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Grand Rounds:
Pre-Game Warm-Up - Modic Changes

James Demetrious, DC, DABCO
Diplomate, American Board of Chiropractic Orthopedists

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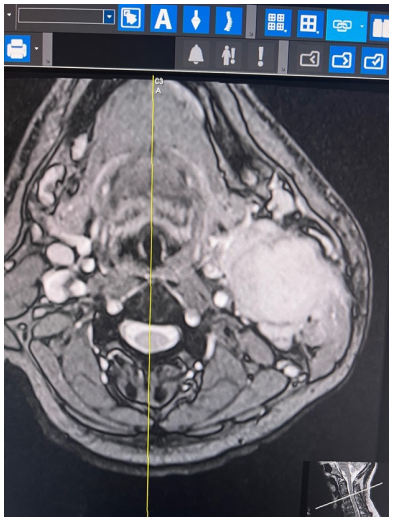
Pre-Game Warm-Ups



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Pre-Game Warm-Ups

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Pre-Game Warm-Ups

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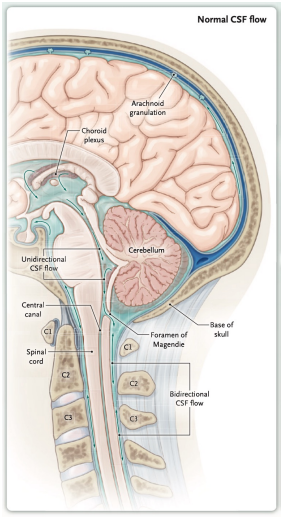
Pre-Game Warm-Ups



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Pre-Game Warm-Ups

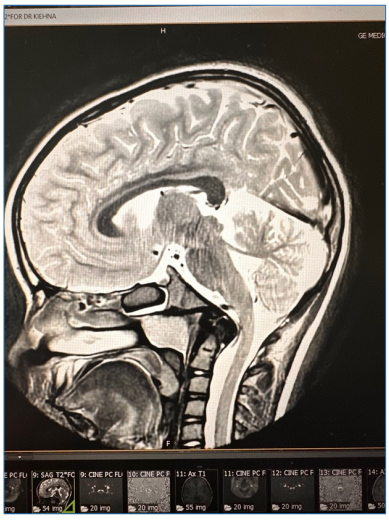

Image from Dr. Cameron Bearder

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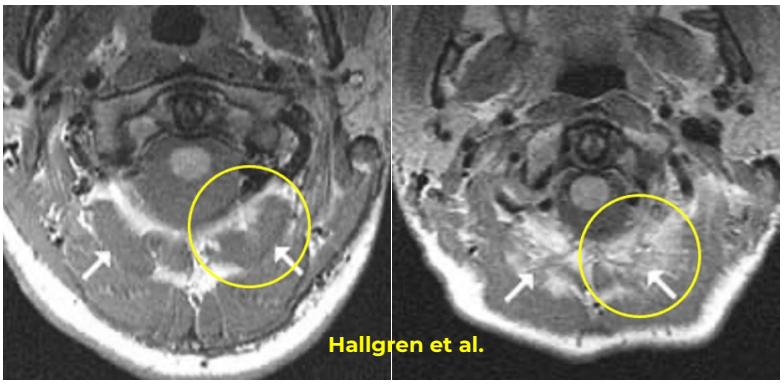
Pre-Game Warm-Ups



Injury > Segmental hypomobility (chiropractic subluxation) and/or posterior primary rami denervation > Atrophic change > Decreased spindle cell populations > Dysafferentation with impaired myodural bridge dural restraint > Dural intrusion and impaired craniospinal CSF outflow > Increased intracranial pressure > Progressive CNS degeneration.

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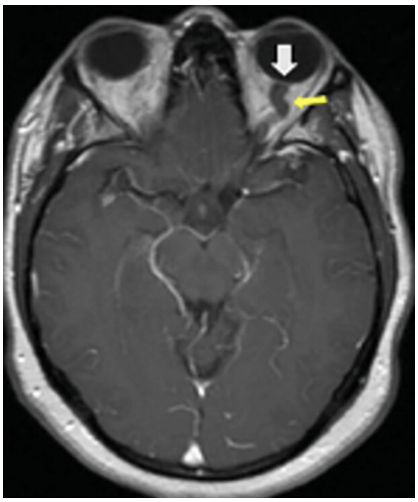
Pre-Game Warm-Ups

8

Pre-Game Warm-Ups



Axial T1-weighted post-GD demonstrating a flattening of the optic disc (white arrow) and a tortuosity of the optic nerve (yellow arrow).

Ali et al. Heliyon 9 (2023) e19756.

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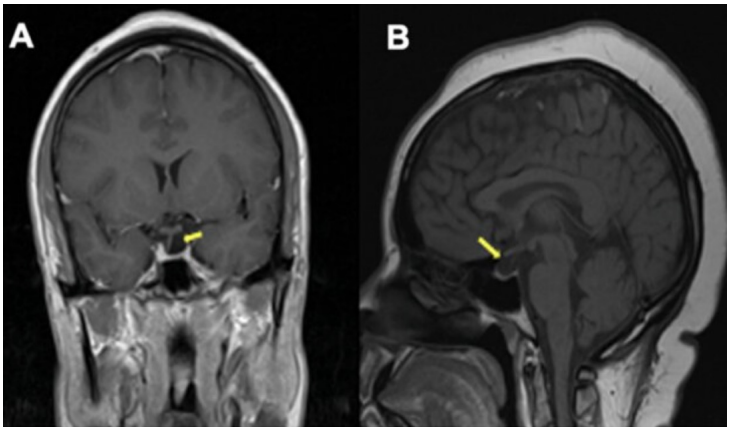
Pre-Game Warm-Ups



Coronal T1-weighted non-enhanced MRI demonstrating a displaced pituitary stalk and partially empty sella. B: Sagittal T1-weighted nonenhanced MRI demonstrating a partially empty sella (yellow arrow).

Ali et al. Heliyon 9 (2023) e19756.

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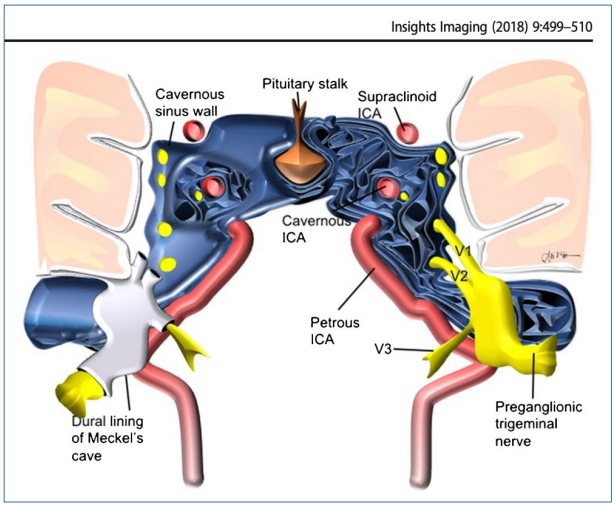
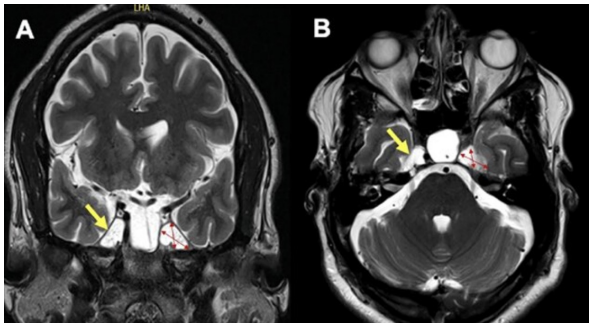
Pre-Game Warm-Ups





Symmetrically dilated Meckel cave

Ali et al. Heliyon 9 (2023) e19756.

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Grand Rounds: Modic Changes

James Demetrious, DC, DABCO

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James Demetrious, DC, DABCO

Clinician
- Active Practice >38 years
- Diplomate, American Board of Chiropractic Orthopedists
- Diplomate, International Academy of Neuromusculoskeletal Medicine

Publications
- Over 31 Peer-Reviewed chiropractic journal articles.
- Many Contributions to NCMIC Examiner and Podcast

Educator
- Post-Grad. > 24 years
- NCMIC Speakers' Bureau for>10 years
- Northeast College of Health Sciences
- **PostGradDC**

Editorial
- Editorial Reviewer for journals *Spine*, *Annals of Internal Medicine*, and *Clinical Anatomy*
- Former Managing Editor of *Journal of Chiropractic Orthopedists*

Honors
- Academy of Chiropractic Orthopedists Distinguished Service and Fellow Awards
- American College of Chiropractic Orthopedists Outstanding Achievement Award

Community
- Lower Cape Fear Hospice, Board Member
- Founder, Past-President Wilmington Autism Society
- Optimists Club – Safety Officer

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- Dr. Demetrious owns and operates **PostGradDC.com**, a company that offers advanced online post-graduate continuing education.
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Purpose…

What are identifiable, objective and measurable biomarkers and assessments that may offer insight into the chiropractic subluxation?

- **Modic changes?**
- Peri-articular edema?
- Paraspinal mm. atrophy?
- IVD Desiccation?
- CSF flow?
- HRV?
- fMRI BOLD imaging?
- DTI?
- SPECT?
- Saccades?
- ?

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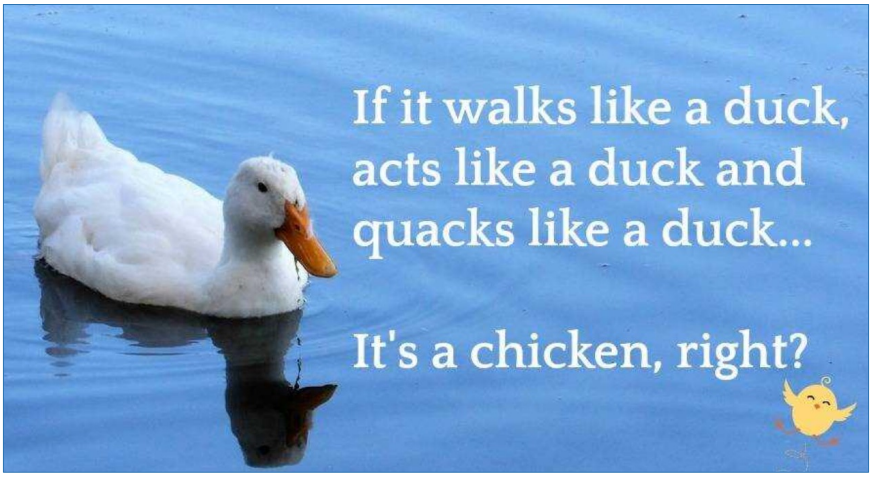
Meaningful Chiropractic Biomarker?



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Syllabus

- Modic
- Modic Changes 1-3
- Modic Pathophysiology
- Modic DDX
- Modic Symptomatic or Asymptomatic?
- Basivertebral nerve ablation (BVNA)?
- Chiropractic care?
- Viable biomoarker?

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Modic

Michael T. Modic, M.D.

Reactive vertebral body modifications associated with disc inflammation and degenerative disc disease, as seen on MR images.

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Modic Changes 1-3

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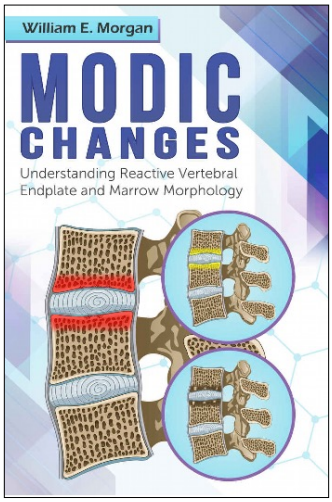
Modic Changes



Normal bone is spongy and uniform in appearance. The vertebral endplates are a thin dense margin of bone.	Normal
Bony edema has been connected with acute endplate or disc disruption. This edema is visible on MRI and is classified as Type 1 Modic change. It has been associated with pain and inflammation.	Type 1 Modic Changes
Type 2 Modic changes are indicative of yellow fatty infiltration into cortical bone following bony ischemia. Type 2 Modic changes may progress from type I Modic changes.	Type 2 Modic Changes
Type 3 changes are categorized by sclerotic changes of subchondral bone and thickening of the endplates. In time, thickened endplates will reduce nutrient and fluid movement into adjoining discs. This will contribute to reduced fluid content within the adjoining disc and subsequent degenerative disc disease.	Type 3 Modic Changes

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Modic Changes

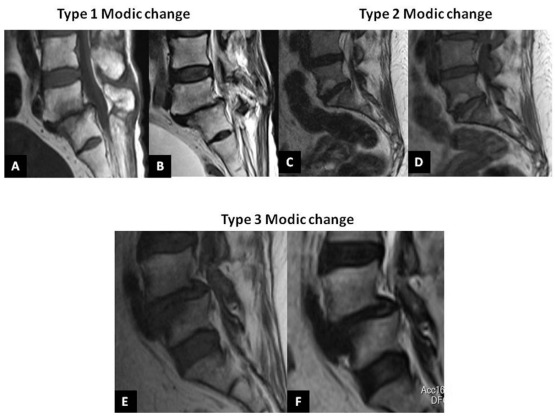

Fig. 2. Modic type I change: **A -** Mid sagittal MRI section (L5-S1) showing hypo-intense signal intensity on T1 weighted image (T1WI) and **B** – Para sagittal MRI (L5-S1) showing hyper-intense bone marrow lesion on T2WI. **C and D -** MC type II lesion (L5-S1) showing hyper-intense signal intensity on T1WI and T2WI parasagittal sections, respectively. **E and F -** Type III MC (at L4-L5) showing hypo-intense signal intensity on both T1WI and T2WI parasagittal sections, respectively. **G and H -** Type III MC (at L4-L5) showing hypo-intense signal intensity on both T1WI and T2WI parasagittal sections, respectively.

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Modic Changes

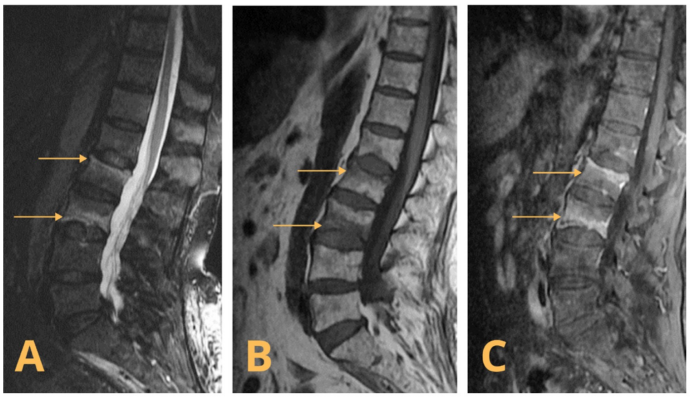

Fig. 3. Sagittal T2-weighted fat-suppressed (A), T1-weighted (B) and T1-weighed fat-suppressed contrast-enhanced (C) magnetic resonance (MR) images of the lumbar spine in a patient with low back pain. In the upper part of the L2 and the lower part of the L3 vertebral bodies, there are areas of hyperintensity on a T2-weighted image and hypointensity on a T1-weighted image, enhancing after contrast administration (arrows), which are compatible with Modic type 1 degenerative changes

Adv Clin Exp Med. 2024;33(1):91–98.

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Modic Changes

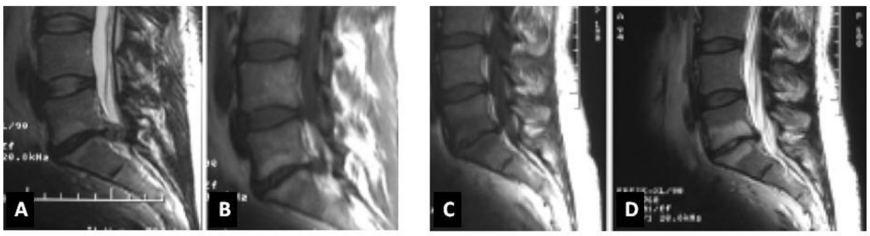

Fig. 3. MRI showing interval change of Modic lesion at L5-S1 over a period of 9 months. **A and B** – T2-and T1WI showing parasagittal sections of a typical Modic type 2 lesion. **C and D** – Mid sagittal sections of T1-and T2WI showing evolution of the same lesions to a larger sized Modic type 1 lesion.

V.K. Viswanathan et al. / Journal of Clinical Orthopaedics and Trauma 11 (2020) 761e769.

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Case Presentation

THE ACADEMY OF CHIROPRACTIC ORTHOPEDISTS

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Editor-In-Chief

e-Journal
Quarterly Journal of ACO – December 2006 –

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Case Presentation

PREVALENCE OF MODIC DEGENERATIVE MARROW CHANGES IN THE CERVICAL SPINE

Cynthia K. Peterson, RN, DC, M Med Ed,[a] B. Kim Humphreys, DC, PhD,[b] and Tania C. Pringle, DC[c]

ABSTRACT

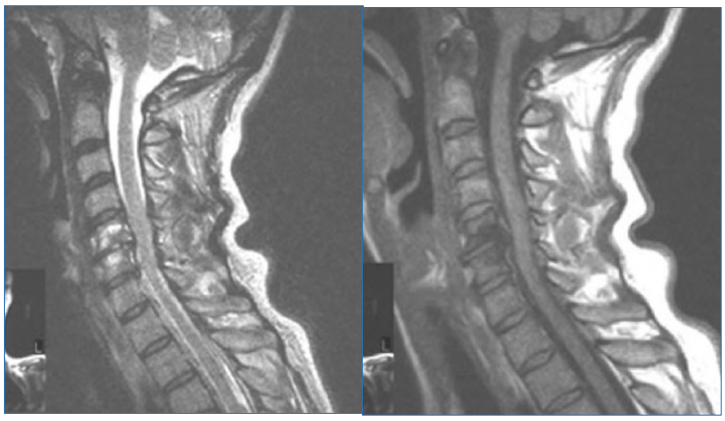
Objective: The prevalence and distribution of Modic degenerative marrow changes as seen on magnetic resonance imaging scans have been reported for the lumbar spine, and research suggests that type 1 Modic changes are linked to low back pain. The purpose of this study was to report on the prevalence, types, and distribution of the changes found for the cervical spine.

Methods: One hundred thirty-three cervical spine T_1-weighted and T_2-weighted sagittal magnetic resonance imaging scans were viewed retrospectively by two radiologists. Data were recorded for patient age, patient sex, and the presence or absence of Modic changes. If Modic changes were present, then the precise vertebral levels of these changes and the specific Modic type were recorded. Descriptive statistics were calculated for the prevalence of Modic changes overall, the prevalence of types 1, 2, and 3 changes, and the prevalence in male vs female patients. The frequency of these changes by spinal level was also determined.

Results: One hundred eighteen patients met the inclusion criteria. Modic changes were seen in 19 patients (16%), with 4 showing changes in more than one segmental level. The most common Modic change observed was type 1. Type 3 marrow changes were the second most common category to be noted. Only 3 patients had Modic type 2 marrow changes. The most common cervical spinal level to show Modic changes was C5-6.

Conclusions: Modic degenerative bone marrow changes are observed in the cervical spine, with the C5-6 level being the most commonly involved. Unlike in the lumbar spine in which Modic type 2 changes predominate, type 1 marrow changes were far more common in the cervical spine. Further studies should focus on the clinical relevance of these findings. (J Manipulative Physiol Ther 2007;30:5-10)

Key Indexing Terms: *Magnetic Resonance Imaging; Intervertebral Disk; Cervical Vertebrae; Bone Marrow*



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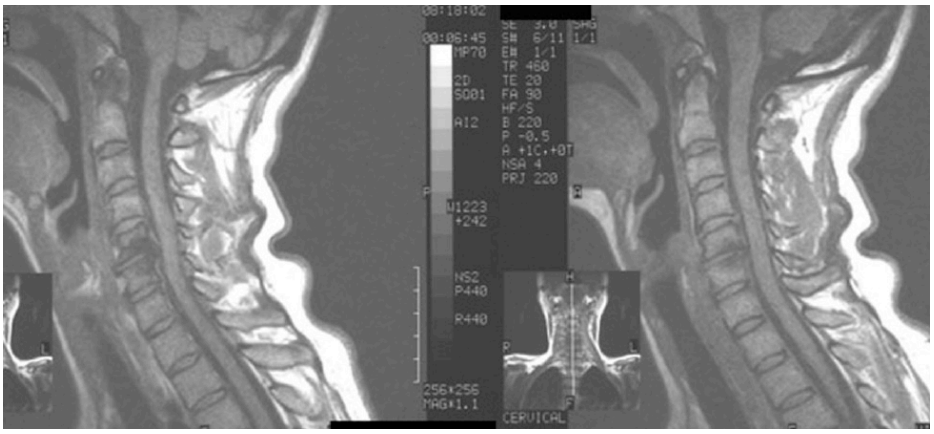
Case Presentation



Journal of Manipulative and Physiological Therapeutics
Volume 30, Number 1

Peterson et al
Prevalence of Modic Degenerative Marrow

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Modic Pathophysiology

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Modic Pathophysiology

Journal of Clinical Orthopaedics and Trauma 11 (2020) 761–769

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/jcot

Modic changes - An evidence-based, narrative review on its patho-physiology, clinical significance and role in chronic low back pain

Vibhu Krishnan Viswanathan [a], Ajoy Prasad Shetty [a, *], S. Rajasekaran [a, b]

[a] Department of Spine Surgery, Ganga Medical Center and Hospitals, Coimbatore, India
[b] Department of Orthopedics, Ganga Medical Center and Hospitals, Coimbatore, India

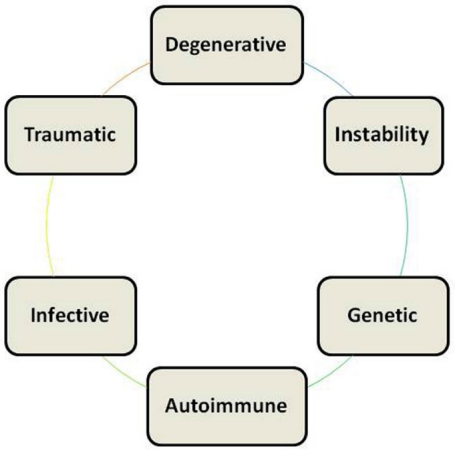

Fig. 4. Diagram showing multi-factorial etiology of Modic changes.

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Modic Pathophysiology

Received: 8 October 2022 | Revised: 4 November 2022 | Accepted: 2 December 2022
DOI: 10.1002/jsp2.1237

RESEARCH ARTICLE

JOR Spine

Modic type 2 changes are fibroinflammatory changes with complement system involvement adjacent to degenerated vertebral endplates

Irina Heggli[1] | Christoph J. Laux[2] | Tamara Mengis[1] | Agnieszka Karol[3] | Frédéric Cornaz[2] | Nick Herger[1] | Borbala Aradi-Vegh[1] | Jonas Widmer[2] | Marco D. Burkhard[2] | Nadja A. Farshad-Amacker[4] | Sibylle Pfammatter[5] | Witold E. Wolski[5,6] | Florian Brunner[7] | Oliver Distler[1] | Mazda Farshad[2] | Stefan Dudli[1]

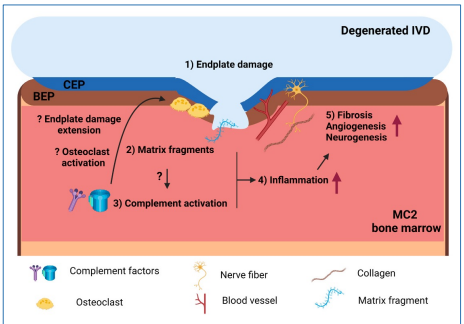

FIGURE 8 Schematic illustration of proposed fibroinflammatory pathomechanisms in MC2. (1) Endplates are damaged. (2) Endplate damage might result in increased drainage of matrix fragments like fibromodulin into the endplate-near bone marrow that (3) potentially activate the complement system. Complement activation might promote further endplate damage through osteoclast stimulation. (4) Inflammation promotes fibrosis, angiogenesis, and neurogenesis in the endplate region. Red arrows indicate upregulation. Created with Biorender.com

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Modic Differential

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Modic vs. Spondyloarthritides vs. Spondylodiscitis

Table 1 Inflammatory non-infectious disorders of the spine and infectious aetiology of pyogenic spondylodiscitis

Inflammatory non-infectious disorders of the spine	Infectious spondylodiscitis
Spondyloarthritides [axSpA]*	Pyogenic vertebral osteomyelitis
Synovitis–acne–pustulosis–hyperostosis–osteitis [SAPHO]	Gram-positive aerobic cocci
Modic changes type-1 syndrome	Staphylococcus aureus, Staphylococcus epidermidis, Haemophilus influenzae, Streptococcus pyogenes, Enterococcus spp., other streptococci
Acute symptomatic calcific discitis	Gram-negative aerobic bacilli
Spinal gout	Escherichia coli, Proteus spp., Pseudomonas aeruginosa, Klebsiella pneumoniae, Enterobacter spp., Salmonella
Destructive spondyloarthropathy of haemodialysis	Infectious granulomatous diseases
	Tuberculous spondylodiscitis
	Brucella spondylodiscitis
	Fungal infection
	Candida spp., Aspergillus spp., Cryptococcus, Coccidioides immitis, Blastomyces dermatitidis
	Parasitic spinal infections
	Taenia solium, Schistosoma japonicum, S. mansoni, S. haematobium, Toxoplasma gondii, Echinococcus granulosus

*axSpA comprise ankylosing spondylitis (AS), reactive arthritis, arthritis/spondylitis in inflammatory bowel diseases (IBD), and psoriatic arthritis with axial involvement

La radiologia medica (2021) 126:843–859.

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Modic vs. Spondylodiscitis

La radiologia medica (2021) 126:843–859
https://doi.org/10.1007/s11547-021-01347-7

MAGNETIC RESONANCE IMAGING

Differentiation between infectious spondylodiscitis versus inflammatory or degenerative spinal changes: How can magnetic resonance imaging help the clinician?

Fausto Salaffi[1] · Luca Ceccarelli[2,4] · Marina Carotti[3] · Marco Di Carlo[1] · Gabriele Polonara[3] · Giancarlo Facchini[4] · Rita Golfieri[2] · Andrea Giovagnoni[3]

Received: 22 August 2020 / Accepted: 14 March 2021 / Published online: 2 April 2021

Table 2 Clinical and MRI features to differentiate tubercular from pyogenic infections (modified from: Frel et al. [95])

	Pyogenic spondylitis	Tuberculous spondylitis
Patient characteristics and clinical symptoms		
Age	Relatively old	Relatively young
Duration to diagnosis	Relatively short symptom to diagnosis interval	Relatively long symptom to diagnosis interval
History	Recent distant bacterial infection or previous spinal surgery	History of TBC infection or current extraspinal manifestations
Onset	Acute or subacute	Subacute
Fever	More frequent associated high fever, acute sepsis	Intermitted fever
ESR, CRP, WCC	Markedly increased	Mild increased
MRI features		
Involvement of vertebral bodies	Involvement ≤ 2 vertebral bodies	Multiple body involvement
Severity of destruction of vertebral bodies	Infrequent and mild to moderate	Frequent and more severe
Disc destruction	Severe to complete disc destruction	Normal to mild disc destruction
Loss of cortical definition	Absent	Present
Areas of paraspinal enhancement	Poorly demarcated contrast	Well-demarcated contrast
Vertebral signal in T2 images	Hyperintense/homogeneous	Heterogeneous
Vertebral enhancement	Diffuse/homogeneous	Focal/heterogeneous
Paraspinal abscess	39–40% of cases	75% of cases
Epidural abscess	11–15% of cases	56–60% of cases
Abscess wall	Thick and irregular	Thin and smooth
Meningeal enhancement at the affected vertebral level	28–30% of cases	> 75% of cases
Subligamentous spread to 3 or more vertebral bodies	Absent	Present
Spinal deformity	Absent	Present
Thoracic spine involvement	Absent	Present

MRI magnetic resonance imaging, *ESR* erythrocyte sedimentation rate, *CRP* C-reactive protein, *WCC* white cell count

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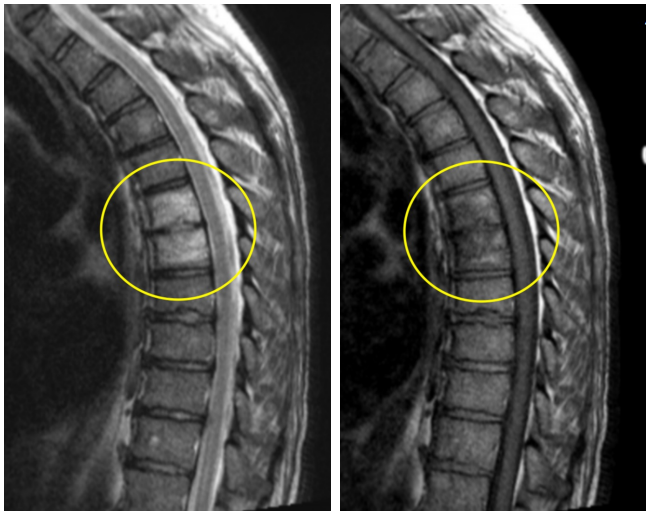
Instructive Case



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Modic Symptomatic or Asymptomatic

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Modic Symptomatic or Asymptomatic

ORIGINAL RESEARCH
SPINE

MRI Findings of Disc Degeneration are More Prevalent in Adults with Low Back Pain than in Asymptomatic Controls: A Systematic Review and Meta-Analysis

W. Brinjikji, F.E. Diehn, J.G. Jarvik, C.M. Carr, D.F. Kallmes, M.H. Murad, and P.H. Luetmer

Outcomes

Outcome	No. of Studies	OR (95% CI)	Prevalence Asymptomatic	Prevalence Symptomatic	*P* Value[a]	I^2 (%)
Annular fissure	6	1.79 (0.97–3.31)	11.3% (9.0%–14.2%)	20.1% (17.7%–22.8%)	.06	59
High-intensity zone	4	2.10 (0.73–6.02)	9.5% (6.7%–13.4%)	10.4% (8.0%–13.4%)	.17	72
Central spinal canal stenosis	2	20.58 (0.05–798.77)	14.0% (10.4%–18.6%)	59.5% (54.9%–63.9%)	.32	94
Disc bulge	3	7.54 (1.28–44.56)	5.9% (3.8%–8.9%)	43.2% (38.2%–48.2%)	.03	90
Disc degeneration	12	2.24 (1.21–4.15)	34.4% (31.5%–37.5%)	57.4% (54.8%–59.8%)	.01	89
Disc extrusion	4	4.38 (1.98–9.68)	1.8% (0.1%–3.7%)	7.1% (5.4%–9.4%)	<.01	0
Disc protrusion	9	2.65 (1.52–4.62)	19.1% (16.5%–22.3%)	42.2% (39.3%–45.1%)	.00	62
Modic changes	5	1.62 (0.48–5.41)	12.1% (9.6%–15.2%)	23.2% (21.7%–27.3%)	.43	65
Modic 1 changes	2	4.01 (1.10–14.55)	3.2% (0.7%–9.4%)	6.7% (4.2%–10.4%)	.04	0
Spondylolisthesis	4	1.59 (0.78–3.24)	3.2% (1.8%–5.8%)	6.2% (4.4%–8.7%)	.20	0
Spondylolysis	2	5.06 (1.65–15.53)	1.8% (0.0%–5.3%)	9.4% (6.6%–12.4%)	<.01	0

[a] *P* values are computed from the meta-analysis of ORs. Prevalence data are provided for reference but are not meant for statistical comparison.

Brinjikji Dec 2015 www.ajnr.org

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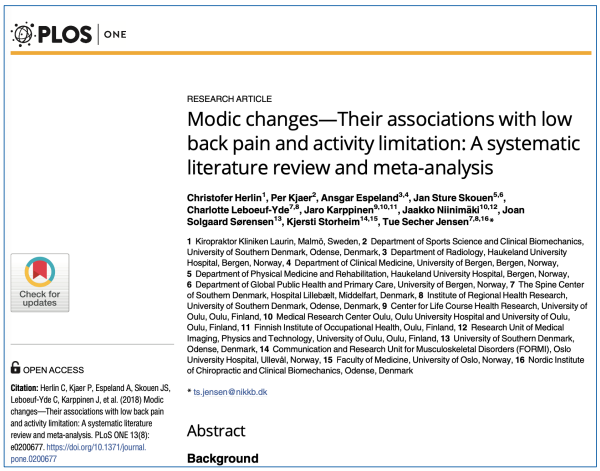
Modic Symptomatic or Asymptomatic



PLOS ONE

RESEARCH ARTICLE

Modic changes—Their associations with low back pain and activity limitation: A systematic literature review and meta-analysis

Christofer Herlin[1], Per Kjaer[2], Ansgar Espeland[3,4], Jan Sture Skouen[5,6], Charlotte Leboeuf-Yde[7,8], Jaro Karppinen[9,10,11], Jaakko Niinimäki[10,12], Joan Solgaard Sørensen[13], Kjersti Storheim[14,15], Tue Secher Jensen[7,8,16]*

1 Kiropraktor Kliniken Laurin, Malmö, Sweden, 2 Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, 3 Department of Radiology, Haukeland University Hospital, Bergen, Norway, 4 Department of Clinical Medicine, University of Bergen, Bergen, Norway, 5 Department of Physical Medicine and Rehabilitation, Haukeland University Hospital, Bergen, Norway, 6 Department of Global Public Health and Primary Care, University of Bergen, Norway, 7 The Spine Center of Southern Denmark, Hospital Lillebælt, Middelfart, Denmark, 8 Institute of Regional Health Research, University of Southern Denmark, Odense, Denmark, 9 Center for Life Course Health Research, University of Oulu, Oulu, Finland, 10 Medical Research Center Oulu, Oulu University Hospital and University of Oulu, Oulu, Finland, 11 Finnish Institute of Occupational Health, Oulu, Finland, 12 Research Unit of Medical Imaging, Physics and Technology, University of Oulu, Oulu, Finland, 13 University of Southern Denmark, Odense, Denmark, 14 Communication and Research Unit for Musculoskeletal Disorders (FORMI), Oslo University Hospital, Ullevål, Norway, 15 Faculty of Medicine, University of Oslo, Norway, 16 Nordic Institute of Chiropractic and Clinical Biomechanics, Odense, Denmark

* ts.jensen@nikkb.dk

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OPEN ACCESS

Citation: Herlin C, Kjaer P, Espeland A, Skouen JS, Leboeuf-Yde C, Karppinen J, et al. (2018) Modic changes—Their associations with low back pain and activity limitation: A systematic literature review and meta-analysis. PLoS ONE 13(8): e0200677. https://doi.org/10.1371/journal.pone.0200677

Abstract

Background

- The results from this comprehensive systematic review indicate that the associations between MCs and LBP-related outcomes are inconsistent.
- The high risk of bias and the heterogeneity in terms of study samples, clinical outcomes and prevalence estimates of MCs and LBP may explain these findings.

Modic Symptomatic or Asymptomatic

Czaplewski *et al.*
Journal of Orthopaedic Surgery and Research (2023) 18:351
https://doi.org/10.1186/s13018-023-03839-w

Journal of Orthopaedic Surgery and Research

REVIEW Open Access

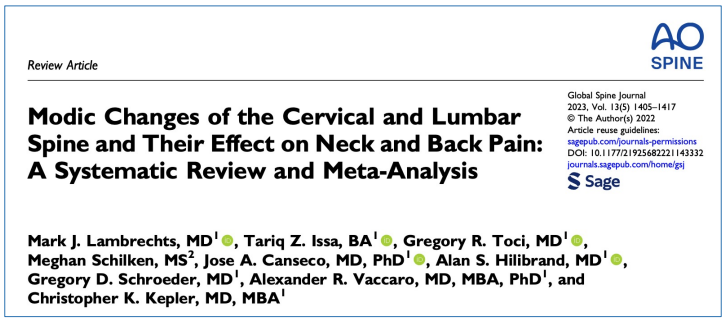
Check for updates

Modic changes as seen on MRI are associated with nonspecific chronic lower back pain and disability

Lloyd G. Czaplewski[1*], Otis Rimmer[2], Duncan McHale[3] and Mark Laslett[4]

- We conclude that Modic changes type 1 and type 2 can be painful, and that the confusing literature is due at least in part to heterogeneous study selection, inclusion of patients with a diversity of syndromes and inappropriate reporting.

Modic Symptomatic or Asymptomatic



Review Article

AO SPINE

Modic Changes of the Cervical and Lumbar Spine and Their Effect on Neck and Back Pain: A Systematic Review and Meta-Analysis

Global Spine Journal
2023, Vol. 13(5) 1405–1417
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Mark J. Lambrechts, MD[1], Tariq Z. Issa, BA[1], Gregory R. Toci, MD[1], Meghan Schilken, MS[2], Jose A. Canseco, MD, PhD[1], Alan S. Hilibrand, MD[1], Gregory D. Schroeder, MD[1], Alexander R. Vaccaro, MD, MBA, PhD[1], and Christopher K. Kepler, MD, MBA[1]

- Modic changes in the lumbar spine are not associated with clinically significant axial low back pain severity or patient disability.
- Similar to the lumbar spine, Modic changes in the cervical spine are not associated with symptom severity, but they are associated with pain duration.

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Modic Basivertebral Nerve Ablation (BVNA)

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BVNA

Journal of Pain Research — Dovepress
open access to scientific and medical research

Open Access Full Text Article — REVIEW

Developments in Minimally Invasive Surgical Options for Vertebral Pain: Basivertebral Nerve Ablation – A Narrative Review

- The current literature demonstrates consistent positive outcomes across multiple studies that basivertebral nerve ablation is effective in reducing pain and disability in appropriately selected patients with chronic axial low back pain of vertebrogenic nature at a minimum of three months follow-up, but perhaps much longer.

Journal of Pain Research 2021:14 1887–1907.

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BVNA

Tieppo Francio et al — Dovepress

Figure 4 Sagittal (**A**) and axial views (**B**) of the sinuvertebral nerve as it enters the vertebral body through the basivertebral foramen, becoming the basivertebral nerve.
Note: Reproduced from Kim HS, Adsul N, Yudoyono F, et al. Transforaminal Epiduroscopic Basivertebral Nerve Laser Ablation for Chronic Low Back Pain Associated with Modic Changes: A Preliminary Open-Label Study. *Pain Res Manag*. 2018;2018:6857983.[14]

Journal of Pain Research 2021:14 1887–1907.

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BVNA

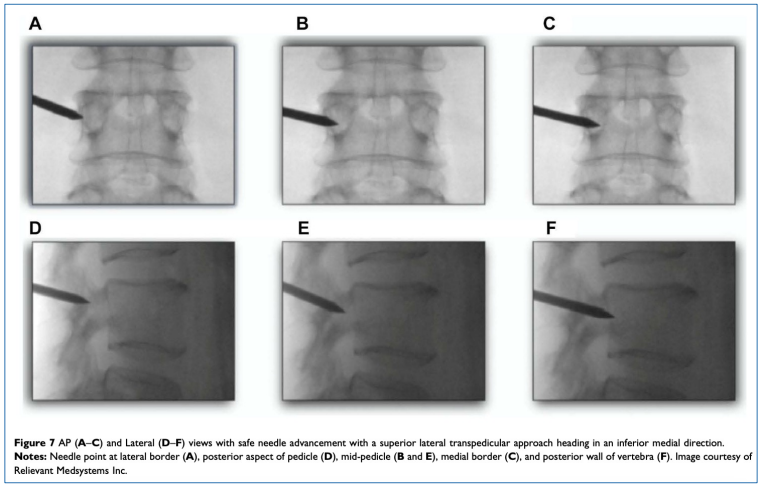

Figure 7 AP (**A**–**C**) and Lateral (**D**–**F**) views with safe needle advancement with a superior lateral transpedicular approach heading in an inferior medial direction. **Notes:** Needle point at lateral border (**A**), posterior aspect of pedicle (**D**), mid-pedicle (**B** and **E**), medial border (**C**), and posterior wall of vertebra (**F**). Image courtesy of Relievant Medsystems Inc.

Journal of Pain Research 2021:14 1887–1907.

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BVNA

Czaplewski *et al.*
Journal of Orthopaedic Surgery and Research (2023) 18:351
https://doi.org/10.1186/s13018-023-03839-w

Journal of Orthopaedic Surgery and Research

REVIEW Open Access

Modic changes as seen on MRI are associated with nonspecific chronic lower back pain and disability

Lloyd G. Czaplewski[1*], Otis Rimmer[2], Duncan McHale[3] and Mark Laslett[4]

- Basivertebral nerve ablation may be effective, but it is an invasive, irreversible procedure.

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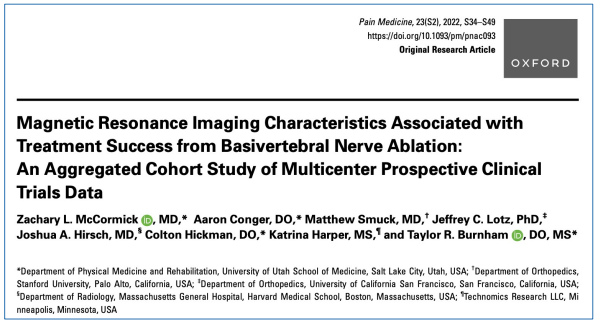
BVNA



Pain Medicine, 23(S2), 2022, S34–S49
https://doi.org/10.1093/pm/pnac093
Original Research Article

OXFORD

Magnetic Resonance Imaging Characteristics Associated with Treatment Success from Basivertebral Nerve Ablation: An Aggregated Cohort Study of Multicenter Prospective Clinical Trials Data

Zachary L. McCormick, MD,* Aaron Conger, DO,* Matthew Smuck, MD,† Jeffrey C. Lotz, PhD,‡ Joshua A. Hirsch, MD,§ Colton Hickman, DO,* Katrina Harper, MS,¶ and Taylor R. Burnham, DO, MS*

*Department of Physical Medicine and Rehabilitation, University of Utah School of Medicine, Salt Lake City, Utah, USA; †Department of Orthopedics, Stanford University, Palo Alto, California, USA; ‡Department of Orthopedics, University of California San Francisco, San Francisco, California, USA; §Department of Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts, USA; ¶Technomics Research LLC, Minneapolis, Minnesota, USA

- In the setting of presumed vertebrogenic low back pain with Modic changes, the presence of almost any degeneative finding of the anterior and posterior column was not associated with a clinically important impact on treatment success after BVN RFA.

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Modic and Chiropractic Care

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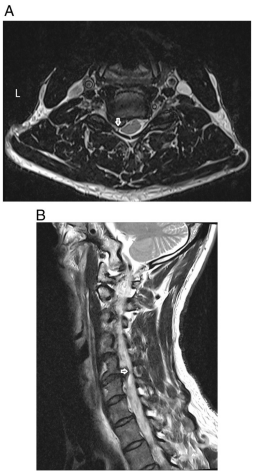
Modic and Chiropractic Care

Relationship of Modic Changes, Disk Herniation Morphology, and Axial Location to Outcomes in Symptomatic Cervical Disk Herniation Patients Treated With High-Velocity, Low-Amplitude Spinal Manipulation: A Prospective Study

Michel Kressig, MChiroMed,[ab] Cynthia K. Peterson, RN, DC, MMedEd,[b] Kyle McChurch, DC,[a] Christof Schmid, DC,[c] Serafin Leemann, DC,[c] Bernard Anklin, DC,[c] and B. Kim Humphreys, DC, PhD[b]

ABSTRACT

Objective: The purpose of this study was to evaluate whether cervical disk herniation (CDH) location, morphology, or Modic changes (MCs) are related to treatment outcomes.
Methods: Magnetic resonance imaging (MRI) and outcome data from 44 patients with CDH treated with spinal manipulative therapy were evaluated. MRI scans were assessed for CDH axial location, morphology, and MCs. Pain (0-10 for neck and arm) and Neck Disability Index (NDI) data were collected at baseline; 2 weeks; 1, 3, and 6 months; and 1 year. The Patient's Global Impression of Change data were collected at all time points and dichotomized into "improved," yes or no. Fischer's exact test compared the proportion improved with MRI abnormalities. Numerical rating scale and NDI scores were compared with MRI abnormalities at baseline and change scores at all time points using the *t* test or Mann-Whitney *U* test.
Results: Patients who were Modic positive had higher baseline NDI scores ($P = .02$); 77.8% of patients who were Modic positive and 53.3% of patients who were Modic negative reported improvement at 2 weeks ($P = .21$). Fifty percent of Modic I and 83.3% of Modic II patients were improved at 2 weeks ($P = .07$). At 3 months and 1 year, all patients with MCs were improved. Patients who were Modic positive had higher NRS and NDI change scores. Patients with central herniations were more likely to improve only at the 2-week time point ($P = .022$).
Conclusions: Although patients who were Modic positive had higher baseline NDI scores, the proportion of these patients improved was higher for all time points up to 6 months. Patients with Modic I changes did worse than patients with Modic II changes at only 2 weeks. (J Manipulative Physiol Ther 2016;39:565-575)
Key Indexing Terms: *Cervical Spine; Disk Herniation; Chiropractic Manipulation; MRI; Outcomes; Modic Changes*



J Manipulative Physiol Ther 2016;39:565-575

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Modic and Chiropractic Care

COMPARISON OF OUTCOMES IN MRI CONFIRMED LUMBAR DISC HERNIATION PATIENTS WITH AND WITHOUT MODIC CHANGES TREATED WITH HIGH VELOCITY, LOW AMPLITUDE SPINAL MANIPULATION

Michelé Annen, B.Med.,[a] Cynthia Peterson, DC, M.Med.Ed.,[b] Serafin Leemann, DC,[c] Christof Schmid, DC,[c] Bernard Anklin, DC,[c] and B. Kim Humphreys, DC, PhD[d]

- Modic positive patients reported higher levels of clinically relevant improvement 2 weeks, 3 and 6 months compared to Modic negative patients. However, at 1 year Modic I patients were significantly less likely to report 'improvement', suggesting they may be prone to relapse.

J Manipulative Physiol Ther 2016;39:200-209.

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Questions?

- Any clinical experience with Modic changes in your office?
- Any chiropractic approaches that were beneficial or provocative?
- Any thoughts about causal relation to injury?
- Do you think that Modic changes are a possible biomarker to evaluate the efficacy of chiropractic care?
- Thoughts?

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Upcoming Grand Rounds Schedule

The First Tuesday of the Month at 8PM EST

Upcoming Rounds

- **August 6, 2024 – IVD Trauma and Annular Tears**
- **Additional live qualifying CAD classes will be available at the end of the year.**

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Thank you!

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