Reviewer's report

Title: Could low grade bacterial infection contribute to low back pain? A systematic review

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Reviewer: Peter P O'Sullivan

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Major compulsory revisions

Thank you for the opportunity to review this interesting paper.

It is well written and presented. As the authors argue, there is a strong case for this review given the huge media claims based on the Albert et al RCT, promoting antibiotics as the ‘new cure’ for chronic LBP. Hence the research question is well defined. The review is comprehensive and conducted in a rigorous manner and adheres to standards of reporting.

However, given the large media ‘attention’ I believe there are a number of areas of the manuscript that would benefit from further clarification. This would also help the readers to place this review in the perspective of the wider LBP population.

1. Modic changes are variable and are commonly classified as type 1, 2 and 3. These may present with or without a history of disc herniation. It is the type I modic changes that are shown to correlate best with LBP. To me this wasn’t clear throughout the paper and in the interpretation of the results - with the referral to ‘modic’ rather than defining and specifying the type (ie. importantly whether they are present in relation to disc herniation or not). While modic type was specified in Table 6 – the only study that reported a relationship between modic changes and bacteria was that of Albert [4] where ‘modic 1 was associated with disc herniation’. The other 2 studies Arndt [10] and Wedderkopp [18] did not find an association between modic changes type 1 and 2 and bacteria (people with disc degeneration / no clinical symptoms) – to me this fact was not highlighted or clearly discussed in the body of the paper. To me this provides preliminary evidence that ‘modic type 1 associated with disc herniation’ may hold a relationship with bacterial infection – but type 1 and 2 (not associated with herniation) does not hold a relationship - based on current evidence. To me this represents no evidence for the relationship between bacterial infection and modic when it is not associated with disc herniation. The only evidence linking bacterial infection to modic 1 associated with herniation is from the same research group – and this work clearly needs replication. The other surgical studies that identified bacteria (but not considering modic changes) were mainly for surgery linked to disc herniation. Presumably most of these people were seeking surgery for radicular pain and not back pain as is the case for
discectomy. Hence this is where I see the story lies and I think this needs to be spelt out clearly to the readers.

2. I think it would also be helpful for the reader to be clear as to the prevalence of type 1 Modic (13% in a clinical LBP population based on Keller Eur Spine J (2012) 21:418–424). Given that the prevalence of acute disc herniation is about 1-5% and not all of these people develop Modic 1 changes – ‘Modic type 1 associated with disc herniation’ as investigated in the Albert study is likely to represent a very small and highly select group of people. This is important to acknowledge from a public health perspective. Hence I felt concerned when I read the conclusions:

1. “This systematic review found moderate evidence to indicate low virulent bacteria have a role in low back pain and moderate evidence for a relationship between bacteria and Modic change.” To me this should read along the lines of: This systematic review found moderate evidence to indicate low virulent bacteria have a role in low back pain disorders associated with disc herniation (in people undergoing surgery?) and moderate evidence for a relationship between bacteria and Modic 1 change associated with disc herniation.

2. “Further work is needed to determine whether these low virulent organisms are a result of contamination or represent low grade infection of the lumbar spine which contributes to chronic low back pain.” In my mind this should be qualified to read …contributes to chronic low back pain disorders associated with type 1 Modic changes in people with a history of acute disc herniation (i.e. in a very small group of patients).

3. I also think it would be helpful for the readers to know that there is no evidence that Modic changes that present in the absence of disc herniation are associated with infection (this would reassure many concerned people in the community). Furthermore this is supported by prospective research has demonstrated that Modic 1 and 2 changes in the general LBP population are NOT predictive of patient reported pain and disability at 1 year follow-up (Keller Eur Spine J (2012) 21:418–424). These findings would not support the presence of an ‘bacterial infection’ in these patients and surely would form part of this debate. It may be that there were no ‘type 1 Modic’s associated with disc herniation’ in this cohort. if so - this would support that ‘Modic type 1 associated with disc herniation’ is a very small group from a clinical population perspective. While the Keller study did not consider the role of bacterial infection and hence was not included in the review – research such as this provides an important counter view for the reader in this controversial debate.

In my view these clarifications are needed within the paper – so the reader has a clear view as to the prevalence and therefore clinical significance of this very small group (Modic type 1 associated with disc herniation) in the context of the wider chronic LBP population. This prevents over extrapolation of the ‘bacteria’ and back pain story and the potential for pathologising the larger back pain population.

Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests