fifties, and seventies. That article is in the public domain ("open access") and should be downloaded and in the library of every physician who treats low-back pain patients.

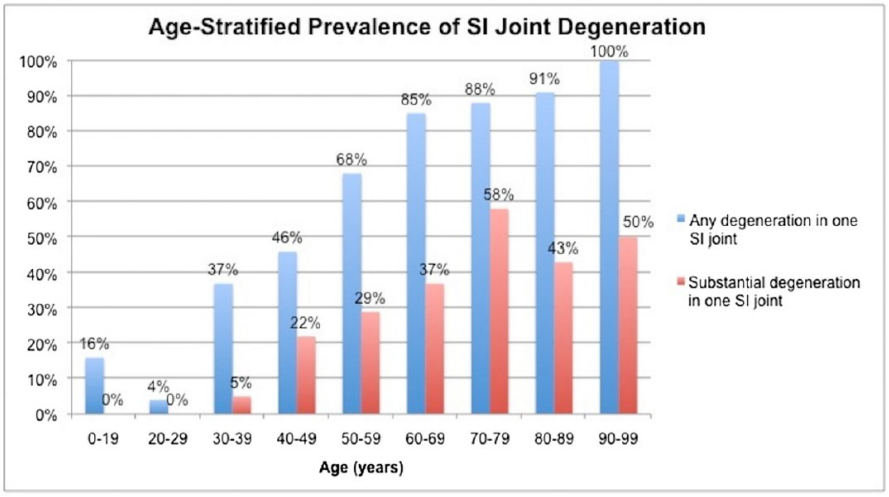
The famous Framingham, Massachusetts cardiac disease risk assessment cohort was used to determine the CT scan prevalence of disc height loss and facet osteoarthritis in a "non-care seeking population" of 1195 adults being monitored over six years for cardiac risk factors, but not seeking care for back pain (Jarraya, 2018). The prevalence of moderate to severe disc degeneration (*height loss or aging change*) that can be confused and interpreted as "disease" and of moderate to severe facet arthritis was:

Age	Men		Women	
	Disc height loss	Facet arthritis	Disc height loss	Facet arthritis
40-59	34%	44%	37%	56%
60-69	53%	66%	53%	78%
70-89	69%	86%	68%	83%

Progression (new or worsening) in severity was common for both sexes over the six years between CT studies, and the older the person, the more likely the severity of these aging changes increased over this short time period. The discussion section of this publication indicates similar prevalence data have been published from other U.S. studies and in studies from five other developed nations.

The presence of joint effusion in arthritic facet joints has been suggested as a sign of the facet joint being symptomatic. However, an MRI study of 808 adults found 34% had facet joint effusion, and the prevalence did not differ between men and women, or between those with low-back pain and those without back pain (Shinto, 2019). One systematic review found that patient history and physical examination were not helpful in identifying the lumbar facet joints as a source of symptoms in an individual patient (Mass, 2016).

The sacroiliac joints were considered a potential cause of low-back pain in the early 1900s, and 100 years ago sacroiliac fusion was a potential treatment (Smith-Petersen, 1926). In the 2000s, a return has occurred to the sacroiliac joint as a potential cause of back pain, likely the result of new implants becoming available for minimally invasive fusion of the SI joints. The Tennessee BWC medical director receives appeals of utilization review denials for this SI joint fusion procedure, most typically with no imaging of the joint in the file. A German CT scan study of 102 low-back pain patients and 102 similar aged normal adults found the sacroiliac joint had already



(Eno 2015)

spontaneously fused (*no surgical procedure performed*) in 24% of both those with and in those without back pain (Gahleitne, 2023). Logically a CT scan should be done before an SI joint fusion surgery is requested, both to establish that pathology is present (*the joint is not normal*) and that the joint is **not** already spontaneously fused.

The prevalence of osteoarthritis (degeneration, or aging change) in the SI joints increases with age, as it does in the lumbar spine, neck, hip, knee, hand, etc. A U.S. study of 746 CT scans in adults without back or pelvic pain found 65% had degeneration, and the aging change was "substantial" in 30.5% of the sacroiliac joints

Injection of local anesthetic into the SI joint has been suggested as a test to determine whether the SI joint is, or is not, the source of low-back pain. An SI joint arthrography study of 76 sacroiliac joint injections found x-ray contrast ("dye") injected into the joint extravasated out of the joint through defects in the joint capsule and onto nearby nerves or nerve roots in 61% of the injections (Fortin 1999). This confounds the results of joint injection tests, making it difficult to interpret whether pain relief was due to anesthetizing the joint, or to the spill of local anesthetic onto nerve roots and/or the lumbosacral plexus. This inability to predict the SI joint as a source of pain was noted in a review of SI joint injections (Berthelot, 2006), and SI Joint neurotomy (Bogduk, 2015).

Lumbar spinal stenosis is the most challenging imaging concept. A systematic review (Jensen, 2020) of 41 published series of 55 populations found a clinical diagnosis prevalence of 11% of adults, and a radiographic criteria prevalence of 11% of adults. The prospective Framingham Heart Disease risk factor assessment cohort was used to estimate stenosis prevalence using 191 adult CT scans obtained to assess abdominal aorta atherosclerosis as a heart disease risk factor (Kalichman 2009). Using the anterior to posterior midline spinal canal diameter at the level of each disc to measure "acquired or degenerative stenosis," they found 22% had relative stenosis (mid-sagittal A-P diameter ≤12 mm), and 7% had definite spinal stenosis (A-P diameter ≤10 mm). This reflects stenosis from degenerative changes in the disc, ligamentum flavum, and facet joints. Measuring instead at the middle of the vertebral body (reflecting congenital short pedicles) with the same definitions for A-P diameter, 4.7% and 2.6% had congenital stenosis.

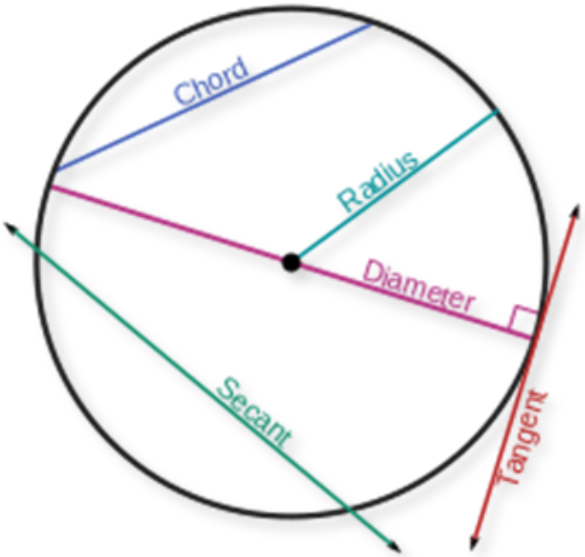
Stenosis, or lack of room for the spinal nerves, can occur in the central canal, at the lateral recess (*where the neural foramen begins*), or in the foramen, through which the nerve root exits the spine. Imaging can be evaluated for stenosis (*a.k.a. the*

absence of "room" for the nerve roots) in these locations by computing an area (*square millimeters*); measuring a linear distance (*millimeters*) of the central canal, the lateral recess, or the foramen; computing a ratio of a bony distance about a nerve root in millimeters compared to a measurement of the size of the vertebra; and visualizing the presence or absence of normal fat about a nerve root in the foramen. Each of these has published studies attempting to define normal either by measurement on images (MRI, CT, or radiographs), or by consensus of "experts" based on their personal experience. Radiology reports will typically state the severity (*mild, moderate, or severe*) of stenosis in one or more of these 3 potential locations for stenosis, but rarely state what measurement system was used or what that radiologist considers to be normal for the measurement used.

Studies have been published on the reliability of lumbar stenosis measurements. In a systematic review, the published literature had 14 different methods (*imaging findings or measurements*) to diagnose lumbar spinal stenosis (Andreisek, 2013). The intra-rater reliability was a kappa of 0.82, while the inter-rater reliability was 0.41 to 0.73.

Central canal stenosis is the easiest to understand. The measurement can be the maximal linear distance (*in millimeters*) on the mid-sagittal image or the axial image, or it can be the area (*in square millimeters*) of the canal on one of the axial views. By consensus, the most commonly used definitions of normal are > 10 millimeters for the linear distance or > 100 millimeters^2 for the area, but these definitions are not universally used (Mamisch 2012).

Stenosis at the lateral recess or in the foramen is more challenging to understand. The foramen is somewhat like a cylinder containing the exiting nerve root. It is oriented from anterior to posterior in the sagittal plane, from medial to lateral in the axial plane, and from superior to inferior in the coronal plane. Published articles with linear measurements of lateral recess or foraminal "diameter" most commonly state "< 3 mm" as the criterion for stenosis in the lateral recess or foramen (Mamisch, 2012). The MRI stenosis measurements are on sagittal or axial MRI images and not on images showing the cross



A **chord** (from the Latin *chorda*, meaning "bowstring") of a circle is a straight line segment whose endpoints both lie on a circular arc. A chord that passes through a circle's center point is the circle's *diameter*.
[https://en.wikipedia.org/wiki/Chord_(geometry)]

section perpendicular to the foramen. Cadaver measurements of the L2 through L5 nerve root width are 4 to 6.5 mm, which sounds impossible in the normal individual (Silverstein 2015). The foramen has to be bigger than the nerve root. The reason for this apparent contradiction is the orientation of the MRI images is not a perfect cross-section of the foramen, and the commonly used linear measurements are not the diameter of the foramen, but from geometry are "chords," which give some information but do not correlate with nerve root compression. CT scan measurements of the foramen diameter are about 9 millimeters (Harianja 2023) in 600 young adults (average age 28).

Published studies on the reliability of lateral recess and foraminal stenosis are less important. For example (Lurie 2008) the SPORT study on lumbar stenosis reported the reliability of lateral recess (a.k.a. subarticular zone) stenosis with a kappa of 0.49 and foraminal stenosis with a kappa of 0.58. Whether two observers agree on the measurements on a single MRI image for stenosis in the lateral recess or foramen is less important, as described above, since the measurements available on routine MRI imaging do not

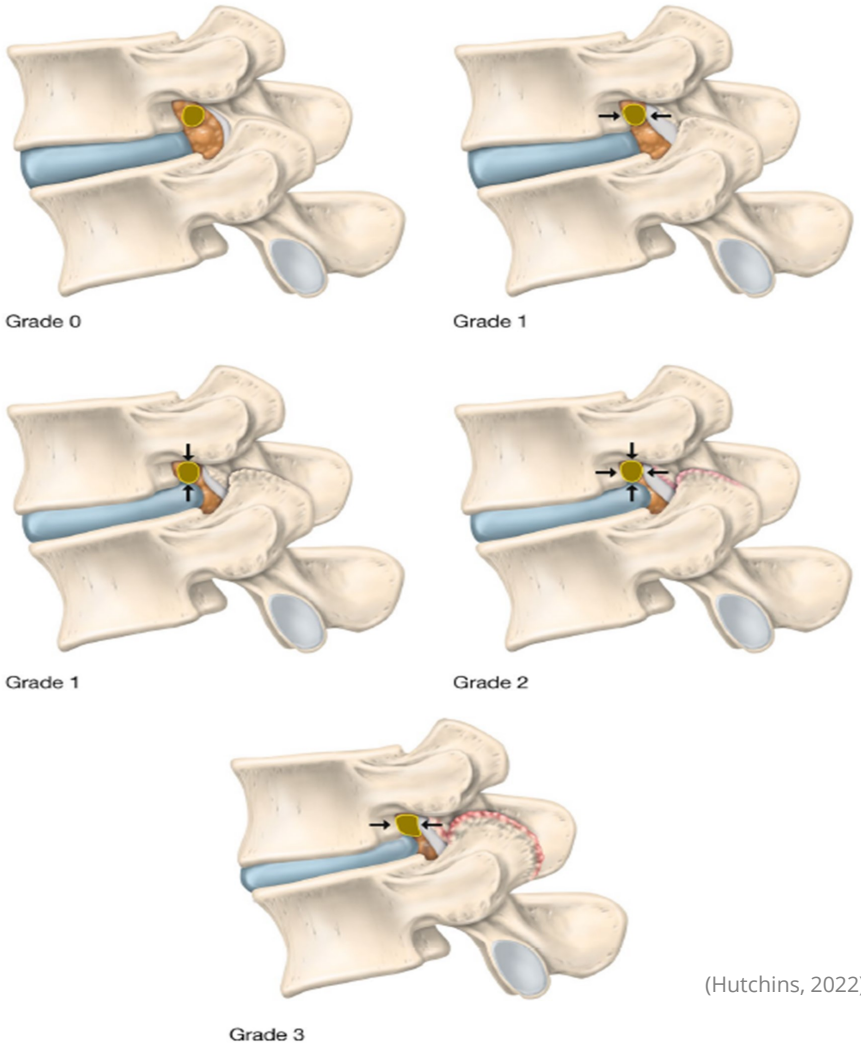


Fig 6. Schematic Illustration of the Lee system for lumbar foraminal stenosis based on sagittal MRI. Grad 0 shows no foraminal stenosis or perineural fat obliteration. Grade 1 depicts transverse or vertical narrowing with perineural fat obliteration. Grad 2 demonstrates complete perineural fat obliteration with surrounding foraminal narrowing from all directions but no morphological change to the nerve root. Grade 3 shows total fat obliteration and a morphological collapse of the nerve root.

(Hutchins, 2022)

actually measure the room for the nerve root, but Lurie reported a kappa of 0.51 for nerve root impingement.

The most reliable assessment method for stenosis in the foramen is using the presence or absence of normal fat on each of the four sides of the nerve root in the foramen (several MRI cuts away from the spinal midline). The original description of this imaging assessment method (Lee, 2010) had an inter-rater reliability kappa of 0.9 to 1.0, or "very good." A subsequent systematic review included four other studies (Hutchins 2022) with inter-rater kappa of 0.47 to 0.89. ["open access" freely downloadable article].

There are studies stating that, in patients having surgical decompression or decompression with fusion for lumbar spinal stenosis, the traditional physical examination and imaging do not predict the outcome of surgery (Schizas, 2010; Weber, 2016; Yang 2023), perhaps because of the confusion about what is, or is not, lateral recess and foraminal stenosis by imaging. Symptoms do predict surgical outcomes. A consensus of 17 spine specialists from eight countries (Genevay 2018) used the Delphi process to identify symptoms that differentiated lumbar stenosis with neurogenic claudication (*leg pain that worsens with continued walking*) from disc herniation with radiculopathy and also from non-specific low back pain with pain radiating to the leg, and then validated those symptoms in a new cohort of patients (Genevay, 2018). Criteria that independently predicted neurogenic claudication from stenosis (*at the p<.05 level of statistical significance*) were age over 60 years, positive 30-second extension test, negative straight leg test, pain in both legs, leg pain relieved by sitting, and leg pain decreased by leaning forward or flexing the spine.

Congenital stenosis or "short pedicles" (*averaging around 6 mm in length*) predicts earlier onset spinal stenosis and disc herniations based on biomechanics (Lai, 2020). Risk factors for congenital stenosis include being born "small for gestational age" (*malnourished in the uterus before birth*). Risk factors for "small for gestational age" include older maternal age, use of opioids (Ryan,2023) or cannabis during pregnancy (Lo 2023), smoking during pregnancy (Anderson 2013), calorie deprivation due to socioeconomic circumstances, major systemic disease, infection during pregnancy, or hyperemesis gravidarum (severe vomiting throughout pregnancy) (Veenendaal, 2011).

Utilization Review Denials Appealed to the Tennessee Bureau of Workers' Compensation

Lumbar spine cases of utilization review denial appealed to the Tennessee Bureau of Workers' Compensation medical director are rarely for invasive treatment for new onset symptoms with new neurologic deficit. Insurers typically approve such requests.

Most requests for invasive treatment (injections, ablations, surgery) have as the surgical indication pain, and not treatment to arrest or reverse neurologic deficit. Very few of these cases have in the medical record:

- Review of medical records prior to the workplace incident to confirm the patient's history of "I have never had this before," when 39% of U.S. adults experience back pain in any three month period (Lucas, 2021), and up to 80% have back pain in their lifetime (Miekisiak, 2023).
- Assessment of potential neurologic deficit **by the IASP criteria** for "probable neuropathic pain" (Finnerup, 2016). This exam and documentation take time, and they are not consistent with most modern physician office schedules. Documentation of this type of pain as actually present by IASP criteria increases the chances of surgery being helpful.
- Assessment for central sensitization, or for nociplastic pain, which would make improvement with invasive procedures much less likely (AdMIRable Review, Fall 2022). Assessment for opioid induced hyperalgesia would fit here as well.
- Assessment for depression symptom severity, anxiety symptom severity, catastrophizing, fear-avoidance beliefs, unresolved anger – the psychosocial factors known to correlate with suboptimal invasive treatment outcomes – to be the focus of the Spring 2024 issue of the AdMIRable Review.

In addition, if the Authorized Treating Physician records the MRI findings, usually it is not clear whether the documentation is the radiologist's report, or the surgeon's/pain specialist's interpretation. When it is obvious that the surgeon viewed the images, and the surgeon and the radiologist disagree, usually the medical records do not mention that the two physicians disagree, nor do they attempt to resolve the disagreement through communication and consensus. With the known inter-rater agreement (kappa) values, disagreements are frequent, but rarely resolved in medical records, making the utilization review physician and the Bureau of Workers' Compensation medical director unclear as to the correct interpretation of the imaging (*usually MRI*).

The more times the authorized treating physician has seen the patient, the more detailed the documented history, the more consistently the patient describes the symptoms, and the more consistently the physician notes the same physical examination findings as present or absent at multiple office visits, the higher the potential confidence of a reviewer (looking at medical records) that the documentation is reliable. The better the physician documentation, the easier it is to correlate the patient's symptoms and physical examination with the imaging reports. As mentioned above, to state "probable neuropathic pain" by IASP criteria requires evidence that the negative neurologic deficit (*neurologic weakness or absence of perception of sensory stimuli*) is consistent in location, which cannot be established at a single office visit (Finnerup, 2016). The plan for invasive treatment should be the plan of the authorized treating physician, and not the plan of a mid-level provider.

Conclusions

Historically the term "failed back surgery syndrome" has been used to describe the 15% (Alshammari, 2023), 20% (Rigoard, 2019; Miekisiak, 2023), or even higher (Sebaaky, 2018) incidence of severe persistent or recurrent back and/or leg pain after spinal surgery. Surgery that was intended to be helpful, if not curative, disappoints both the patient and the surgeon. This diagnosis is being renamed "persistent spinal pain syndrome" (Christelis, 2021; Miekisiak, 2023) to avoid a pejorative connotation – that seems to blame either the patient or the surgeon, or both. Failed back surgery syndrome is no longer present in ICD-11, the medical diagnosis coding system used by the World Health Organization and 64 countries (WHO, 2023).

The studies reviewed in this article show that the "mistake available to be made" is to assume any MRI finding listed on a report in a patient with low-back and/or leg pain, in the absence of an accurate and confirmatory history and physical examination, explains the person's pain (*cognitive bias of base rate neglect, which leads to the cognitive bias of confirmation bias*). Physicians mean well, but they are subject to the same cognitive biases and flawed conclusions that are common to humans in general. When physicians, who are motivated to help the patient in pain, assume that commonly seen and potentially asymptomatic age-related changes are the source of the patient's pain, invasive treatment commonly fails. This article highlights the difficulty insurance adjusters and physicians doing utilization review have approving invasive treatment requests. Similarly, this article documents the same difficulty the Bureau medical director has doing utilization review denial appeals. The medical director is faced with uncertainty about what the real MRI findings are, and whether the proposed operation will really help the patient, or

instead lead to yet another "persistent spinal pain syndrome" referral to pain management.

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An Interview with Spine Surgeon

Daniel J. Burval, MD

AdMIRable Review Staff

Daniel J. Burval, MD, is one of the Certified Physician Program's newest CPP Physicians. He is a long-time member of the Medical Impairment Rating registry, having performed spinal MIRs to help resolve impairment rating disputes. AdMIRable Review caught up with Dr. Burval's busy practice in Hendersonville, Tennessee, to ask him a few questions about his treatment of spine conditions.

AdMIRable Review (AR): What is the most typical type of spinal pathology you see?

Daniel J. Burval, MD (DJB): Degenerative conditions (age) are the most commonly seen spinal pathologies. This process of course occurs in all of us albeit at different rates and severity. As the work force ages so will the frequency of encounters with this underlying pathology that must be delineated from injury. Trauma, tumor, and infections of the spine are statistically seen at much lower incidence.

AR: What's the most typical type of workers' compensation spine injuries that you see?

DJB: Low back pain after a lifting event is the most common worker's compensation complaint seen in clinic. Radiating extremity pain (shoulder, arm, hip, leg) attributable to spine is also commonly seen either early in complaints or later when the extremity etiology of pain is ruled out by the physician of record. If you treat spine patients, include a hip and shoulder exam with every patient to help r/o mechanical causes to their complaints versus neurogenic ones.

AR: How do you personally determine whether spine pathology is work-related? Are there any tell-tale signs that you look for?

DJB: Spine pathology (as opposed to complaint) is what can be detected on imaging (X-ray**,** CT, MRI). I was trained to ask myself if what is seen on imaging could be due to trauma and if yes what is the likelihood (few percent, less than 50%, greater than 50%) it is trauma or another cause absent the history for the

moment. Surgeons are trained in environments of intense scrutiny, self-review, and accuracy amongst many peers of a wide range of experience and wisdom. The diagnosis made, data interpreted, treatment rendered, and outcomes are analyzed with equal scrutiny to ensure the highest levels of care. I always ask myself if I presented this patient to ten physicians face to face of the same specialty, would they generally agree or disagree with me on diagnosis, cause and plan? Another thing I consider is this complaint due to something at work or is it something that just occurred at work? The same is asked of the pathology once the anatomical diagnosis is made. Does the level of violence described by the IW make sense?

AR: In your experience, what is the typical recovery time for patients who are treated conservatively (i.e. non-surgically) and with surgery? Do you see any difference between workers' compensation patients and non-work-related injuries? Are your experiences consistent with your understanding of typical recovery times or published literature on spine injuries?

DJB: Recovery from work events is highly variable. From a pulled back after lifting that is 90+% better by the time they see you (natural history of human back and slightly less for neck pain) to over a year sadly sometimes. Patients who are treated promptly with conservative care (in absence of red flag findings: objective progressive weakness, foot drop, urinary overflow incontinence due to retention, saddle anesthesia, spinal instability) with close follow-up (three to four weeks) to assess response to prescribed treatment whether that is rest, NSAIDS, muscle relaxants, and/or PT generally do better and have quicker return to work because the treatment is being followed closely, repeat exams and history are done, progress of improvement can be appreciated and change an intervention can be done without delay if/when medically indicated. A constant state of re-assessment of the patient, yourself and the diagnosis and contributing factors is vital to successful treatment. Surgical patients typically have even longer recoveries because for example the time leading up to a specialist evaluation to determine if surgery indicated, the surgery itself and the common length restrictions of strenuous activity after surgery. Recovery times are consistent with published recovery times and are much longer than matched non-workers compensation patients in study after study independent of the diagnosis, however I feel it is important to maintain close follow-up to minimize delays in patient care.

AR: Do you try to help set your patients' expectations on returning to work? If so, how might you do this?

DJB: Managing expectations is paramount in patient care. This includes insuring patients understand their condition at their comfort level (I have always showed

patients their imaging), realistic timeline (the natural history of a given condition: lumbar strain, herniated disc, fracture, etc) what they can expect to happen with different treatments, co-factors that might affect recovery (age, health, body habitus, nicotine use, type of work), when you will see them back, and how to protect against further injury.

AR: What advice can you offer physicians for treating workers' compensation injuries that deal with the spine?

DJB: Listen to your patient. Obtain good insight into their job duties/ requirements. Use that to help determine their restrictions. Reassure patients what activities may hurt to do versus those that would be damaging to do. This is a large part of expectations and restrictions. If you have never done a job similar to theirs, arrange a site visit to get firsthand knowledge. This may not be realistic for every job however. Know this is challenging and rewarding work that requires excellent history and physical skills, diagnostic (always read your own imaging) skills, critical thinking and insight into the goals/motives of the patient, and patience. You will not make everyone happy if you are doing your job, maintain integrity, and are open and honest with your patients. This is not easy nor meant for every physician. Learn the state laws regarding causation, as they may differ from what was learned in training programs or prior practices before TN. Read the current Guides on the areas you treat, the entire chapter, several times. It is very insightful, has references for natural history of findings, rules for impairment ratings, and medicolegal insight to help avoid miscommunication with the legal community. Be consistent with the Guides in your ratings and rationale of causation. When you have done everything you know to do and they are still hurting, do not be afraid to verbalize that to the patient and if you truly feel there is another provider that can fix the problem make the referral and if not, it is your duty to establish MMI. This is hard and does not get easier with time. Realize that not every complaint is work related: in the same fashion that not everything can be due to the work event, nor can nothing be related to the work event. Lastly, there is no last. Always learn, ask questions, discuss, educate, repeat.

Daniel J. Burval, MD

Daniel J. Burval, M.D. is a graduate of the Cleveland Clinic where he served as Chief Resident. He received extensive training in spinal and orthopedic surgery at the renowned Cleveland Clinic, as well as during his fellowship in Adult and Pediatric Spinal Disorders at OrthoIndy in Indianapolis. At OrthoIndy, he trained under Dr. Terry Trammell who has provided spinal care for all Indy Car drivers since 1984

until retiring in 2014. He was a flight physician for Cleveland Metro LifeFlight from 2004-2008 and is experienced in all levels of trauma care. He has trained at some of the largest trauma centers in the country, lectured nationally and internationally, written research papers and authored a book chapter on spine fractures.

Dr. Burval is a graduate of the West Virginia University School of Medicine with Honors and completed his undergraduate degree cum laude in Biology at Case Western Reserve University in Cleveland, Ohio. He is Board Certified with the American Board of Orthopaedic Surgeons. Dr. Burval is affiliated with Hendersonville Medical Center and Skyline Trauma Center.

Outside of work, he cherishes his family, enjoys the water and is an avid runner and skier. He participates with local Boy Scout Adventure trips and is active in his church.

Panel Offers Guidance

Proving Aggravations of Preexisting Conditions

Jane Salem, staff attorney, Nashville

A recent appellate opinion from the Supreme Court's Workers' Compensation Appeals Panel discusses the standard for medical causation in a case where a back injury is alleged to have caused an aggravation/exacerbation of a preexisting condition. The opinion holds that, when giving a causation opinion about the compensability of an aggravation of a preexisting condition, one way an employee can be successful is to prove the work injury resulted in an anatomic change in the preexisting condition.

This is a longstanding legal principle relied on by the Panel in this case. The opinion is noteworthy, though, because it breathes new life—*possibly*—into a Supreme Court opinion previously considered the seminal case on the topic of aggravations of preexisting conditions.

Trial court denies the claim

In *Edwards-Bradford v. Kellogg Company*, the employee was working in 2019 when she reported an injury to her back.

Two authorized doctors reached similar conclusions on medical causation. Edwards -Bradford was first seen by Dr. Fereidoon Parsioon. He noted no anatomical changes from the work injury, placed her at maximum medical improvement, and assigned a zero-percent impairment rating. Edwards-Bradford then saw Dr. Sam Murrell. He also found no discrete injury, pronounced her at maximum medical improvement, and gave a zero-percent impairment rating.

Edwards-Bradford then went to Dr. Apurva Dalal for an independent medical evaluation. Dr. Dalal found moderate tenderness in the lower lumbar spine, paraspinal muscle spasms, and occasional bursitis in the right hip. He also documented altered sensation in the L5 and L5-S1 distribution on the right leg. He concluded that Edwards-Bradford suffered an aggravation of her preexisting degenerative arthritis from the work injury and gave a seven-percent rating.

The trial judge found that Dr. Dalal's opinion didn't rebut the presumption of correctness given to the treating physicians and denied the claim.

Appellate court affirms

The Panel began by noting that the authorized treating physicians concluded that the injury resulted in pain after the incident. In particular Dr. Murrell testified that Edwards-Bradford had only degenerative disc disease of the lumbar spine with an "element of stenosis."

In contrast, Edwards-Bradford testified that she had increased pain after the work incident, and Dr. Dalal testified that the work incident made her preexisting degenerative condition symptomatic.

The Panel cited caselaw dating back to 1969 holding that an injury is "not compensable if it results only in increased pain or other symptoms caused by the underlying condition." The Panel then observed that the Tennessee Supreme Court repeated this principle in *Trosper v. Armstrong Wood Products, Inc.*, which the Panel quoted: "[I]f an injury does not cause an actual progression or aggravation of the underlying, pre-existing condition, the claim is not compensable. .... [I]f the injury results only in an increase in pain with no corresponding permanent anatomical change, then there is no new compensable injury."

Applying that to the facts, the Panel pointed out that although Dr. Dalal testified that the work incident caused pain and made Edwards-Bradford's preexisting condition symptomatic, he didn't conclude that the work injury "advanced the preexisting condition or caused a new, distinct injury."

The Panel further reasoned that the authorized doctors never found that Edwards-Bradford had a positive straight leg raise test or any muscle weakness in her legs. Further, two years after the work incident, the straight leg raise was negative bilaterally, and a follow-up MRI didn't show any significant change. This was after a break from treatment for over a year, and Edwards-Bradford had been working seven days a week without restrictions.

The ramifications

The opinion is significant because *Trosper* was decided in 2008, before the Reform Act of 2013. LEXIS still gives the case the "positive treatment" signal. Per LEXIS, it has been treated positively 17 times, neutrally three times, and merely cited 94 times.

In 2015, in *Miller v. Lowe's Home Centers,* the Tennessee Workers' Compensation Appeals Board held that a trial court committed error, albeit "harmless," when it cited *Trosper* to award benefits at the interlocutory stage.

The Board gave several reasons for that conclusion, but among them was that *Trosper* cited several legal principles that were directly impacted by the 2013 reforms. Notably, the high court wrote in *Trosper* that "reasonable doubt" regarding medical causation "must be resolved in favor of the employee." However, the Reform Act no longer allows a liberal or remedial interpretation of the statute in favor of an employee—"so this statement of pre-reform law no longer applies," the Board wrote.

The Supreme Court in *Trosper* also relied on a longstanding principle that an expert need only testify that the word accident "could be" the cause of the aggravation. Again, the Board noted that the 2013 Reform Act rejected that principle. The Board affirmed the denial.

So has *Trosper* been resurrected? That remains unclear. The principle cited by the Panel in *Edwards-Bradford*, that an employee can succeed on a claim by proving that a work injury caused an anatomic change in the employee's preexisting condition, appears to be good law.

However, the level of proof required to support that finding has changed since *Trosper* was decided. First, it's no longer enough for a physician to testify that the work accident "could have" caused an anatomic change in the preexisting condition. Instead, the law now requires that the employee prove the work accident was more than fifty percent the cause of the aggravation. Second, a court can no longer "break a tie" in favor of the employee by applying a remedial interpretation to the statute. Instead, the law must now be construed "in a manner favoring neither the employee nor the employer."

Of course, a Supreme Court Panel opinion is afforded higher precedential value than the Appeals Board. The Board can conclude that a judge's reliance on a Supreme Court case was erroneous, but it can't overrule the case itself. Still, no trial judge for cases after July 1, 2014, has cited *Trosper* since *Miller* came down.

The Panel in *Edwards-Bradford* didn't mention at all *Trosper's* reliance on the remedial construction of the law or its statements regarding the "could be"

standard of causation. Could it be that the Panel didn't read *Miller*? Or merely thought it didn't apply to the case at bar?

Or maybe the opinions can be harmonized, in that the cases were at different phases: interlocutory in *Miller* versus final adjudication in *Edwards-Bradford*. The stage matters because the standard for relief differs between the two types of hearings.

Moreover, although the Appeals Board in *Miller* cast doubt on the viability of *Trosper,* post-Reform*,* the Board's opinion didn't disturb the notion that an anatomical change can support the employee's claim in aggravation cases. In fact, after *Miller* in 2022, the Board affirmed in *Hanna v. Gaylord Opryland,* where a trial court accepted the opinion of a doctor who testified that the employee's aggravation was temporary and resulted in no anatomical change.

The answer is, time will tell if *Trosper* remains good law.

Why do we have a Certified Physician Program?

Jay Blaisdell, MPA

The Tennessee Bureau of Workers' Compensation's REWARD Program offers tools and resources to help Tennessee employers return their injured workers to gainful employment. First and foremost, it offers the REWARD Toolkit, which provides in-depth guidance for employers wanting to start their own return-to-work program. Secondly, it offers synchronous online training for a company's Return-to-work Coordinator, the hub of any employer's return-to-work efforts. Third, it helps connect and recognize like-minded employers through the REWARD Support Network, Honor Roll, and bimonthly Report. Finally, it provides access to a network of highly trained physicians who not only accept workers' compensation patients but also apply the Bureau's best practices for treating and evaluating injured workers. This network of physicians and the rules that apply to it is the REWARD Certified Physician Program (CPP).

When creating the REWARD program, the Bureau's task force quickly realized that physician education would be an integral part of our efforts to **R**eturn **E**mployees to **W**ork **A**nd **R**educe **D**isabilities. Our research consistently showed us that a quicker return to work led to improved medical outcomes and reduced disability claims (Carlier et al, 2013; Jurisic et al., 2017; Kroll et al., 2009; Morris et al., 1994; Reuda et al., 2012; Roelfs et al, 2011; Shiri et al., 2013; Waddell et al., 2007). It also showed us that there was strong correlation between an injured worker's expectations of returning to work and the actuality of doing so (Heymans, 2006; Iles, 2008; Iles, 2009; Sandström & Esbjörnsson, 1986; Kapoor et al., 2006). We found that treating physicians were in an excellent position to help shape an injured worker's expectation of returning to work, especially when they provided "consistent, accurate information" based on published outcome data for the injury in question (Lewkonia et al, 2012; Schouten et al, 2015).

But some important questions remained for the Bureau's task force. For one, how do we emphasize to physicians that one of the best treatments that they can offer an injured workers is, well, work itself? And even if physicians recognize work as good medicine, how do we further incentivize them to help set high return-to-work expectations for their patients? On a more fundamental level, how do we encourage physicians to accept workers' compensation patients

and learn all that is required of them under the workers' compensation law? Physicians who treat Tennessee workers' compensation patients are routinely required to make determinations regarding causation, work restrictions, maximum medical improvement, and permanent impairment. This is problematic because these same physicians seldom receive formal training on these issues in medical school.

The culmination of the task force's effort to address these questions is the Certified Physician Program, which trains and certifies physicians in the Tennessee workers' compensation system. The heart of the CPP is an online self-paced training course entitled "Best Practices for Treating and Evaluating Injured Workers." Comprised of thirteen training modules, the Best Practices course teaches physicians the fundamentals of workers' compensation, including returning patients back to work; setting RTW expectations; determining causation, MMI, permanent impairment, and work restrictions; navigating utilization review, treatment guidelines, and billing processes; and understanding the administrative court system. Physicians who take this course, pass a comprehensive test, and agree to treat workers' compensation patients are eligible to receive enhanced fees.

To be eligible, a physician must be a licensed Doctor of Medicine, Osteopathy, or Chiropractic, must be a board-certified or board-eligible, and must be certified in the AMA *Guides*®, 6th Edition, through a Bureau-approved vendor. CPP Physicians must also agree to have their names published on the Bureau's website so that employers and their insurance carriers can easily find them when they need to provide a medical panel. The Certified Physician Program essentially plays matchmaker, connecting employers and their injured workers with physicians who want to treat workers' compensation patients.

So, if you're a physician who wants to expand your workers' compensation practice, please consider becoming a CPP Physician. if you're an employer, case manager, or insurance carrier, try visiting the CPP Registry the next time you're having trouble finding a doctor for your Employee's Choice of Physician Medical Panel, Here you will not only find trained physicians who accept workers' compensation patients, but you will also find physicians who understand the value of a quicker return to work and have the know-how to make it happen. You can search for physicians by name, medical specialty, board certification, or location. The physician's contact

information, website, and NPI number are also readily available, making the process as user-friendly as possible.

We at the Bureau recognize that finding trained physicians who accept workers' compensation patients and know how to get them back to work is often a difficult task. With time, though, as more physicians are added to the CPP Registry every month, we think the process will become easier. If you know of physicians who might want to be on the CPP Registry, please send them a link to the program. We'll help them in any way we can.

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Kyle Jones is the Communications Coordinator for the Tennessee Bureau of Workers' Compensation. After receiving his bachelor's degree from MTSU, he began putting his skillset to work with Tennessee State Government. You will find Kyle's fingerprints on many digital and print publications from videos to brochures published by the Bureau. Kyle believes that visuals like motion graphics can help explain and break down complex concepts into something more digestible and bring awareness to the Bureau's multiple programs that are designed to help Tennesseans.

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Sarah Byrne is a staff attorney for the Court of Workers' Compensation Claims. She has a bachelors' degree in journalism from Belmont University and a masters' degree in English from Simmons College in Boston. After working in religious publishing and then state government, she earned a law degree from Nashville School of Law in 2010. She first joined the Bureau of Workers' Compensation in 2010 as a mediator.

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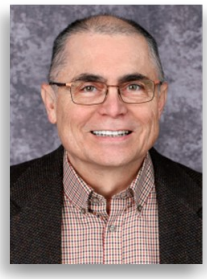
J. Wills Oglesby, MD

Dr. Oglesby was appointed Assistant Medical Director for the Bureau of Workers' Compensation in the Summer of 2021. He graduated from the University of Tennessee School of Medicine in Memphis in 1978. His orthopedic residency was served at the University of North Carolina at Chapel Hill. He completed his training as chief resident of that program in 1983. He practiced as an orthopedic surgeon at TOA for the next 38 years, until his retirement in 2021. Dr. Oglesby is certified by the American Board of Orthopaedic Surgery.

Robert B. Snyder, MD

Dr. Snyder was appointed Medical Director for the Bureau of Workers' Compensation in January, 2014 after 37 years of private practice in Orthopaedics. He graduated from Wayne State University School of Medicine in Detroit and completed two years of general surgery training at the University of Pittsburgh before he came to Nashville, completing his residency in Orthopaedics and Rehabilitation at Vanderbilt University.

James B. Talmage, MD



Dr. Talmage is a graduate of the Ohio State University for both undergraduate school (1968) and medical school (1972). His orthopedic surgery training was in the United States Army. He has been Board Certified in Orthopaedic Surgery since 1979 and also was Board Certified in Emergency Medicine from 1987 - 2017. Since 2005 he been an Adjunct Associate Professor in the Division of Occupational Medicine, Department of Family and Community Medicine at Meharry Medical College in Nashville. In 2014 he became Assistant Medical Director for the renamed Bureau of WC. He has been an author and co-editor of the AMA published books on Work Ability Assessment, and the second edition of the Causation book. He was a contributor to the AMA Impairment Guides, 6th Edition, and he has served as co-editor of the AMA Guides Newsletter since 1996.

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