Are Modic Changes Representative of Primary Endplate Infections?

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Why is this topic Important

- Modic changes are commonly observed in patients with chronic low back pain, yet their exact etiology remains poorly understood.
- Increasing evidence links Cutibacterium acnes and other low-virulence bacteria to Modic changes, suggesting that these MRI findings may represent a form of subclinical infection rather than purely mechanical degeneration.
- If Modic changes represent “primary endplatitis,” this could prompt a paradigm shift in how spinal degenerative disease is diagnosed and managed—potentially including targeted antimicrobial therapy.
- The inconsistent findings across studies and debates about contamination, causation, and clinical relevance highlight the need for a systematic synthesis of available evidence to guide future research and treatment protocols.

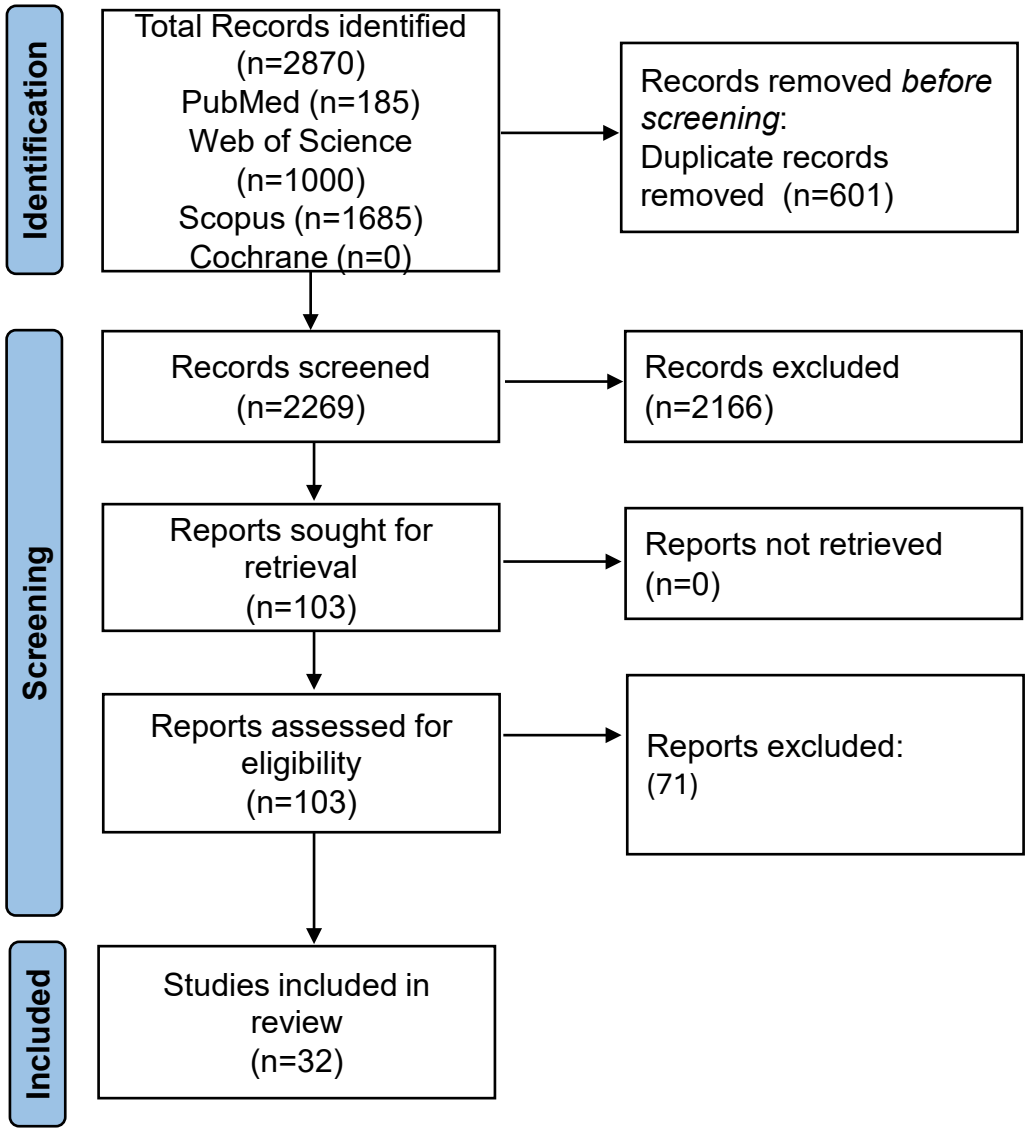
Literature Review/ Process

PubMed

Clarivate Web of Science™

Cochrane Library

Scopus



Findings from Literature

Study	Key Findings	Strengths	Limitations
Stirling et al. [7]	Identified Propionibacterium acnes in disc samples from patients with sciatica, suggesting a bacterial association.	Clear bacterial association.	Small sample size (n=36).
Fritzell et al. [8]	Found bacterial DNA in degenerated discs without clinical infection signs, indicating detection without establishing causation.	Detection without clinical signs.	No causation established.
Agarwal et al. [9]	Conducted bacterial cultures from intervertebral discs, indicating a potential infectious role.	Direct bacterial culture evidence.	Limited sample size (n=25).
Chen et al. [10]	Reported low-virulence bacterial infections in cervical discs linked to degeneration, based on a prospective design focusing on cervical discs.	Prospective design.	Focus on cervical discs only.

Findings from Literature

Study	Key Findings	Strengths	Limitations
Salehpour et al. [11]	Identified C. acnes in herniated discs, emphasizing antibiotic susceptibility, but did not establish causation.	Antibiotic relevance highlighted.	Does not establish causation.
Georgy et al. [12]	Detected C. acnes in 54% of MC1 cervical samples compared to 20% non-MC1, focusing on cervical samples.	Focus on cervical samples.	Limited to cervical samples.
Aghazadeh et al. [13]	Found 80% of MC samples positive for C. acnes; only 14% non-MC positive, indicating a strong bacterial association but focusing on one bacterium.	Strong bacterial association.	Focus on one bacterium.
Yuan et al. [14]	Reported 80% of cultures from MC participants positive for C. acnes, with a high association rate but a small sample size.	High association rate with MC.	Small sample size (n=20).

Findings from Literature

Study	Key Findings	Strengths	Limitations
Tang et al. [15]	Found 33% of herniated disc samples positive for bacteria, with 60% having MC, providing longitudinal evidence but with possible PCR contamination.	Longitudinal evidence of bacterial role.	Possible contamination in PCR.
Najafi et al. [17]	Reported 62.2% of lumbar disc biopsies positive for P. acnes via PCR, providing molecular evidence without establishing direct causation.	Molecular evidence with PCR.	No direct causation established.
Albert et al. [3]	Found 46% of microbial cultures positive, linking anaerobic bacteria to MC development, based on a randomized controlled trial with methodological concerns.	Randomized controlled trial.	Methodological concerns.

Findings from Literature

Study	Key Findings	Strengths	Limitations
Ahmed-Yahia et al. [18]	Found no consistent association between C. acnes and MC, suggesting contamination, addressing contamination but failing to confirm causation.	Addresses contamination.	Fails to confirm causation.
Rigal et al. [19]	Found no association between Modic 1 changes and low-grade infection, challenging the infectious hypothesis but failing to confirm causation.	Challenges infectious hypothesis.	Fails to confirm causation.
Fritzell et al. [20]	Found no clear bacterial link between Modic changes and degenerative pathology, based on a multicenter comparison with confounding factors not fully addressed.	Multicenter comparison.	Confounding factors not fully addressed.

Question:

Are Modic Changes Representative of Primary Endplate Infections?

Response:

- **While a definitive causal relationship has yet to be fully established, current literature increasingly suggest the hypothesis that subclinical infection may contribute to the development of modic changes.**

❖Vote:

Agree – 66%, Disagree – 10%, Abstain – 24%
(Moderate Consensus)