

# **Evaluation of Low Grade Bacterial Infection of the Intervertebral Disc**

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## **Abstract**

This thesis considers the novel concept that persistent low back pain in the setting of intervertebral disc herniation and specific signal changes on magnetic resonance imaging (MRI) may reflect a previously unrecognised low grade anaerobic bacterial infection, specifically with *Propionibacterium Acnes* (*P. Acnes*). A prolonged course of oral antibiotics has been proposed as an effective treatment strategy in patients with such an infection. This hypothesis has the potential to dramatically alter the approach to treatment of these patients in whom traditionally surgery may have been offered.

A comprehensive review of the literature was performed initially, showing a wide variation in the rate of bacterial growth from intervertebral discs sampled during open surgery. While many papers commented on their adherence to strict sterility procedures during collection of specimens, details on these procedures was scant and therefore comparison between findings was difficult.

The primary experiment in this project was the collection of intervertebral disc samples from patients undergoing open spinal surgery with a view to histopathological review, bacterial culture and polymerase chain reaction for *P. Acnes*. The results of these cultures were compared against pre-operative MRI findings, in particular the presence of Modic changes at the vertebral endplates corresponding to level of surgery. This study found no relationship between the presence of Modic changes and subsequent identification of bacteria in discs.

A secondary experiment was conducted to consider an extrapolation of this hypothesis. If infection was the source of ongoing pain, then without adequately addressing the primary pathology a poor outcome would be expected. It was therefore proposed that if low grade bacterial infection was the source of some patients' persistent pain, it should follow that

surgical outcomes would be poorer in this group than those without infection. Presence of Modic changes at operative levels was used as a surrogate marker for potential bacterial infection and patients were contacted approximately two years after their procedure. No significant difference was found in outcomes between the two groups.

The findings of these experiments call into question the claims made about the ability of a clinician to successfully treat chronic low back pain with oral antibiotics. It is proposed that contamination of the surgical field is the source of bacterial growth in specimens excised for culture. It is difficult to definitively refute the hypothesis that clinically important – but low grade – infection contributes to pain in some patients. Without strong evidence of either the existence of such infections, or a reliable non-invasive method of diagnosis, the proposed antibiotic treatment strategy cannot be supported.

## **Author Declaration**

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree. I give consent to this copy of my thesis when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968. The author acknowledges that copyright of published works contained within this thesis resides with the copyright holder(s) of those works. I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library Search and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

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