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Recent data from radiofrequency denervation trials further emphasise that treating nociception is not the same as treating pain

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MKB and BMW wrote the first draft of the manuscript. GLM and JHM contributed importantly to the manuscript for intellectual content and style. All authors read and approved the final version of the manuscript.

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Back pain, clinical trials, radiofrequency denervation, interventional pain medicine, evidence-based medicine

*Summary / Abstract*

Chronic low back pain is a condition that current health care provision is failing and we suggest that recent evidence from the interventional pain medicine field points to what these failings are.

Radiofrequency denervation is performed on the presumption that denervation of a peripheral structure will eradicate or significantly reduce pain and improve function. The results of six moderately sized and well conducted clinical trials that demonstrate no efficacy and no real-world effectiveness for denervation procedures are a stark illustration of how flawed this approach is. We suggest that these results represent a line-in-the-sand for back pain research and management. This is a clear signal to finally abandon research agendas and management paradigms that focus primarily on nociception and instead, truly embrace the biopsychosocial model of pain.

Persistent low back pain (LBP) is the leading cause of disability globally, for which ever larger increases in health care expenditure have not made a difference in terms of prevalence or burden [1]. It is unquestionable that current health care is failing individuals with chronic LBP and we contend that recent evidence from the interventional pain medicine field points clearly to what these failings are.

#### *Radiofrequency denervation does not work for LBP*

There has been remarkable growth in the use of interventional pain medicine procedures to manage chronic LBP, particularly radiofrequency denervation [2]. In this approach, various diagnostic practices are used to identify a peripheral ‘nociceptive driver’ with the presumption that denervation of the peripheral structure will eradicate or significantly reduce pain and improve function [3]. The growth in the use of radiofrequency denervation is surprising given that, until recently, the evidence base was equivocal [2] and based on conflicting results from a limited number of small trials.

A welcome addition to the field was recently provided by Juch et al. [2], who reported on the outcome of three large clinical trials of neuroablative procedures in chronic LBP. All three trials compared guideline based physical rehabilitation to rehabilitation with the addition of radiofrequency denervation. Despite employing a methodology that is likely to inflate the effect of the intervention, the results are markedly negative, with no clinically worthwhile benefit for pain or function demonstrated with facet denervation, sacroiliac joint denervation or a combination of denervation procedures. Perhaps more striking is that average pain intensity varied little across the 12-month follow up in all three studies and rarely did more than 50% of participants achieve greater than 30% reduction in pain intensity.

The studies demonstrate that a large group of participants with chronic LBP who were: 1) selected because their treating physician suspected that their problem originated from a peripheral tissue source; 2) positive on a diagnostic block (albeit a single block) and 3) included only if there were no apparent psychological co-morbidities or work-related issues, obtained almost no benefit from

denervation of the identified peripheral tissue. These findings are in accordance with a recent, more methodologically rigorous series of studies that found no difference between true and sham interventions for denervation of the facet joints [4], the lumbar disc [5] or the sacroiliac joints [6].

*How do the findings impact our understanding of LBP?*

While we anticipate commentary around the recent findings will focus on the diagnostic process, we urge those in the chronic LBP field to consider how remarkable the results are for our theoretical understanding of the problem. Despite decades of research illustrating the equivocal link between nociception and pain [3], as well as the disparity between reported pain and disability [3], many in the back pain community continue to see the management of nociception as the primary focus in the management of LBP. The results of six moderately sized and well conducted clinical trials that demonstrate no efficacy [4–6] and no real world effectiveness [2] for denervation procedures are a stark illustration of how flawed this approach is. This series of studies utilised a version of what is probably the best clinical tool available for identifying a peripheral nociceptive driver; certainly better than a careful interview, physical examination or any type of structural imaging. This diagnostic process was coupled with what is likely the best clinical tool we have for blocking peripheral nociceptive input, one that is better than any medication, biologic, manual technique, electrophysical modality or exercise in current use. Crucially, this approach offered little benefit to people with chronic LBP.

*How do the findings impact the management of LBP?*

We suggest that the results represent a line-in-the-sand moment for LBP research and management. This is a clear signal to finally abandon research agendas and management paradigms that equate pain to nociception, and to embrace the perspective that LBP emerges from multiple interacting domains [7]. In this contemporary biopsychosocial perspective, the ‘bio’ is regarded to be more than just structural pathology and encompasses changes across a range of body systems, including the central nervous system [8,9]. The ‘psychosocial’ captures the beliefs, knowledge, attitudes, thoughts and

meaning of one's pain, one's mood and the sociological context; as these are associated with pain and disability [9]. Rehabilitation needs to make sense of these factors for the individual [10] and employ a person-centred reactivation process that seeks to decrease the perceived need for protection, build confidence and restore hope. Promising approaches could include, for example, reconceptualising the individuals' understanding of pain and disability, normalising the way the back is represented within the central nervous system and progressively improving the capacity of the body to cope with activities of daily living [8,11,12].

George Engel broadcast the fallibility of a model of care that addresses only tissue pathology [13] – surely it is time we actioned his recommendations and really embrace the biopsychosocial model of pain.

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