Diagnostic blocks of the cervical and lumbar medial branches: an evidence based review

October 2015
Important note

- The purpose of this report is to outline and interpret the best current evidence for the performance of diagnostic cervical and lumbar medial branch blocks.

- It is not intended to replace clinical judgement or be used as a clinical protocol.

- A reasonable attempt has been made to find and review papers relevant to the focus of this report; however, it does not claim to be exhaustive.

- This document has been prepared by the staff of the Evidence Based Healthcare Team, ACC Research. The content does not necessarily represent the official view of ACC or represent ACC policy.

- This report is based upon information supplied up to October 2015.
1 Executive Summary

1.1 Background

The objective of this review is to update ACC’s current recommendations on the use of diagnostic nerve blocks of the cervical and lumbar medial branches. Diagnostic medial branch blocks involve the injection of small volumes of local anaesthetic into the medial branches of the lumbar or cervical dorsal rami to see whether one or more of the related z-joints are responsible for a patient’s back pain. ACCs recommendations for these services were last updated in 2005 as part of the online Interventional Pain Management (IPM) guidelines.

The research questions this review aims to answer are:

1. What is the evidence for the effectiveness of cervical medial branch nerve blocks in diagnosing neck pain originating with the facet joints (z-joints)?
2. What is the evidence for the effectiveness of lumbar medial branch nerve blocks in diagnosing low back pain originating with the facet joints (z-joints)?

1.2 Search strategy

This review is intended to be a pragmatic assessment of the best available evidence published since the 2005 IPM guidance. Following scoping, a decision was made to include systematic reviews and guidelines published since 2005 and any primary studies not included in the identified secondary literature. Systematic reviews and guidelines based explicitly on a systematic review which investigated the performance of diagnostic medial branch blocks in people with chronic lumbar or cervical pain were included in the current report.

1.3 Methodology

Ten systematic reviews and three clinical guidelines met inclusion criteria and were assessed for their quality using SIGN criteria and levels of evidence. The most recent systematic review was published in 2015 and no additional primary studies were identified.

1.4 Main results

The evidence base for diagnostic cervical and lumbar medial branch blocks has increased moderately in size but not quality since 2005. The guidelines and systematic reviews identified for these topics were mostly of low to moderate quality, many noting the low quality of primary studies and the lack of a high quality reference standard against which to judge the performance of diagnostic medial branch blocks. The false positive rates for both lumbar and cervical medial branch blocks vary quite widely across studies. Attempts have been made to determine the patient selection criteria which might improve diagnostic accuracy. Better results have been obtained with double-blind, comparative blocks when a higher pain relief threshold is applied (75-80% or greater), as well as the return of previously painful activities. Patient factors such as previous surgery, age and traumatic versus non-traumatic origin of pain may influence diagnostic accuracy but there is further research needed in this area.

1.5 Conclusions

The evidence base for diagnostic cervical and lumbar medial branch blocks has not changed dramatically since 2005. The core recommendation that diagnostic and cervical medial branch blocks may be used to investigate chronic back pain still seems appropriate. Taking into account the wide variability in prevalence and false positive rates, patient selection criteria are likely to be very important, as is the use of rigorous technique and diagnostic thresholds.

1.6 Recommendations

It is recommended that ACC retain the 2005 recommendations for these services with the following additions:

- A threshold of at least 80% pain relief with the ability to perform previously painful activities should be the minimum criteria for a positive diagnosis.
- The technique recommended by the Spine Intervention Society for the performance of diagnostic medial branch blocks should be followed. (GPP)
- Rigorous patient selection criteria should be applied to reduce the likelihood of false positive diagnoses. (GPP)
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2 Background

2.1 Objective of this report

The objective of this review is to update ACC’s current recommendations on the use of diagnostic nerve blocks of the cervical and lumbar medial branches. The recommendations were last updated in 2005 as part of the online Interventional Pain Management (IPM) guidelines.

The research questions this review aims to answer are:

3. What is the evidence for the effectiveness of cervical medial branch nerve blocks in diagnosing neck pain originating with the facet joints (z-joints)?
4. What is the evidence for the effectiveness of lumbar medial branch nerve blocks in diagnosing low back pain originating with the facet joints (z-joints)?

This review is intended to be a pragmatic assessment of the best available evidence published since the 2005 recommendations were released. The updated evidence based recommendations will be used to support ACC clinical advisors in making decisions about managing clients with persistent back pain. They will also be presented to the ACC Purchasing Guidance Advisory Group in order to develop purchasing guidance for the business.

2.2 ACC’s current position

The full recommendations are available on the IPM website – see the intervention pages for diagnostic cervical and diagnostic lumbar medial branch blocks. The recommendations are summarised below:

Table 1. Recommendations from the ACC Interventional Pain Management guidelines (2005)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Clinical practice recommendations</th>
<th>Purchasing recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN40 Diagnostic cervical medial branch block</td>
<td>Double-blind, comparative medial branch blocks, followed by an independent outcome assessment, may be used in the investigation of cervical pain in adults (B).</td>
<td>Purchase</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is medium quality evidence that cervical medial branch blocks have diagnostic utility in the investigation of pain in adults.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>We recommend that double blind comparative medial branch blocks should be used in the investigation of cervical pain in adults.</td>
</tr>
<tr>
<td>IN41 Diagnostic lumbar medial branch block</td>
<td>Double blind comparative medial branch blocks may be used in the investigation of adults with persistent low back pain (B).</td>
<td>Purchase</td>
</tr>
<tr>
<td></td>
<td></td>
<td>We recommend that double blind comparative medial branch blocks should be used in the investigation of adults with persistent low back pain.</td>
</tr>
<tr>
<td>Good practice points</td>
<td>In order to determine the sensitivity, specificity and reproducibility of this technique [lumbar diagnostic medial branch blocks], replication of the rigour used for medial branch blocks in the cervical spine is encouraged. This includes double-blind, independent outcome assessment, and use of comparative, local anaesthetic block. (GPP)</td>
<td></td>
</tr>
</tbody>
</table>
2.3  Diagnostic Cervical and Lumbar Medial Branch Blocks

Cervical and lumbar zygapophysial (Z- or facet) joints are recognized as a potential source of neck and low back pain respectively. Diagnosis of these joints as a source of pain remains a challenge however, because facet joint pain cannot be confidently diagnosed from history, clinical examination, or radiological findings1,2.

The facet joints receive their nerve supply from nerves called the medial branches of the dorsal rami. Each joint is supplied by two medial branches, except C2-3 which is innervated by the third occipital nerve. Diagnostic medial branch blocks involve the injection of small volumes of local anaesthetic into the medial branches of the lumbar or cervical dorsal rami to see whether one or more of the related z-joints are responsible for a patient’s back pain. If the injections temporarily relieve the patient’s pain, it can be deduced that the z-joint innervated by those medial branches is the source of pain. Modes of treatment, such as radiofrequency neurotomy of the nerves for the affected z-joint, can then be considered. Injections are usually performed under fluoroscopic guidance1,2,3.

Diagnostic medial branch blocks can be conducted as a single block using one anaesthetic with no comparison, or double, comparative blocks. Single blocks have been associated with a high false-positive rate, and for this reason are no longer recommended1. The lowest false-positive rate is obtainable using placebo-controlled blocks, where responses to three separate injections are assessed – a saline injection and two anaesthetics, but this is considered less feasible in practice6. The most commonly used protocol is comparative blocks with two anaesthetics of different durations of action. Commonly the two anaesthetics used are lidocaine, relatively short-lasting, and bupivacaine, longer-lasting. Ideally the length of time the pain is relieved should correspond with the anaesthetic used (short-acting or long-acting), however discordant responses, where the length of pain relief does not match the anaesthetic used, are often accepted as positive responses1,5. To reduce observer bias, neither the patient, the physician administering the blocks, nor the person assessing the patient's response to the block should know the order of administration of the two anaesthetics1.

The reliability of diagnostic medial branch blocks varies for lumbar and cervical facet joint pain because of differences in the prevalence of each condition. The prevalence of low back pain which is mediated by the lumbar facet joints is low, approximately 35% when a criteria of 75% pain relief is used which drops to 10% with 100% pain relief1,2. The typical patient will have persisting low back pain, with or without radiation of pain into the buttocks or legs. The prevalence of facet-joint related cervical pain is estimated at 55% across all patient samples, with the prevalence increasing to approximately 60% in patients whose neck pain is caused by whiplash5.

3  Methods

3.1  Search Strategy
A search was conducted in December 2014 in the following databases:

- Cochrane Library
- Embase
- Medline and PreMedline
- Trip database

Auto alerts were run on Medline and Embase to ensure that studies added to the databases whilst the review was in progress were picked up. See the Appendices (section 8) for the full search strategy.

3.2  Inclusion and Exclusion Criteria
This review is intended to be a pragmatic assessment of the best available evidence published since the 2005 IPM guidance. Following scoping, a decision was made to include systematic reviews and guidelines published since
2005 and any primary studies not included in the identified secondary literature. The most recent systematic review was authored by Boswell and colleagues in 2015\textsuperscript{12}. No additional primary studies were identified.

3.2.1 Inclusion Criteria

- Types of studies: clinical guideline based on systematic review, health technology assessment, systematic review, single arm of a randomised controlled trial, prospective cohort study
- Types of participant: Patients with chronic low back or neck pain (suspected to be of facet-joint origin)
- Types of interventions: Diagnostic cervical and lumbar medial branch blocks
- Types of comparison: No valid reference standard available for diagnosing facet-joint pain
- Types of outcome measures: Prevalence, sensitivity, specificity, false-positive rate, false-negative rate

3.2.2 Exclusion Criteria

- Types of studies: Case-control studies, Case series, general review, opinion, conference proceedings, abstract only
- Types of participant: Patients with acute low back or neck pain
- Types of interventions: Therapeutic medial branch blocks; other diagnostic blocks e.g. intra-articular blocks
- Animal or laboratory studies
- Non-English studies

3.3 Level of Evidence

Studies meeting the criteria for inclusion in this report were assessed for their methodological quality using the Scottish Intercollegiate Guideline Network (SIGN) level of evidence system. Each study was summarised in evidence tables (Appendix A) and graded for overall methodological quality.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1++</td>
<td>High quality meta analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1+</td>
<td>Well conducted meta analyses, systematic reviews of RCTs, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1-</td>
<td>Meta analyses, systematic reviews of RCTs, or RCTs with a high risk of bias</td>
</tr>
<tr>
<td>2++</td>
<td>High quality systematic reviews of case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal</td>
</tr>
<tr>
<td>2+</td>
<td>Well conducted case control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal</td>
</tr>
<tr>
<td>2-</td>
<td>Case control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal</td>
</tr>
<tr>
<td>3</td>
<td>Non-analytic studies, e.g. case reports, case series</td>
</tr>
<tr>
<td>4</td>
<td>Expert opinion</td>
</tr>
</tbody>
</table>

SIGN checklists and accompanying materials are available from the SIGN website, [www.sign.ac.uk](http://www.sign.ac.uk/).
4 Results

4.1 Study selection
The initial search identified 67 references of which 24 related to diagnostic lumbar medial branch blocks, 15 diagnostic cervical medial branch blocks and 28 both lumbar and cervical blocks. Twenty-seven articles were retrieved and after a review of the full text, a total of 54 articles were excluded for the following reasons:

- Non-systematic review: n=11
- Commentary: n=2
- Investigated therapeutic medial branch blocks: n=18
- Guidelines superseded by an updated version: n=2
- Guideline with no information about diagnostic medial branch blocks: n=2
- Investigated another type of block or no information on diagnostic MBB: n=8
- Case series: n=7
- Primary study cited in secondary systematic review: n=4

4.2 Study overview
After review of the full text, three clinical guidelines 8,9,10,11 and ten systematic reviews 12-21 were included in the final report. Two additional primary studies 22,23 were included in the synthesis but not formally appraised.

Table 3. Studies of diagnostic medial branch blocks included in the current report

<table>
<thead>
<tr>
<th>Study type</th>
<th>Systematic reviews and/or meta-analyses</th>
<th>Guidelines based on a systematic review</th>
<th>Primary studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic lumbar medial branch block</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Diagnostic cervical medial branch block</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Studies covering both</td>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Two reviews 13,14 included only systematic reviews and randomized controlled trials. While these were high quality reviews, they were unable to come to any conclusions about the diagnostic performance of medial branch blocks because of their strict inclusion criteria. The remaining reviews included cohort studies (prospective and retrospective) and case-control studies, with two guidelines 8,10,11 and five reviews also including case series 12,15,18-20. According to the National Health and Medical Research Council (NHMRC) guidelines 7, prospective cohort studies and a single arm of an RCT are considered acceptable study designs for the assessment of diagnostic test performance. Case control studies and case series are considered lower quality evidence.

Some reviews excluded studies which utilised only single blocks 15,19,20 and those studies which used a pain threshold of less than 80% pain relief 15,21. Two case series initially excluded on the basis of study design 22,23 were included in the evidence summary and discussion. These two case series were based on a large cohort of patients presenting to two pain clinics in Christchurch, New Zealand. Most of these patients are likely to have been ACC clients. The authors of these reports strictly followed the technique recommended by the Spinal Intervention Society (SIS) guidelines, utilised double-blind, comparative blocks and applied a threshold of 100% pain relief to classify a response as positive. Taking into account both the high quality of their study protocol and the relevance to ACC clients, a decision was made to include the studies in the evidence synthesis, although they were not formally appraised.
4.3 Study quality

The biggest shortcoming of the evidence base for diagnostic medial branch blocks as a whole is the lack of a valid reference standard against which diagnostic medial branch blocks can be compared. Because of this the primary studies use either the response to a second block or subsequent radiofrequency neurotomy to evaluate the performance of the diagnostic blocks. Only those patients who have a positive response to the diagnostic blocks continue to radiofrequency neurotomy, leading to a potential verification bias. Ideally, all patients would be tested using the index test (diagnostic medial branch blocks) and the reference standard, with assessors blind to disease-status. Most of the systematic reviews acknowledged this limitation but did not consider the potential impact of verification bias in their synthesis of the evidence.

Most of the included systematic reviews employed an adequate search strategy and have a low risk of omitting important studies. Several reviews included low quality primary studies, such as case series, and many performed only a limited appraisal of the quality of primary studies and so may have underestimated the risk of bias. The main limitation of the secondary literature was in the description and synthesis of included studies. The source population of included primary studies was not clearly described in many cases, nor was patient selection criteria, which may not have reflected current best practice. None of the systematic reviews were able to perform a meta-analysis of prevalence or false-positive rates because of variability in the study populations (traumatic versus non-traumatic origin), procedural technique (single versus comparative blocks) and pain thresholds for a positive diagnosis (50% versus 80% versus 100% reduction). Some reviews reported the prevalence and false-positive rates for different pain thresholds and single versus comparative blocks, but these were often based on a very limited pool of studies.

For those reviews which included all retrospective and prospective cohort studies and case-control studies, the same pool of primary studies was generally identified and summarized. This includes a large set of studies by Manchikanti, Boswell, Falco and colleagues, who also authored several of the systematic reviews. These researchers are all listed as co-authors of the American Society for Interventional Pain Physicians guidelines. This means that the evidence base for diagnostic medial branch blocks is not diverse and relies heavily on a set of studies produced by one group of researchers. Recommendations may appear consistent because they are repeated by the same authors in multiple reviews. Other independent reviews have commented that the conclusions reached by many of these reviewers do not seem to accurately reflect the evidence.

The authors of a high quality systematic review by the Canadian Agency for Drugs and Health Technologies noted that conclusions regarding the performance of diagnostic medial branch blocks did not seem to reflect the strength of the evidence in many of the previous systematic reviews. Many findings were drawn from studies with a high risk of bias (e.g. case-control, case series), false-positive rates varied widely and had high upper limits (17-66% for lumbar and 27-63% for cervical MBB). This was described as ‘good’ or ‘strong’ evidence in some reviews which seems to overstate the quality of the evidence base. The CADTH review included only systematic reviews, meta-analyses and randomized controlled trials and, because of the lack of high quality trials, was unable to reach any recommendations regarding the accuracy or utility of diagnostic medial branch blocks.

Evidence tables summarising the methodology and findings of included studies are presented in Appendices 8.6 – 8.8.

4.4 Diagnostic performance of cervical and lumbar diagnostic medial branch blocks

4.4.1 Overall recommendations

Tables 4 and 5 summarise the recommendations for diagnostic cervical and lumbar medial branch blocks from included studies. There was reasonable consistency in the studies included and recommendations developed by each of the guidelines. Eight studies included prospective and retrospective cohort studies as well as RCTs. These reviews generally concluded that there was moderate to good evidence that utilizing comparative blocks with greater than 75% criterion pain relief was a reliable method of diagnosing facet-joint mediated pain. Single blocks were not recommended. Appropriate image guidance during the procedure was recommended. Two
systematic reviews\textsuperscript{13,14} excluded study designs below randomized controlled trials and these reviews generally concluded that there was insufficient evidence to make a recommendation.

Evidence synthesis in most cases involved reporting the range of prevalence and false-positive rates, which varied widely with high upper limits. For lumbar diagnostic blocks prevalence rates ranged from 31 – 61% using a single block, and 15 – 61% with comparative blocks. False positive rates ranged from 17 – 66% using comparative blocks. The prevalence and false-positive rates are similar for diagnostic cervical medial branch blocks with a prevalence ranging from 36 to 67% and false positive rates between 27 and 63%. Recent reviews have attempted to understand the source of this variability with most focusing on the use of different pain thresholds to categorise a positive response to the block. This does not seem to account for all the variability and it is likely that differences in technique and patient selection play a part. One recent review attempted to examine the effect of some patient factors on outcomes\textsuperscript{12}. See sections 4.4.2 and 4.4.3 below for a discussion of the evidence around pain thresholds and patient factors.

Overall, the primary evidence base has not changed markedly since 2005. Appendices 8.2 and 8.3 summarise the primary studies included in the most recent systematic review (Boswell et al, 2012)\textsuperscript{12}. This review included studies published up to March 2015, with four primary studies\textsuperscript{28,29,31,32} published since 2005. For diagnostic lumbar medial branch blocks more recent studies seem to have focused on a comparison of different pain relief thresholds (50% versus 80%) and an examination of the performance of diagnostic blocks in select patient groups e.g. post-surgery patients; obese patients; older patients. Fewer primary studies of diagnostic cervical medial branch blocks have been published since 2005, with no substantial change in the evidence base.

Table 4. Secondary studies of diagnostic cervical medial branch blocks included in the current report

<table>
<thead>
<tr>
<th>Guideline/Systematic Review</th>
<th>Level of evidence included</th>
<th>Recommendations</th>
<th>Quality of evidence</th>
</tr>
</thead>
</table>
| American Society of
Interventional Pain Physicians (2013)\textsuperscript{10,11} | Systematic reviews, meta-analyses, randomized controlled trials, cohort, case series | Comparative nerve blocks with 75-100% pain relief as the criterion standard – evidence good Prevalence 36 - 67% FPR 40 - 63% Comparative nerve blocks with 50-74% pain relief – evidence is limited Single blocks – evidence is limited | Level 2++ Moderate |
| American Society of Anesthesiologists Task Force (2010)\textsuperscript{8} | Systematic reviews, meta-analyses, randomized controlled trials, cohort, case series | Diagnostic MBB may be considered for patients with suspected facet-mediated pain to screen for subsequent therapeutic procedures. Diagnostic MBB should be performed with appropriate image guidance | Level 2++ Low |
| Canadian Agency for Drugs and Technologies in Health (2011)\textsuperscript{13} | Health technology assessments, systematic reviews, meta-analyses | Low quality evidence and unable to recommend Caution should be used in applying the current body of research to policy decisions because the findings of the reviews were not clearly supported by the evidence Prevalence ranged from 36 – 67% FPR ranged from 27 – 63% | Level 1- High |
| Sehgal et al (2005; 2007)\textsuperscript{19,20} | All prospective and retrospective studies | Controlled comparative local anesthetic blocks of facet joints are reproducible, reasonably accurate and safe. | Level 2++ Moderate |
Excluded single block studies

Prevalence of facet joint pain in people with chronic neck pain is 54 – 67%. FPRs with double blocks are 40 – 63%.

**Falco, Ehrhart et al (2009)**

- Systematic reviews, randomized controlled trials, cohort
- Included only double comparative block studies with at least 80% pain relief threshold

Strong evidence for the use of controlled diagnostic blocks with greater than 80% pain relief and return of previously painful movements

Prevalence 36 – 67%

FPR 27 - 63%

**Falco, Datta et al (2012)**

- Systematic reviews, randomized controlled trials, cohort, case-control
- Single and double blocks with at least 50% pain relief threshold

Good evidence for the use of controlled diagnostic cervical facet joint blocks with at least 75% pain relief as the criterion standard.

Double blocks:

Prevalence 39 – 67%

FPR 40 - 63%

**Boswell et al (2015)**

- Systematic reviews, randomized controlled trials, cohort, case-control, case series

Level II evidence for cervical facet joint nerve blocks. Variable prevalence, internal inconsistency

At least 80% pain relief

Prevalence 36 - 67%

FPR 27 - 63%

**Table 5. Secondary studies of diagnostic lumbar medial branch blocks included in the current report**

<table>
<thead>
<tr>
<th>Guideline/Systematic Review</th>
<th>Level of evidence included</th>
<th>Recommendations</th>
<th>Quality of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>American Society of Interventional Pain Physicians (2013)</strong></td>
<td>Systematic reviews, meta-analyses, randomized controlled trials, cohort, case series</td>
<td>Comparative nerve blocks with 75-100% pain relief as the criterion standard – evidence good&lt;br&gt;Comparative nerve blocks with 50-74% pain relief – evidence is fair</td>
<td>Level 2++ Moderate</td>
</tr>
<tr>
<td><strong>American Society of Anesthesiologists Task Force (2010)</strong></td>
<td>Systematic reviews, meta-analyses, randomized controlled trials, cohort, case series</td>
<td>Diagnostic MBB may be considered for patients with suspected facet-mediated pain to screen for subsequent therapeutic procedures. Diagnostic MBB should be performed with appropriate image guidance</td>
<td>Level 2++ Low</td>
</tr>
<tr>
<td><strong>Watters et al (2014)</strong></td>
<td>Systematic reviews, randomized controlled trials, cohort, case-control</td>
<td>To establish the diagnosis of lumbar facet-mediated pain, the double-injection technique with an improvement threshold of 80% or greater is suggested (single Level I study).</td>
<td>Level 2++ Low</td>
</tr>
</tbody>
</table>
### American Pain Society guidelines (Chou et al; 2009)14
- Systematic reviews, randomized controlled trials
- There is insufficient evidence to evaluate validity or utility of diagnostic medial branch block as diagnostic procedures for low back pain with or without radiculopathy
- Level 1-High

### Canadian Agency for Drugs and Technologies in Health (2011)13
- Health technology assessments, systematic reviews, meta-analyses
- Low quality evidence and unable to recommend
- Caution should be used in applying the current body of research to policy decisions because the findings of the reviews were not clearly supported by the evidence
- Level 1-High

### Sehgal et al (2005; 2007)19,20
- All prospective and retrospective studies
- Excluded single block studies
- Moderate to strong evidence that controlled diagnostic facet joint blocks are safe, valid, and reliable
- Level 2++ Moderate

### Falco, Manchikanti et al (2012)18
- Systematic reviews, randomized controlled trials, cohort, case series
- Good evidence for the use of 75-100% pain relief with controlled diagnostic blocks as the criterion standard.
  - FPR 25 – 49%
  - Fair evidence for the use of 50-74% pain relief with controlled diagnostic blocks. FPR 17-66%
  - Poor evidence for the use of single diagnostic blocks.
- Level 2++ Moderate

### Datta et al (2009)15
- Systematic reviews, randomized controlled trials, cohort, case-control, case series
- Included controlled diagnostic blocks only with at least 80% pain relief criterion
- Diagnostic lumbar facet joint nerve blocks are safe, valid and reliable.
  - Overall FPR 30% (range 17 – 49%)
- Level 2++ Moderate

### Boswell et al (2015)12
- Systematic reviews, randomized controlled trials, cohort, case-control, case series
- Level I evidence for lumbar facet joint nerve blocks
  - At least 75% pain relief
  - Prevalence 16 - 41%
  - FPR 25 - 44%.
- Level 2++ Moderate

### Manchikanti et al (2009)21
- Not specified
  - 80% or greater pain relief threshold
- Diagnostic lumbar facet joint nerve blocks are recommended in patients with suspected facet joint pain.
  - Indications include:
    - Patients suffering with somatic or non-radicular low back and lower extremity pain, with duration of pain of at least 3 months.
    - Average pain levels at least 7/10
- Level 2++ Low
4.4.2 Pain relief thresholds for a positive diagnosis

Three reviews\textsuperscript{17,18,10,11}, compared the prevalence and false positive rates of different pain relief thresholds. In most cases studies were divided into two groups: those with 50%-74% pain relief thresholds and those that used a cut-off of 75% or more. Meta-analysis was not possible because of heterogeneity in the studies and a very small number of primary studies for some groups (e.g. single blocks with 50-74% pain relief). Instead, data synthesis involved presenting the range of prevalence and false-positive rates for single versus double blocks and for different thresholds of pain relief.

The two reviews of diagnostic lumbar blocks were completed by the same group of authors\textsuperscript{10,11,18} and included the same primary studies. For lumbar medial branch blocks, prevalence ranged from 15-61% with a pain relief threshold between 50 and 74%, and 25-61% for a pain relief threshold greater than 75%. Thirteen primary studies (including case series) used comparative blocks with a 75% pain relief threshold or greater. The prevalence for these studies was 25-45% with a false positive rate ranging between 25-49%. The authors concluded that there is good evidence for the performance of comparative nerve blocks with a pain relief threshold of 75-100%.

The two reviews of diagnostic cervical blocks were also completed by the same group of authors\textsuperscript{10,11,17}. Again, there were very few studies in three subgroups (50-74%, single block: n=1; 75-100% single block: n=2; 50-74% comparative: n=0). Prevalence was 55% with a pain relief threshold between 50 and 74%, and ranged from 25-67% for a pain relief threshold greater than 75%. Nine primary studies (including case series) used comparative blocks with a 75% pain relief threshold or greater. The prevalence for these studies was 39-67% with a false positive rate ranging between 27-63%. The authors again concluded that there is good evidence for the performance of comparative cervical nerve blocks with a pain relief threshold of 75-100%.

The wide variability in prevalence and high upper limits of the false positive rates brings into question the validity of these conclusions given the evidence.

4.4.3 Patient factors affecting diagnostic performance of medial branch blocks

Two studies\textsuperscript{12,18} attempted to synthesise primary studies of the effect of patient-related factors on prevalence and false-positive rates for diagnostic medial branch blocks. These primary studies did not undergo a quality appraisal and may not include all studies of patient factors.

Lumbar facet-joint pain

There is some evidence that lumbar facet-joint related pain is more prevalent in patients over the age of 50 years, however false-positive rates also rise alongside prevalence in older patients.

Several studies have attempted to identify clinical features which may be associated with lumbar facet-joint pain. Revel and colleagues identified seven clinical features associated with an increased likelihood of a positive response to diagnostic medial branch blocks. Subsequent studies have failed to validate the utility of these features\textsuperscript{4} but they are included in current SIS guidelines as possible indicators of lumbar facet-joint pain\textsuperscript{1}. No studies have identified any correlation between radiological findings and an increased likelihood of a positive MBB diagnostic response.

One study\textsuperscript{34} suggested there was no difference between normal weight and obese patients in the prevalence of facet-joint related lumbar pain.

There is reasonable evidence from six studies of a low prevalence of lumbar facet-joint related pain in patients who have had back surgery patients. Prevalence seems to be in the region of 15-20%. Note that the insurance agency AETNA will not fund diagnostic medial branch blocks for people who have had prior spinal fusion surgery, disc herniation, significant narrowing of the spinal canal or spinal instability requiring surgery.
Cervical facet-joint pain

There have been fewer studies focusing on patient-related factors and the likelihood of cervical facet-joint pain. The SIS guidelines note that there is little empirical data on the validity of clinical criteria which might identify patients who are most likely to be affected by facet-joint mediated pain. They do however, draw attention to the increased prevalence of cervical facet-joint pain in people whose pain is of a traumatic origin, for example as the result of a motor vehicle accident. In these patients the prevalence of facet-joint pain is approximately 60% and the likelihood of a true-positive in response to a diagnostic medial branch block is thus increased. One study of cervical facet-joint pain in patients post-surgery found no significant difference in prevalence or false-positive rates.

4.5 Recommendations for the performance of diagnostic medial branch blocks from other injury compensation organisations

A number of international insurers and other injury compensation organisations have policies and guidance around the performance of diagnostic medial branch blocks. Their policies are summarized in Appendix 8.3 along with those from the Spine Intervention Society\(^1\) and the Australian and New Zealand College of Anaesthetists\(^2\). The recommendations are generally in agreement and include the following:

- Diagnostic medial branch blocks are only for chronic back or neck pain (duration of at least 3 months)
- The patient should be able to identify a focal area of pain
- A minimum pain score is required by two organisations of at least 4/10 (BUPA, UK) or 5/10 (TAC, Australia)
- Other serious causes of spinal pain must be ruled out
- A comprehensive physical and psychosocial assessment must be completed prior to the procedure, including medical and pain history. Patients should be ‘psychologically suitable’ and have a full understanding of the diagnostic purpose of the procedure
- Conservative pain management options must be thoroughly explored before considering diagnostic medial branch blocks (and radiofrequency neurotomy)

There is also good consistency across different organisations regarding the technique and interpretation of diagnostic medial branch blocks. Most organisations recommend the use of double-blind comparative or placebo-controlled blocks with a threshold of at least 80% pain relief and the ability to perform previously painful activities as the criteria for a positive result. The Spine Intervention Society (SIS) and the Australian and New Zealand College of Anaesthetists Faculty of Pain Medicine also recommend utilizing comparative local anaesthetic blocks with at least an 80% reduction in pain. Recommendations for the performance and interpretation of diagnostic medial branch blocks are summarized in Appendix 8.4.

4.6 Additional findings

Two New Zealand case series\(^22,23\) were included in the evidence synthesis for this report but were not formally appraised. These studies prospectively followed patients presenting to a Christchurch pain clinic with chronic low back or neck pain. They reported good outcomes from radiofrequency neurotomy for patients who experienced complete pain relief and the ability to perform previously painful movements following double-blind comparative lumbar or cervical medial branch blocks. Specialists performing the medial branch blocks and subsequent RFN received training and guidance from the SIS and strict criteria were used to classify successful outcomes.

Strengths of these case series:

- Large samples, patients selected consecutively and all losses-to-follow-up accounted for and included as failures in analyses
- Comprehensive demographic information, including type of injury, age range, nerves treated, numbers of blocks required to identify the symptomatic segment
- Samples were representative of the wider treatment population
- Comprehensive description of the RFN procedure – performed according to SIS guidelines and following training by Nikolai Bogduk
- Strict and conservative classification of success = at least 80% pain relief + full return of ADLs + return to work + no other health care for the pain (other than over-the-counter analgesics)
- Duration of pain relief conservative = time from RFN procedure to return of 50% of pain level prior to treatment
- Patient selection based on 100% relief of pain and able to perform 4 ADLs which are usually restricted by the pain for both diagnostic MBBs (lidocaine and bupivacaine). Duration of pain relief was not considered because it does not significantly improve the diagnostic performance of the blocks

Limitations:
- Case series following patients who had a positive response to diagnostic blocks followed by RFN procedure. No follow-up of patients who did not have the RFN procedure, which means the person collecting pain and ADLs data would know that all the participants had the RFN procedure = possible interviewer bias (authors tried to limit this as much as possible by using assessors who had nothing to do with the treatment of the participants)
5 Discussion

5.1 Nature and quality of the evidence

The evidence base for diagnostic cervical and lumbar medial branch blocks has increased moderately in size but not quality since 2005. The guidelines and systematic reviews identified for these topics were mostly of low to moderate quality, many noting the low quality of primary studies and the lack of a high quality reference standard against which to judge the performance of diagnostic medial branch blocks. Most were appraised as level 2++ because they included studies with a high risk of bias.

A reasonable number of secondary research studies (guidelines and systematic reviews) have been published on these two interventions since 2005, particularly for the lumbar region. Most of the guidelines recommend that diagnostic medial branch blocks are an acceptable diagnostic tool for facet-joint mediated back and neck pain, but the strength of the recommendations varies. This may in part be based on the inclusion criteria employed by each guideline, with those including single block studies concluding that the evidence is limited, while for double blocks it is fair to good. Additionally, some guidelines or reviews included only randomised controlled trials, systematic reviews and meta-analyses and concluded that there was insufficient evidence to determine the reliability of diagnostic medial branch blocks.

The evidence base for diagnostic medial branch blocks is not diverse and relies heavily on a set of studies produced by one group of researchers. Recommendations may appear consistent because they are repeated by the same authors in multiple reviews. Other independent reviews have commented that the conclusions reached by many of these reviewers do not seem to accurately reflect the evidence. The CADTH (2011) systematic review in particular noted the discrepancy between the high false-positive rates reported in some reviews and the strength of the recommendations reached.

Prevalence and false positive rates seem to improve with a pain relief threshold of 75-80% or greater, but there is still wide variability. Taking into account the low prevalence of lumbar facet-joint mediated pain and the variable false-positive rates, it would seem that patient selection is of particularly high importance for the use of these blocks in people with chronic low back pain. The prevalence of chronic cervical pain mediated by the facet-joints is higher, particularly in patients whose pain is the result of an injury (~60%) making diagnostic medial branch blocks a more valid option for these patients.

Other insurance and injury compensation organisations will fund the use of diagnostic medial branch blocks to explore suspected facet-joint mediated pain once conservative therapies have failed. It is also expected that a comprehensive assessment, including physical and psychosocial assessments, is carried out prior to considering diagnostic medial branch blocks (or subsequent radiofrequency neurotomy procedures). Double-blind, comparative blocks with at least a 75-80% pain relief threshold are recommended by all the organisations.

5.2 Limitations

The biggest limitation of the included secondary literature was the lack of high quality primary studies. There is no valid reference standard against which to compare the performance of diagnostic medial branch blocks and many of the primary studies have a high risk of bias, including verification bias. In the secondary literature there is an over-reliance on the studies of one group of authors.

In addition, there was not always a clear linkage between recommendations and the evidence base. The high false-positive rates for both lumbar and cervical medial branch blocks do not seem to reflect conclusions that there is ‘good’ or ‘strong’ evidence of the accuracy of these tests.
6 Conclusion

6.1 Evidence statement

The 2005 ACC guidelines recommend that double-blind comparative diagnostic blocks may be used for both cervical and lumbar back pain which is suspected to originate in the facet joints. The evidence base has not changed dramatically since the 2005 recommendations were made and this core recommendation seems appropriate. Despite the limitations of the secondary literature, there is some evidence that diagnostic medial branch blocks can be employed as useful diagnostic tools of facet joint-related pain if a rigorous technique is followed and strict patient selection criteria and diagnostic thresholds are applied. The current evidence suggests a threshold of at least 80% pain relief with the ability to perform previously painful activities should be applied to maximise the diagnostic performance of medial branch blocks. Careful patient selection and the use of the technique recommended in the SIS guidelines also seem to increase the success of these procedures.

Other organisations consistently recommend the use of comparative diagnostic blocks with a threshold of at least 80% pain relief and the ability to perform previously painful activities as the criteria for a positive response. The Spine Intervention Society goes further to recommend double-blind blocks with complete pain relief. Two NZ case series\textsuperscript{22,23} which employed a rigorous technique and the criteria for pain relief recommended by SIS achieved good results.

6.2 Implications for practice/further research

Several studies, including two New Zealand case series, have demonstrated that cervical and lumbar diagnostic medial branch blocks can be valid and reliable diagnostic tools if strict protocols and patient selection criteria are followed. The SIS guidelines provide best practice guidance for the performance of diagnostic medial branch blocks. This guidance is also available through the ANZCA FPM website and it is recommended that these be endorsed by ACC.

6.3 Recommendations based on available evidence

It is proposed that ACC retain the recommendations from the 2005 IPM guidelines for both diagnostic cervical and lumbar medial branch blocks. It is further proposed that an additional recommendation be added regarding the minimum criteria for a positive diagnosis. Two good practice points are suggested encouraging the use of a rigorous technique and patient selection criteria to maximize the diagnostic performance of the tests.

These recommendations are outlined below:

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Clinical practice recommendations</th>
</tr>
</thead>
</table>
| IN40 Diagnostic cervical medial branch block | - Double-blind, comparative medial branch blocks, followed by an independent outcome assessment, may be used in the investigation of cervical pain in adults (B).  
- A threshold of at least 80% pain relief with the ability to perform previously painful activities should be the minimum criteria for a positive diagnosis. |
<table>
<thead>
<tr>
<th>IN41</th>
<th>Diagnostic lumbar medial branch block</th>
</tr>
</thead>
<tbody>
<tr>
<td>![checkmark]</td>
<td>Double blind comparative medial branch blocks may be used in the investigation of adults with persistent low back pain (B).</td>
</tr>
<tr>
<td>![checkmark]</td>
<td>A threshold of at least 80% pain relief with the ability to perform previously painful activities should be the minimum criteria for a positive diagnosis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td>In order to determine the sensitivity, specificity and reproducibility of this technique (lumbar diagnostic medial branch blocks), replication of the rigour used for medial branch blocks in the cervical spine is encouraged. This includes double-blinding, independent outcome assessment, and use of comparative, local anaesthetic block. (GPP)</td>
</tr>
<tr>
<td>The technique recommended by the Spine Intervention Society for the performance of diagnostic medial branch blocks should be followed.</td>
</tr>
<tr>
<td>Rigorous patient selection criteria should be applied to reduce the likelihood of false positive diagnoses.</td>
</tr>
</tbody>
</table>
7 References

7. National Health and Medical Research Council (2009). NHMRC additional levels of evidence and grades for recommendations for developers of guidelines. Australia: NHMRC.
8.1 Primary studies of diagnostic cervical medial branch blocks included in Boswell et al (2015)\textsuperscript{12}

<table>
<thead>
<tr>
<th>Reference</th>
<th>Participants</th>
<th>Injectate volumes</th>
<th>Pain relief threshold</th>
<th>Prevalence (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnsley et al 1993</td>
<td>47 patients with chronic neck pain following a motor vehicle accident</td>
<td>2% lidocaine</td>
<td>100%</td>
<td>\textit{Prevalence} = 60%</td>
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<td></td>
<td></td>
<td>0.5% bupivacaine</td>
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<td></td>
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<td>0.5ml</td>
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<tr>
<td>Yin and Bogduk, 2008</td>
<td>84 patients with chronic neck pain of at least 3 months duration</td>
<td>4% lignocaine</td>
<td>100% pain relief with</td>
<td>\textit{Prevalence} = 55% (38 – 62%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.75% bupivacaine</td>
<td>duration of response</td>
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<td></td>
<td></td>
<td>0.5ml</td>
<td>concordant with the</td>
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<td></td>
<td></td>
<td></td>
<td>anaesthetic used</td>
<td></td>
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<tr>
<td>Manchukonda et al, 2007</td>
<td>251 patients with chronic neck pain of at least 6 months duration. Non-specific with no radicular component</td>
<td>1% lidocaine</td>
<td>(\geq 80%) with the ability to perform previously painful movements</td>
<td>\textit{Prevalence} = 39% (32 – 45%)</td>
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<tr>
<td></td>
<td></td>
<td>0.25% bupivacaine</td>
<td></td>
<td>\textit{FPR} = 45% (37 – 52%)</td>
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<tr>
<td></td>
<td></td>
<td>0.5 mL</td>
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<tr>
<td>Manchikanti et al, 2004</td>
<td>255 patients with chronic neck pain without disc-related pain with radicular symptoms</td>
<td>1% lidocaine</td>
<td>(\geq 80%) with the ability to perform previously painful movements</td>
<td>\textit{Prevalence} = 55% (49 – 61%)</td>
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<tr>
<td></td>
<td></td>
<td>0.25% bupivacaine</td>
<td></td>
<td>\textit{FPR} = 63% (54 – 72%)</td>
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<tr>
<td></td>
<td></td>
<td>0.5 mL</td>
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</tr>
<tr>
<td>Manchikanti et al, 2002</td>
<td>120 patients with chronic neck pain presenting to a private practice for diagnosis</td>
<td>1% lidocaine</td>
<td>(\geq 80%) with the ability to perform previously painful movements</td>
<td>\textit{Prevalence} = 67% (58 – 75%)</td>
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<tr>
<td></td>
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<td>0.25% bupivacaine</td>
<td></td>
<td>\textit{FPR} = 63% (48 – 78%)</td>
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<tr>
<td></td>
<td></td>
<td>0.5 mL</td>
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</tr>
<tr>
<td>Manchikanti et al, 2002</td>
<td>106 patients with chronic neck pain of at least 6 months duration who had failed conservative treatment and had no evidence of radiculitis or disc herniation</td>
<td>1% lidocaine</td>
<td>(\geq 75%) pain relief with duration of response concordant with the anaesthetic used</td>
<td>\textit{Prevalence} = 60% (50 – 70%)</td>
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<tr>
<td></td>
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<td>0.25% bupivacaine</td>
<td></td>
<td>\textit{FPR} = 40% (34 – 46%)</td>
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<td>0.5 mL</td>
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<tr>
<td>Reference</td>
<td>Participants</td>
<td>Injectate volumes</td>
<td>Pain relief threshold</td>
<td>Prevalence (95% CI)</td>
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<tr>
<td>Speldewinde et al, 2001</td>
<td>97 patients with chronic neck pain</td>
<td>2% lidocaine</td>
<td>100%</td>
<td>Prevalence = 36% (27 – 45%)</td>
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<tr>
<td></td>
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<td>0.5% bupivacaine</td>
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<td>0.5ml</td>
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<tr>
<td>Barnsley et al, 1995</td>
<td>50 consecutive patients with chronic neck pain of at least 3 months duration following a motor vehicle accident</td>
<td>2% lignocaine</td>
<td>100% pain relief with duration of response concordant with the anaesthetic used</td>
<td>Prevalence = 54% (40 – 68%)</td>
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<td></td>
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<td>0.5% bupivacaine</td>
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<td></td>
<td>0.5ml</td>
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<tr>
<td>Lord et al, 1996</td>
<td>68 consecutive patients with chronic neck pain of at least 3 months duration following whiplash</td>
<td>2% lignocaine</td>
<td>100%</td>
<td>Prevalence = 60% (46 – 73%)</td>
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<td></td>
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<td>0.5% bupivacaine</td>
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<td>0.5ml</td>
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<tr>
<td>Barnsley et al, 1993</td>
<td>55 consecutive patients with chronic non-specific neck pain of at least 3 months duration following a motor vehicle accident</td>
<td>2% lignocaine</td>
<td>100%</td>
<td>FPR = 27% (15 – 38%)</td>
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<td></td>
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<td>0.5% bupivacaine</td>
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</table>

8.2 Primary studies of diagnostic lumbar medial branch blocks included in Boswell et al (2015)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Participants</th>
<th>Injectate volumes</th>
<th>Pain relief threshold</th>
<th>Prevalence (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schwarzer et al, 1994</td>
<td>176 consecutive patients with chronic low back pain following injury</td>
<td>2% lidocaine</td>
<td>At least 50% pain relief with duration of response concordant with the anaesthetic used</td>
<td>Prevalence = 15% (10 – 20%)</td>
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<td>0.5% bupivacaine</td>
<td></td>
<td>FPR = 38% (30 – 46%)</td>
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<tr>
<td></td>
<td></td>
<td>0.5ml</td>
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<tr>
<td>Manchikanti et al 2010</td>
<td>181 patients with chronic low back pain</td>
<td>1% lidocaine</td>
<td>Compared 50% pain relief with 80% pain relief (both with the ability to perform previously painful movements)</td>
<td>At least 50% pain relief</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.25% bupivacaine</td>
<td></td>
<td>Prevalence = 61% (53 – 81%)</td>
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<td></td>
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<td>0.5 mL</td>
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<td>FPR = 17% (10 – 24%)</td>
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<td>At least 80% pain relief</td>
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<td></td>
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<td>Prevalence = 31% (26 – 35%)</td>
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<td></td>
<td></td>
<td>FPR = 42% (35 – 50%)</td>
</tr>
<tr>
<td>Study</td>
<td>Patients Description</td>
<td>Minimum Pain Relief</td>
<td>Prevalence</td>
<td>FPR</td>
</tr>
<tr>
<td>------------------------------</td>
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</tr>
<tr>
<td>Manchikanti et al 2000</td>
<td>200 consecutive patients with chronic low back pain</td>
<td>≥75% with the ability to perform previously painful movements</td>
<td>Prevalence = 42% (35– 49%)</td>
<td>FPR = 37% (32 – 42%)</td>
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<tr>
<td></td>
<td>1% lidocaine</td>
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<tr>
<td></td>
<td>0.25% bupivacaine</td>
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<td>0.5 mL</td>
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<tr>
<td>Manchikanti et al 2001</td>
<td>100 patients with chronic low back pain</td>
<td>≥75% with the ability to perform previously painful movements</td>
<td>Prevalence = 40% (31 – 49%)</td>
<td>FPR = 47% (35 – 59%)</td>
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<td></td>
<td>50 aged less than 65 years and 50 aged 65 years or over</td>
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<td></td>
<td>1% lidocaine</td>
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<td></td>
<td>0.25% bupivacaine</td>
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<td>0.4 – 0.6 mL</td>
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<tr>
<td>Manchikanti et al 2001</td>
<td>100 patients with chronic low back pain</td>
<td>≥75%</td>
<td>Normal weight</td>
<td></td>
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<tr>
<td></td>
<td>Group I = normal weight</td>
<td></td>
<td>Prevalence = 36% (22 – 50%)</td>
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<tr>
<td></td>
<td>Group II = obese</td>
<td></td>
<td>FPR = 44% (26 – 61%)</td>
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<tr>
<td></td>
<td>1% lidocaine</td>
<td></td>
<td>Obese</td>
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<td>0.25% bupivacaine</td>
<td></td>
<td>Prevalence = 40% (26 – 54%)</td>
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<td>0.4 – 0.6 mL</td>
<td></td>
<td>FPR = 33% (16 – 51%)</td>
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</tr>
<tr>
<td>Manchikanti et al 2001</td>
<td>120 patients with chronic low back pain who had failed conservative treatment</td>
<td>≥80%</td>
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<tr>
<td></td>
<td>1% lidocaine</td>
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<tr>
<td></td>
<td>0.25% bupivacaine</td>
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<td></td>
<td>0.3 – 0.6 mL</td>
<td></td>
<td></td>
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<tr>
<td>Manchikanti et al 1999</td>
<td>397 patients with chronic low back pain</td>
<td>At least 80% pain relief with ability to perform previously</td>
<td>Prevalence = 31% (27 – 36%)</td>
<td>FPR = 27% (22 – 32%)</td>
</tr>
<tr>
<td></td>
<td>1% lidocaine</td>
<td>painful movements</td>
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<tr>
<td></td>
<td>0.25% bupivacaine</td>
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<td></td>
<td>0.5 mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manchukonda et al 2007</td>
<td>303 patients with chronic low back pain of at least 3 months duration following a</td>
<td>At least 80% pain relief with ability to perform previously</td>
<td>Prevalence = 27% (40 – 68%)</td>
<td>FPR = 45%</td>
</tr>
<tr>
<td></td>
<td>motor vehicle accident</td>
<td>painful movements</td>
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<td></td>
<td>0.25% bupivacaine</td>
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<td></td>
<td>0.5 mL</td>
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<td></td>
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</tr>
<tr>
<td>Manchikanti et al 2002</td>
<td>120 consecutive patients with chronic low back pain and neck pain</td>
<td>At least 80% pain relief</td>
<td>Prevalence = 40% (31 – 49%)</td>
<td>FPR = 30% (20 – 40%)</td>
</tr>
<tr>
<td></td>
<td>1% lidocaine</td>
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<tr>
<td></td>
<td>0.25% bupivacaine</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Study</td>
<td>Patients</td>
<td>Anesthetic</td>
<td>Outcome</td>
<td>Prevalence</td>
</tr>
<tr>
<td>-------</td>
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<td>------------</td>
</tr>
<tr>
<td>Manchikanti et al, 2007</td>
<td>117 consecutive patients with chronic low back pain after lumbar surgical interventions</td>
<td>1% lidocaine, 0.25% bupivacaine, 0.5 mL</td>
<td>At least 80%</td>
<td>Prevalence = 16% (9-23%)</td>
</tr>
</tbody>
</table>
### 8.3 Summary of patient selection criteria prior to diagnostic medial branch block procedure from other organisations

<table>
<thead>
<tr>
<th>Organisation</th>
<th>History and differential diagnoses</th>
<th>Diagnosis</th>
<th>Localisation of pain</th>
<th>Psychological criteria</th>
<th>Previous treatment</th>
</tr>
</thead>
</table>
| **ANZCA FPM guidance** | Serious possible causes of spinal pain such as tumours, infection, vascular and metabolic disease must be excluded by careful history, examination, and appropriate laboratory and imaging tests. Comprehensive multidimensional assessment has been performed including: medical and pain history, physical and psychosocial assessments. | Painful disabilities persist for at least 3 months Meet IASP Taxonomy criteria for somatic cervical or lumbar spinal pain of unknown or uncertain origin | Patient should be able to identify one or more focal areas of pain in a region supplied by one or more medial branches of dorsal rami of cervical or lumbar nerves | Psychologically suitable  
Cognitively intact – not distressed  
Able to give clear responses as to efficacy of procedure;  
Full understanding of diagnostic purpose of procedure | Patients may or may not have had adequate trials of other treatments or management strategies. It is important that the clinician review the patients’ prior access to, and experience of, the various conservative management options before embarking on diagnostic medial branch blocks |
| **SIS guidelines** | Serious possible causes of spinal pain such as tumours, infection, vascular and metabolic disease must be excluded by careful history, examination, and appropriate laboratory and imaging tests. | Only indicated for chronic back pain | Patient should be able to identify one or more focal areas of pain in a region supplied by one or more medial branches of dorsal rami of cervical or lumbar nerves | | |
| **BUPA, UK** | | Pain greater than 4/10 on VAS | No psychological distress (primarily, moderate to severe depression or post traumatic stress disorder (PTSD)) | Conservative treatment (including analgesic medication, physiotherapy) has failed | |
| **AETNA** | Member has had no prior spinal fusion surgery; and  
Neuroradiologic studies are negative or fail to confirm disc herniation; and  
Member has no significant narrowing of the vertebral canal or | Chronic back or neck pain (pain lasting more than 3 months despite appropriate conservative treatment) | | | Member has tried and failed conservative treatments such as bed rest, back supports, physiotherapy, correction of postural abnormality, as well as pharmacotherapies (e.g., anti-inflammatory agents, analgesics and muscle relaxants); |
spinal instability requiring surgery; and

<table>
<thead>
<tr>
<th>Organization</th>
<th>Medial Branch Block procedure and technique</th>
<th>Response to MBB</th>
</tr>
</thead>
</table>
| ANZCA | Follows SIS guidelines  
Comparative local anaesthetic blocks are the recommended standard practice.  
Utilizing the double-injection technique and an 80% threshold will diminish inappropriate and unnecessary treatment | The patient’s responses to a series of comparative local anaesthetic blocks may fall into three categories:  
Discrepant – positive response to the first block but a negative or indeterminate response to the second block of the same target nerves. The series is considered negative;  
Concordant – longer-lasting relief with the longer-acting local anaesthetic and shorter-lasting relief with the shorter-acting local anaesthetic, with both periods of relief being consistent with the expected duration of action of the agents. This constitutes a positive diagnostic series;  
Discordant – longer-lasting relief following the shorter-acting local anaesthetic and vice versa. This can also be qualified as “prolonged discordant” if relief following one or other agent exceeds its expected duration of action. Under double-blind conditions, the majority of patients who had discordant responses did not respond to a normal saline injection so these responses are considered positive. |
| SIS | Recommends placebo-controlled blocks as the ideal  
Recommends comparative blocks in elderly patients where the prevalence of lumbar Z-joint pain is ~40% | Complete relief of all pain not expected.  
A positive response = complete relief of pain in a topographic area which forms part of a patients complaint, and which corresponds with an area which would be expected to be mediated by the nerves anaesthetised |
| BUPA | | Evidence of response to a medial branch block or intra-articular facet joint injection of at least 80% relief for an appropriate time period |
| Transport Accident Commission, VIC, Australia | | RFN only after two positive Medial Branch Blocks have taken place and at least 75% or greater relief of pain is achieved on standardized outcome measures.  
Diagnostic blocks may be repeated up to three times for one location in order to clearly diagnose pain generators through the use of placebo controlled blocks. |

8.4 Summary of criteria for classification of a positive diagnostic response to medial branch block from other organisations
8.5 Search Strategy

1. exp pain/
2. pain$.mp.
3. analg$.mp.
4. exp analgesia/
5. exp analgesics/
6. or/1-5
7. case stud$.pt.
8. case ser$.pt.
10. case series.tw.
11. case series/
12. case series.mp.
13. case stud$.tw.
14. or/7-13
15. randomized controlled trial.pt.
16. controlled clinical trial.pt.
17. randomized controlled trials/
18. random allocation/
19. double-blind method/
20. single-blind method/
21. or/15-20
22. clinical trial.pt.
23. exp clinical trial/
25. ((singl$ or doubl$ or tripl$ or trebl$) adj25 (blind$ or mask$)).tw.
26. placebos/
27. placebo$.tw.
28. random$.tw.
29. research design/
30. or/22-29
31. (clinical adj3 stud$).mp.
32. (systematic adj3 review$).mp.
33. (meta adj3 analysis).mp.
34. or/31-33
35. treatment outcome/
36. meta-analysis/
37. exp guideline/
38. or/35-37
39. 14 or 21 or 30 or 34 or 38
40. 39 and 6
41. exp nerve block/
42. (diagnos$ or nerve) adj2 block$.mp.
43. ((cervical or lumbar) adj2 (medial or branch$)).mp.
44. zygapophyseal joint/
45. (41 or 42) and (43 or 44)
46. diagnos$.mp. or di.fs.
47. 45 and 46
48. 40 and 47
### Systematic Reviews

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
</table>
| Watters et al (2014)   | Systematic review to update guideline recommendations (2005) Search of Medline (PubMed) 2003 2011 limited to English language Papers selected were confined to studies of chronic low-back pain (>3–6 months) due to lumbar degenerative disease without deformity and without radiculopathy. Included study designs not clearly described but stated that Level I – III were included in evidence tables. Level IV (case series?) included in discussion but not evidence tables. Three research questions including: 2) Are lumbar facet injections effective for improving the outcomes of patients with chronic low-back pain resulting from degenerative disease of the lumbar spine? Diagnostic facet nerve blocks discussed as part of the procedure for completing facet joint injections | Datta et al Level 1 and 2 evidence suggested use of double-controlled blocks and 80% pain relief threshold produced highest specificity in diagnosing facet-mediated back pain Manchikanti et al (2010): diagnostic utility of 80% v 50% pain relief threshold with 2 year follow-up: 80% = 89.5% patients with sustained diagnosis at 2 years follow-up 50% = 51% patients with sustained diagnosis at 2 years follow-up Recommendations:  
Grade B To establish the diagnosis of lumbar facet-mediated pain, the double-injection technique with an improvement threshold of 80% or greater is suggested (single Level I study).  
Grade C Diagnostic facet blocks by the double-injection technique with an improvement threshold of 80% are an option for predicting a favourable response to facet medial nerve ablation by thermocoagulation for facet-mediated chronic low-back pain without radiculopathy in patients with degenerative disease of the lumbar spine (single Level II study).  
Grade I: Inconclusive There is no evidence to support the use of diagnostic facet blocks as a predictor of lumbar fusion outcome in patients with chronic low-back pain from degenerative lumbar disease (conflicting Level IV evidence). | Clearly defined research question Two people selected studies and extract data Comprehensive literature search carried out Authors clearly state how limited review by publication type Included and excluded studies listed Characteristics of included studies are provided Scientific quality of included studies assessed and documented Scientific quality of included studies assessed appropriately | Y | Lack of clarity regarding included study designs Limited databases searched | N – Medline | N | N | N | N | N | N |
| J Neurosurg Spine 21:79–90 | Study Design Systematic review Research Question To systematically review the evidence for the performance of fusion procedures | | | | | | | | | |
### Study

**Boswell, Manchikanti et al (2015)**

Pain Physician, 18, E497 – 533.

A best evidence systematic review of the diagnostic accuracy and utility of facet (zygapophysial) joint injections in chronic spinal pain.

#### Literature search:

PubMed, Cochrane Library, US National Guideline Clearinghouse, clinicaltrials.gov, were searched through to March 2015

#### Inclusion criteria:

Studies evaluating spinal facet joint pain of cervical, thoracic, and lumbar facet joints

Studies utilizing controlled diagnostic blocks either with placebo, comparative local anesthetic blocks or single blocks

Studies performed under

---

#### Outcomes & results

Investigated diagnostic accuracy of facet joint injections, including medial branch blocks

Included 10 primary studies – these were the same studies reported in previous systematic reviews – no additional studies were identified

**Findings**

Controlled comparative MBB block with at least 75% pain relief (n= 10 studies)

Prevalence 36 – 67%

FPR 27 – 63%

**Authors comments**

The available evidence is Level I for lumbar facet joint nerve blocks with the inclusion of a total of 17 studies with

---

#### Paper Grading

Clearly defined research question

Two people selected studies and extract data

Comprehensive literature search carried out

Authors clearly state how limited review by publication type

Included and excluded studies listed

Characteristics of

---

#### Reviewer comments & evidence level

Literature search was adequate

Studies were too heterogenous to allow for meta-analysis so the ranges of prevalence and FPRs were reported

Conclusions regarding the accuracy of diagnostic MBB do not seem to reflect the FPRs reported in the studies

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<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
</table>
| Boswell, Manchikanti et al (2015) | **Literature search:** PubMed, Cochrane Library, US National Guideline Clearinghouse, clinicaltrials.gov, were searched through to March 2015 | Investigated diagnostic accuracy of facet joint injections, including medial branch blocks

Included 10 primary studies – these were the same studies reported in previous systematic reviews – no additional studies were identified

**Findings**

Controlled comparative MBB block with at least 75% pain relief (n= 10 studies)

Prevalence 36 – 67%

FPR 27 – 63%

**Authors comments**

The available evidence is Level I for lumbar facet joint nerve blocks with the inclusion of a total of 17 studies with | Clearly defined research question

Two people selected studies and extract data

Comprehensive literature search carried out

Authors clearly state how limited review by publication type

Included and excluded studies listed | Literature search was adequate

Studies were too heterogenous to allow for meta-analysis so the ranges of prevalence and FPRs were reported

Conclusions regarding the accuracy of diagnostic MBB do not seem to reflect the FPRs reported in the studies |
**Systematic review**

**Funding:** Not clear

**Exclusion criteria**
Reports without an appropriate diagnosis, nonsystematic reviews, book chapters, and case reports

**Outcomes:**
- The primary outcome parameter was pain relief.
- The secondary outcome measure was functional status improvement.

The primary studies were evaluated for methodological quality and data extracted by two authors.

Methodological quality evaluated using QAREL criteria

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<table>
<thead>
<tr>
<th>Study</th>
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<th>Outcomes &amp; results</th>
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<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chou et al (2009)</strong></td>
<td>Ovid Medline and Cochrane databases search through to July 2008 for nonsurgical interventions for low back pain and radicular pain</td>
<td>Guideline based its recommendations for invasive diagnostic tests on studies that assessed rates of positive tests in persons without low back pain and studies that evaluated effects of invasive diagnostic tests on clinical outcomes.</td>
<td>Clearly defined research question Two people selected</td>
<td>This is a high quality review which has opted to include only the highest quality</td>
</tr>
</tbody>
</table>
Interventional Therapies, surgery and interdisciplinary rehabilitation for Low Back Pain: An evidence-based clinical practice guideline from the American Pain Society

Evidence based on a systematic review, see Chou, Atlas et al (2009)

Clinical guideline

To present guidance for benefits and harms of nonsurgical interventional therapies for low back and radicular pain.

Oregon Health and Science University; Harvard Medical School; University of Iowa; Northwestern

(n=1331 references)

N=105 RCTs and n=30 SRs included

Criteria for inclusion:
English language, or non-English language trial but included in an English language systematic review

Evaluated nonpregnant adults (18 years old) with low (lumbar or sacral) back pain of any duration, alone or with leg pain

Evaluated a target injection or other interventional therapy (Table 1)

Reported at least 1 of the following outcomes: back specific function, generic health status, pain, work disability, or patient satisfaction.

2 independent reviewers appraised studies for quality using criteria from Cochrane Back Review Group

Overall strength of evidence (good, fair, or poor), was judged based on the number, quality, and size of studies; consistency of results between studies; and directness of evidence

USPSTF system for grading the strength of the evidence was used in developing recommendations

| outcomes | Recommendation 1:
| --- | There is insufficient evidence to evaluate validity or utility of diagnostic selective nerve root block, intra-articular facet joint block, medial branch block, or sacroiliac joint block as diagnostic procedures for low back pain with or without radiculopathy
|  | No reliable data exist on the diagnostic accuracy or clinical utility of diagnostic facet joint, medial branch, sacroiliac joint, or selective nerve root blocks.
|  | No studies identified by the systematic review evaluated the accuracy of diagnostic nerve block tests in guiding choice of therapy or their effect on patient outcomes compared with not using invasive diagnostic tests.

<table>
<thead>
<tr>
<th>studies and extract data</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive literature search carried out</td>
<td>N</td>
</tr>
<tr>
<td>Authors clearly state how limited review by publication type</td>
<td>Y</td>
</tr>
<tr>
<td>Included and excluded studies listed</td>
<td>Y</td>
</tr>
<tr>
<td>Characteristics of included studies are provided</td>
<td>Y</td>
</tr>
<tr>
<td>Scientific quality of included studies assessed and documented</td>
<td>Y</td>
</tr>
<tr>
<td>Scientific quality of included studies assessed appropriately</td>
<td>Y</td>
</tr>
<tr>
<td>Appropriate methods used to combine individual study findings</td>
<td>Y</td>
</tr>
<tr>
<td>Likelihood of publication bias assessed</td>
<td>N</td>
</tr>
<tr>
<td>Conflicts of interest declared</td>
<td>N</td>
</tr>
<tr>
<td>Are results of study directly applicable to primary studies. Unfortunately, no RCTs examining diagnostic MBBs were identified.</td>
<td>Y</td>
</tr>
<tr>
<td>While the quality of the review is high, they were unable to make any recommendations due to a lack of evidence.</td>
<td>N</td>
</tr>
</tbody>
</table>
### Study

**Falco, Manchikanti et al (2012)**


An update of the systematic assessment of the diagnostic accuracy of lumbar facet joint nerve blocks

**Methodology**
- Literature search from 1966 to June 2012 of Medline, Embase, Cochrane library, US National Guideline Clearinghouse, clinicaltrials.gov, previous systematic reviews for further references
- N=25 diagnostic accuracy studies included
- Each included study evaluated using QAREL (12 item appraisal checklist for studies of diagnostic reliability).
- 2 authors independently selected papers for inclusion and performed quality appraisals – only papers which met at least 50% of quality checklist were included in final analyses
- Inclusion criteria:
  - Pain relief classified as at least 50% pain relief from baseline pain
  - Diagnostic accuracy study
  - Use of controlled local anaesthetic blocks
  - Diagnostic lumbar facet joint nerve blocks performed under fluoroscopy

**Outcomes & results**
- Pain relief
- Ability to perform previous painful movements
- Meta-analysis was not feasible in any category because of heterogeneity in populations and pain relief thresholds
- Studies analysed based on pain threshold used:
  - **50 – 74% pain relief with single block, n=1**
    - Prevalence 48%
    - Evidence - poor
  - **75 – 100% pain relief with single block, n=4**
    - Prevalence 31 – 61%
    - Evidence - limited
  - **50 – 74% pain relief with dual block, n=5**
    - Prevalence 15 – 61%
    - FPR 17 – 66%
    - Evidence - fair
  - **75 - 100% pain relief with dual block, n=13**
    - Prevalence 25 - 45%, post-laminectomy syndrome prevalence 16%
    - FPR 25 – 49
    - Evidence – good
  - Effect of age, psychological factors, obesity, post-surgery factors, gender, smoking, sedation investigated

**Paper Grading**
- Clearly defined research question
- Two people selected studies and extract data
- Comprehensive literature search carried out
- Authors clearly state how limited review by publication type
- Included and excluded studies listed
- Characteristics of included studies are provided
- Scientific quality of included studies assessed and documented
- Scientific quality of included studies assessed appropriately

**Reviewer comments & evidence level**
- A well-conducted review but limited by the inclusion of lower quality studies, a lack of homogeneity in study populations and a paucity of data for some subanalyses (single blocks).
- Prevalence and false-positive rates varied quite widely.
- The authors suggest that there is good evidence for the accuracy of dual diagnostic blocks with >75% pain relief thresholds.
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
</table>
| **Part 1:** Manchikanti et al (2013) | Literature search of PubMed from 1966, Embase from 1980, Cochrane Library, US guideline clearinghouse, clinicaltrials.gov and other systematic reviews up to Dec 2012. Inclusion criteria: RCTs Non-randomised observational studies Diagnostic accuracy studies Case reports and reviews for complications | **Diagnostic Outcome Measures**  
For facet joint and sacroiliac joint interventions:  
- The primary outcome measure was pain relief concordant with the type of controlled diagnostic blocks performed.  
- The secondary outcome measure was the ability to perform previously painful movements without significant pain or complications  
**Pain relief thresholds:**  
Clinically meaningful pain relief of at least a 3-point change on an 11-point scale of 0 to 10, or 50% pain relief from the baseline, and/or a functional status improvement of 40% or more as clinically significant.  
**Findings** | Clearly defined research question  
Two people selected studies and extract data  
Comprehensive literature search carried out  
Authors clearly state how limited review by publication type  
Included and excluded studies listed | This review is of moderate quality.  
An adequate search strategy was used. All study designs were included, including those at high risk of bias (case series). Data synthesis involved presentation of the range of prevalence and FPRs – limited information about patient selection or source populations was provided. |
(ASIPP): An Update of Comprehensive Evidence-Based Guidelines for Interventional Techniques in Chronic Spinal Pain.

Systematic review and clinical guideline

To develop evidence-based clinical practice guidelines for interventional techniques in the diagnosis and treatment of chronic spinal pain.

Funding: American Society of Interventional Pain Physicians

performed with proper technique under image guidance (fluoroscopy, computed tomography [CT], or magnetic resonance imaging [MRI]) were included.

Excluded:
Ultrasound-guided interventions or interventions without fluoroscopic or CT guidance were excluded.

Participants:
Adults aged at least 18 years with chronic spinal pain of at least 3 months duration.

Patients must have failed previous pharmacotherapy, exercise therapy, etc., prior to starting interventional pain management techniques

Quality appraisal by two authors using appropriate checklists (Cochrane, Newcastle-Ottawa scale for observational studies, QAREL)

3 systematic reviews (covering 25 primary studies) – see Falco et al (2012) for summary

50 – 74% pain relief with single block, n=1
Prevalence 48%
Evidence - poor

75 – 100% pain relief with single block, n=4
Prevalence 31 – 61%
Evidence - limited

50 – 74% pain relief with dual block, n=5
Prevalence 15 – 61%
FPR 17 – 66%
Evidence - fair

75 - 100% pain relief with dual block, n=13
Prevalence 24 - 45%, post-laminectomy syndrome prevalence 16%
FPR 25 – 49%
Evidence – good

7 studies looked at influence on diagnostic blocks on therapeutic outcomes.

Evidence summary:
Dual nerve blocks with 75% to 100% pain relief as the criterion standard = evidence is good
Dual nerve blocks with 50 – 74% pain relief = evidence is fair
Single nerve block with 75 – 100% pain relief = evidence is limited
Single nerve block with 50 – 74% pain relief = evidence is poor

Characteristics of included studies are provided
Scientific quality of included studies assessed and documented
Scientific quality of included studies assessed appropriately
Appropriate methods used to combine individual study findings
Likelihood of publication bias assessed
Conflicts of interest declared
Are results of study directly applicable to patient group targeted by guideline?

limiting the usefulness of the recommendations.
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>American Society of Anesthesiologists Task Force (2010)</strong></td>
<td>The guidelines apply to patients with chronic noncancer neuropathic, somatic (e.g., myofascial), or visceral pain syndromes</td>
<td>Diagnostic procedures:</td>
<td>Clearly defined research question</td>
<td></td>
</tr>
<tr>
<td>Anesthesiology 2010; 112:810 – 33</td>
<td>Covers a range of patient evaluation, diagnosis and treatment interventions</td>
<td>The choice of an interventional diagnostic procedure (e.g., selective nerve root blocks, medial branch blocks, facet joint injections, sacroiliac joint injections, or provocative discography) should be based on the patient’s specific history and physical examination and the anticipated course of treatment.</td>
<td>Two people selected studies and extract data</td>
<td>N</td>
</tr>
<tr>
<td>Practice Guidelines for Chronic Pain Management (update)</td>
<td>12 person task force developed guidance</td>
<td>Intervventional diagnostic procedures should be performed with appropriate image guidance.</td>
<td>Comprehensive literature search carried out</td>
<td>N</td>
</tr>
<tr>
<td>Clinical guideline To review the evidence for the management of chronic pain</td>
<td>Literature review (databases not stated) from 1944 – 2009. Manual search of the literature.</td>
<td>Diagnostic medial branch blocks or facet joint injections may be considered for patients with suspected facet-mediated pain to screen for subsequent therapeutic procedures</td>
<td>Authors clearly state how limited review by publication type</td>
<td>N</td>
</tr>
<tr>
<td>Funding: American College of Anesthesiologists</td>
<td>Meta-analysis for some topics. Consensus statements developed as guidance through different methods – some surveys of ASA members</td>
<td></td>
<td>Included and excluded studies listed</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Characteristics of included studies are provided</td>
<td>N</td>
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<td></td>
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<td></td>
<td>Likelihood of</td>
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<td></td>
<td>Inadequate description of literature search or inclusion and exclusion criteria. Rationale for final set of included papers unclear.</td>
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<td>Many of the recommendations seem to be developed by surveying members of the ASA without clear linkage to the literature.</td>
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</table>
### ACC Research: Evidence-Based Healthcare Review

**Publication bias assessed**

**Conflicts of interest declared**

**Are results of study directly applicable to patient group targeted by guideline?**

<table>
<thead>
<tr>
<th>Study</th>
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<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
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<tbody>
<tr>
<td>Sehgal et al (2005)</td>
<td>Literature search of Medline, Ovid, PubMed, Embase, CINAHL and Cochrane Database of Systematic Reviews, Biomed Central from 1966 to Nov 2004. Manual search of reference lists of systematic reviews and narrative reviews.</td>
<td>Study characteristics: 10 RCTs, 17 prospective studies 7 randomised double-blind, 4 placebo-controlled double-blind &lt;100 patients = 13 studies, 100 – 200 patients = 14 studies, &gt;500 patients = 1 study Spine region studied - Cervical = 10 studies, Thoracic = 2 studies, Lumbar = 17 studies Diagnostic assessment protocol: Placebo-controlled triple block =2 studies Saline v lignocaine = 1 study Double blocks with lidocaine and bupivacaine Interval between blocks usually 2 or more weeks Physician blind to type of block = 4 studies</td>
<td>Clearly defined research question Two people selected studies and extract data Comprehensive literature search carried out Authors clearly state how limited review by publication type Included and excluded studies listed Characteristics of included studies are provided Scientific quality of</td>
<td>Y</td>
</tr>
</tbody>
</table>
Facet or zygapophysial joint injections in diagnosing chronic spinal pain of facet joint origin.

Funding: Not clear

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sehgal et al (2007)</td>
<td>Literature search of PubMed, Embase, CINAHL and Web of Knowledge from 2004 – 2006. Manual search of reference lists of systematic reviews and narrative reviews. Included: Double-block trials with Investigated diagnostic accuracy of facet joint injections, including medial branch blocks Criterion standard for pain relief was at least 50% pain relief for the duration of local anaesthetic effect. Diagnostic accuracy (3 additional studies): Manchukonda et al (2007) retrospective cohort, N=500 patients; Prevalence = 27% (95% CI 22 – 33%); FPR =</td>
<td>Clearly defined research question Two people selected studies and extract data Comprehensive literature search</td>
<td>Y Y Y</td>
</tr>
</tbody>
</table>

Primary outcome measure:
Pain relief measured by self-report scale Prevalence of facet joint pain 15 – 45% of those with low back pain FPR single blocks = 17 – 47%

Authors comments:
This systematic review provides moderate to strong evidence that controlled diagnostic facet joint blocks are safe, valid, and reliable, while uncontrolled facet joint injections are associated with a significant and variable false-positive rate.

Inadequate description of literature search or inclusion and exclusion criteria. Rationale for final set of included papers unclear.

Many of the
To update the evidence for the accuracy, safety and reproducibility of facet or zygapophysial joint injections in diagnosing chronic spinal pain of facet joint origin.

Funding: Not clear

- **fluoroscopy/image guidance**
- Prospective and retrospective studies in people with spinal pain of duration 3 months or more
- **Excluded:**
  - Single-block trials or blocks without radiological control
  - Case reports, Book chapters, narrative reviews, guidelines, letters
- Appraisal of study quality completed by 2 reviewers using AHRQ criteria and QUADAS criteria
- Prospective studies with placebo-control or comparative-controlled local anaesthetic blocks were given priority over retrospective studies

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Included and Excluded Studies Listed</th>
<th>Characteristics of Included Studies Are Provided</th>
<th>Scientific Quality of Included Studies Assessed and Documented</th>
<th>Scientific Quality of Included Studies Assessed Appropriately</th>
<th>Appropriate Methods Used to Combine Individual Study Findings</th>
<th>Likelihood of Publication Bias Assessed</th>
<th>Conflicts of Interest Declared</th>
<th>Are Results of Study Directly Applicable to Patient Group Targeted by Guideline?</th>
<th>Recommendations Seem to Be Developed by Surveying Members of the ASA without Clear Linkage to the Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manchikanti et al (2007) prospective cohort, n=117 patients; prevalence = 16%; FPR = 49%</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Overall rates for diagnostic studies of facet joint injections in the lumbar spine:</td>
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<tr>
<td>Prevalence = 15 – 45%</td>
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<tr>
<td>FPR = 17 – 47%</td>
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</tbody>
</table>
### Study: Datta et al (2009)

**Pain Physician** 12, 437 - 460

**Systematic assessment of diagnostic accuracy and therapeutic utility of lumbar facet joint injections.**

**Methodology:**
- Literature search of Medline, Embase, Cochrane database, Clinical trials registry to December 2008. Reference lists of systematic reviews, narrative reviews also checked.
- **Inclusion criteria:**
  - Diagnosis of lumbar facet joint pain in patients with chronic pain (3 months +)
  - Controlled diagnostic blocks – either placebo or comparative anaesthetic block under fluoroscopy
  - Studies with criterion pain standard of at least 80% pain relief

**Exclusion criteria:**
- Case reports, book reviews, non-evidence based guidelines, expert opinions
- Assessment of studies by two reviewers using AHRQ criteria – any disagreements resolved by 3rd reviewer

**Outcomes & results:**
- N=1782 studies identified
- N= 35 studies considered for inclusion
- N= 7 studies met the inclusion criteria and utilised controlled local anaesthetic blocks with at least 80% pain relief
- **Prevalence** 27 – 40% with a prevalence of 16% in post lumbar laminectomy patients
- **FPR** 17 – 49%

**Authors notes:**
- Diagnostic lumbar facet joint nerve blocks are safe, valid, and reliable.
- Overall prevalence (n = 1,420) and false-positive rate of all studies is 31% (95% CI; 28% to 33%) and 30% (95% CI; 27% to 33%) respectively.

**Paper Grading:**
- Clearly defined research question
- Two people selected studies and extract data
- Comprehensive literature search carried out
- Authors clearly state how limited review by publication type
- Included and excluded studies listed
- Characteristics of included studies are provided
- Scientific quality of included studies assessed and documented
- Scientific quality of included studies assessed appropriately
- Appropriate methods used to combine individual study findings
- Likelihood of

**Reviewer comments & evidence level:**
- Inadequate description of literature search or inclusion and exclusion criteria. Rationale for final set of included papers unclear.
- Many of the recommendations seem to be developed by surveying members of the ASA without clear linkage to the literature.
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Agency for Drugs and Technologies in Health (2011) Rapid Response Report: Summary with Critical Appraisal Rapid systematic review</td>
<td>Literature search of PubMed, Cochrane databases, CRD databases, ECRI, Euroscan, international health technology agencies from 2006 – 2011. Inclusion criteria: health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, safety data, economic studies, and guidelines studies that assessed the effectiveness of therapeutic and diagnostic facet joint injections in patients with neck or low back pain interventions of interest were FJIs directly into the joint (intraarticular)</td>
<td>Included studies for diagnostic lumbar facet joint injections: 1 HTA – Belgian Health Care Knowledge Centre report 1 systematic review Datta et al (2009) Findings: Pooled FPR (7 studies) was 30% (95% CI 27 – 33%). No other estimates of diagnostic accuracy reported Lack of information about reference standard to which the FJIs were compared, drugs injected, injection technique, site of injection (intraarticular or nerve blocks) Findings of the reviews were not clearly supported by the evidence summarised therein.</td>
<td>Clearly defined research question Two people selected studies and extract data Comprehensive literature search carried out Authors clearly state how limited review by publication type Included and excluded studies listed Characteristics of included studies are provided Scientific quality of included studies</td>
<td>Y</td>
</tr>
<tr>
<td>Study</td>
<td>Methodology</td>
<td>Outcomes &amp; results</td>
<td>Paper Grading</td>
<td>Reviewer comments &amp; evidence level</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| Manchikanti, Boswell et al (2009) | Literature search:  
Details of the databases searched and search terms used were not included in the report  
Inclusion and exclusion criteria not stated  
- 80% or greater pain relief  
The primary studies were evaluated | Investigated diagnostic accuracy of facet joint injections, including medial branch blocks  
Included 9 primary studies – these were the same studies reported in Sehgal et al (2005; 2007) plus two additional studies:  
Manchikanti et al (2008), 206 non-surgery patients and 45 post-surgery patients, Double MBB  
Non-surgery: Prevalence = 39% (95% CI 33 – 46%), FPR = | Clearly defined research question  
Two people selected studies and extract data  
Comprehensive literature search carried out | Limitations of this review include as lack of information regarding the search strategy and databases, inclusion and exclusion criteria and method of selecting papers for inclusion. |
<table>
<thead>
<tr>
<th>Basis and diagnostic interventions in managing chronic spinal pain</th>
<th>Clinical practice guideline based on best evidence synthesis</th>
<th>Funding: Not clear for methodological quality and data extracted.</th>
</tr>
</thead>
</table>

**Authors comments**

Diagnostic lumbar facet joint nerve blocks are recommended in patients with suspected facet joint pain. Indications include:

- Patients suffering with somatic or non-radicular low back and lower extremity pain, with duration of pain of at least 3 months.
- Average pain levels are of greater than 6 on a scale of 0 to 10.
- Patients suffering with somatic or non-radicular neck pain or headache and upper extremity pain, with duration of pain of at least 3 months.
  - Average pain levels of greater than 6 on a scale of 0 to 10.
  - Pain is at least intermittent or continuous causing functional disability.
  - Problem has failed to respond and has not resolved with more conservative management, including physical therapy modalities with exercises, chiropractic management, and non-steroidal anti-inflammatory agents.
  - Lack of preponderance of evidence of cervical discogenic pain, disc herniation, or radiculitis.
  - There is no evidence of contraindications for the needle placement and injection of local anesthetics.
  - Contraindications or inability to undergo physical

<table>
<thead>
<tr>
<th>Author</th>
<th>Prevalence</th>
<th>FPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yin and Bogduk (2008), 84 patients</td>
<td>Prevalence = 42% (95% CI 44 – 54%)</td>
<td></td>
</tr>
</tbody>
</table>

Post-surgery:

- Prevalence = 36% (95% CI 22 – 51%), FPR = 50% (95% CI 32 – 68%)

---

43% (95% CI 35 – 52%)
therapy, chiropractic management, or inability to tolerate non-steroidal anti-inflammatory drugs.

♦ A positive response is based on the following evidence:
  • Patient has met the above indications.
  • Patient responds positively to controlled local anesthetic blocks either with placebo control or comparative local anesthetic blocks with appropriate response to each local anesthetic of < 1 mL.
  • At least 80% relief as criterion standard with the ability to perform previously painful movement without deterioration of the relief (i.e., extension, lateral rotation, flexion, overhead activity, etc.).
  • The patient’s response should be recorded independently by an assessor – generally a registered nurse familiar with patient or another physician.

<table>
<thead>
<tr>
<th>8.7 Excluded case series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study</strong></td>
</tr>
<tr>
<td>MacVicar et al 2013</td>
</tr>
<tr>
<td>Pain Medicine, 14: 639 - 645</td>
</tr>
<tr>
<td>Research design: Prospective case</td>
</tr>
</tbody>
</table>

1 Y = yes, N = no, NA = not applicable, ? = can’t say (information is missing or unclear)
Research Question:
To determine the effectiveness of lumbar RFN performed according to rigorous guidelines.

Funding:
ISIS research grant

<table>
<thead>
<tr>
<th>Series</th>
<th>Research Question:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To determine the effectiveness of lumbar RFN performed according to rigorous guidelines.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medicinal branch blocks</th>
<th>Diagnostic MBB procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lignocaine or bupivacaine</td>
<td></td>
</tr>
<tr>
<td>Controlled, triple-blind procedure</td>
<td></td>
</tr>
<tr>
<td>Positive response was classified as complete relief of pain for both blocks and able to perform daily activities which were usually restricted.</td>
<td></td>
</tr>
</tbody>
</table>

Duration of pain relief was not a criterion for a positive response because it is only marginally superior as a diagnostic factor.

Exact number of patients screened with MBB is not known because records were lost as a result of the Christchurch earthquakes.

RFN procedure
Completely according to ISIS guidelines.

Procedures carried out by two XX trained by Nikolai Bogduk according to ISIS guidelines.

16 gauge (1.6mm diameter) Cosman RRE electrodes and either 10cm or 15cm electrodes used depending on size of patient. Electrodes placed parallel to the medial branches. Multiple lesions to cover the likely location of the nerve.

**Exclusion**
Anything less than 100% relief of pain following the diagnostic medial branch blocks.

**Outcomes**
and all ADLs restored, the remainder reported 100% relief of pain and all ADLs restored.

Two practices were very similar in outcomes:
- Practice A: 58% total success, 18% outright failures.
- Practice B: 54% total success, 23% outright failures.

Practice B: 2 patients were classified as failures who had full relief of pain but ADLs not restored for other reasons – if they were called successes, the numbers would be almost identical.

Median 15 months relief of pain from first RFN if successful.

Average 16 months relief of pain for each successful RFN procedure.

Ongoing relief in 66% of patients.

Author conclusion: The present study echoes and extends the benchmark set by Dreyfuss et al (2000), and shows that 53-58% of patients maintain complete relief of pain and return to ADLs for over 12 months following RFN using rigorous protocols for diagnosis (controlled, double-blind MBB) and operative technique. Complete relief of pain, with no other need for healthcare, is the benchmark for successful lumbar RFN. To reduce false-positives even further, the authors suggest placebo-controlled blocks would be better for patient selection.

**Outcomes**
- Were the characteristics of the cases not significantly different from the treated population? | Y |
- Study conducted prospectively? | Y |
- Key outcomes measured before and after the intervention using a priori criteria | Y |
- Response at main moment of follow-up is > 80% or non – response not selective | Y |
- Are losses to follow-up accounted for and included in final analysis | Y |
- Were outcomes measured using standardised protocols? | Y |
- Were assessors blind to the intervention status of the cases? | N |
- Appropriate statistical models (univariate/multivariate) | NA |
- Measures of effectiveness included: interquartile range | N |
- Relevant to ACC report for effectiveness of diagnostic lumbar MBB and lumbar RFN | Y |

Grade: 3+
<table>
<thead>
<tr>
<th>VAS or verbal numerical pain rating score reported prior to treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ADLs nominated by patient, which were impeded by their pain and important to them</td>
</tr>
<tr>
<td>Work status</td>
</tr>
<tr>
<td>Current health care being used for their pain</td>
</tr>
<tr>
<td>Follow-up face-to-face or by phone. Pain scores and ADLs, work status and use of other health care.</td>
</tr>
<tr>
<td>Assessors were primary care physicians who were not involved in treatment of the patients</td>
</tr>
<tr>
<td>Duration of relief calculated as time from RFN procedure until time that pain had returned to 50% of it's pre-treatment level</td>
</tr>
</tbody>
</table>

**Successful RFN:**

Complete, or at least 80% relief, of pain for at least 6 months **and,**

Restoration of ADLs **and,**

No other health care required for their pain **and,**

Return to work

NB Over-the-counter analgesics were acceptable, but any prescription meds for the pain were considered a failure
## 8.8 Evidence tables – cervical diagnostic medial branch blocks

### Systematic Reviews

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falco, Erhart et al (2009)</td>
<td>Literature search from 1966 to December 2008&lt;br&gt;Medline, Embase, Cochrane review database, Google Scholar. Other systematic reviews handsearched for further references.</td>
<td>N=14 diagnostic accuracy studies included 5 excluded based on low pain threshold criteria (less than 80%) or use of single blocks&lt;br&gt;N=9 included in final synthesis of which 5 reported both prevalence and FPR data</td>
<td>Clearly defined research question&lt;br&gt;Two people selected studies and extract data&lt;br&gt;Comprehensive literature search carried out&lt;br&gt;Authors clearly state how limited review by publication type&lt;br&gt;Included and excluded studies listed&lt;br&gt;Characteristics of included studies are provided&lt;br&gt;Scientific quality of included studies assessed and documented</td>
<td>Y&lt;br&gt;Y&lt;br&gt;Y&lt;br&gt;N&lt;br&gt;N&lt;br&gt;Y&lt;br&gt;N&lt;br&gt;Y&lt;br&gt;Y</td>
</tr>
</tbody>
</table>
| Pain Physician, 12, 323 – 344 | Systematic review Systematic review of the diagnostic accuracy and therapeutic effectiveness of cervical facet joint interventions | Funding: Not stated<br><br>Participants: ≥18 years with chronic neck pain of at least 3 months duration<br><br>Inclusion criteria: Diagnostic accuracy study<br>Use of controlled comparative or placebo-controlled local anaesthetic blocks, performed under fluoroscopy or with CT imaging<br>Positive diagnostic response classified as at least 80% pain relief from baseline pain and the ability to perform previously painful movements<br><br>Excluded:<br>Interventional techniques performed blindly or using other identification modalities were excluded.<br>Less than 80% pain relief<br>Studies utilising single block Essays, reviews, letters, editorials, | Studies were limited to those that utilised controlled comparative or placebo-controlled diagnostic blocks and an 80% or greater reduction in pain plus return of otherwise painful movements. Even so, FPR varied widely suggesting patient populations, other patient selection factors and operative technique may have varied significantly between included studies. | Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y

Manchikanti et al (2002)     | Prevalence = 67% (95% CI 58 – 75%)<br>FPR = 63% (95% CI 48 - 78%) | Prevalence:<br>Non-surgery = 39% (95% CI 33 – 46%) | Prevalence: Non-surgery = 39% (95% CI 33 – 46%) | Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y

Manchikanti et al (2004)     | Prevalence = 55% (95% CI 49 – 61%)<br>FPR = 63% (95% CI 54 - 72%) | Prevalence:<br>Non-surgery = 39% (95% CI 33 – 46%) | Prevalence: Non-surgery = 39% (95% CI 33 – 46%) | Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y

Manchukonda et al (2007)     | Prevalence = 39% (95% CI 32 – 45%)<br>FPR = 45% (95% CI 37 - 52%) | Prevalence:<br>Non-surgery = 39% (95% CI 33 – 46%) | Prevalence: Non-surgery = 39% (95% CI 33 – 46%) | Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y

Manchikanti et al (2008)     | Prevalence: Non-surgery = 39% (95% CI 33 – 46%) | Prevalence:<br>Non-surgery = 39% (95% CI 33 – 46%) | Prevalence: Non-surgery = 39% (95% CI 33 – 46%) | Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y

Barnsley et al (1993)        | Prevalence – not reported<br>FPR = 27% (95% CI 15 – 38%) | Prevalence:<br>Non-surgery = 39% (95% CI 33 – 46%) | Prevalence: Non-surgery = 39% (95% CI 33 – 46%) | Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y<br>Y

It was unclear what the reference standard was in the included studies – presuming outcomes from cervical RFN but may have been subsequent therapeutic MBB injections. The conclusions and recommendation are not clearly derived from the included studies.
abstracts, surveys, learning modules, and animal or cadaveric studies.

**Quality assessment:**
Each retrieved study initially screened using modified AHRQ criteria. Studies had to score at least 50/100 to be included in the final set – scoring based on criteria developed by the ASIPP.

The final list of included studies was appraised using Cochrane criteria
2 authors independently selected papers for inclusion and performed quality appraisals. Disagreements decided by a third author
Authors of included studies did not perform the quality appraisal for those studies

Post-surgery = 36% (95% CI 22 – 51%)
FPR:
Non-surgery = 43% (95% CI 35 – 52%)
Post-surgery = 50% (95% CI 32 – 68%)

**Authors conclusions:**
The present systematic review provides strong evidence in favour of controlled diagnostic blocks with at least 80% pain relief and return of previously painful movements. Diagnostic cervical MBB are safe, valid and reliable.

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falco, Datta et al (2012)</td>
<td>Literature search of PubMed, Emerge, Cochrane database, US guideline clearinghouse, clinical trials.gov to June 2012. Reference lists of systematic reviews, narrative reviews also handsearched for additional references.</td>
<td>N=26 studies considered for inclusion N=5 excluded because they looked at pain patterns, 1 did not report FPR, 8 reported on characteristics which influence diagnosis of cervical facet joint pain N= 12 studies met the inclusion criteria of which 3 looked at single blocks and 9 comparative blocks Prevalence 27 – 40% with a prevalence of</td>
<td>Clearly defined research question Two people selected studies and extract data Comprehensive literature search carried out Authors clearly state how limited review by publication type Included and excluded studies listed</td>
<td>N Y Y It was unclear what the reference standard was in the included studies – presuming outcomes from cervical RFN but may have been subsequent therapeutic MBB injections. The conclusions and recommendation are not clearly derived from the</td>
</tr>
<tr>
<td>None Conflicts of interest declared</td>
<td>Failure of conservative therapy Diagnostic blocks performed under fluoroscopy or CT guidance At least 50% pain relief concordant with the type of block used and ability to perform previously painful movements</td>
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<tr>
<td><strong>Exclusion criteria:</strong></td>
<td><strong>Findings:</strong> 16% in post lumbar laminectomy patients FPR 17 – 49%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Non-clinical studies (not defined) Case reports, book chapters, non-systematic reviews</td>
<td>3 systematic reviews (covering 25 primary studies) – see Falco et al (2012) for summary</td>
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<tr>
<td><strong>Quality assessment:</strong> Search and selection potential studies by 2 authors Assessment of retrieved studies by two reviewers using QAREL criteria – any disagreements resolved by 3rd reviewer. Studies which met at least 50% of the criteria were included in the review.</td>
<td><strong>50 – 74% pain relief with single block, n=1 study</strong> Prevalence 55%</td>
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<tr>
<td></td>
<td><strong>75 – 100% pain relief with single block, n=2 studies</strong> Prevalence 25 - 63%, no confidence intervals presented</td>
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<tr>
<td></td>
<td><strong>50 – 74% pain relief with controlled comparative or placebo-controlled block, n=0 studies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>75 - 100% pain relief with controlled comparative or placebo-controlled block, n=9 studies</strong> 5 studies reported FPRs: <strong>Barnsley et al (1993)</strong> Prevalence – not reported FPR = 27% (95% CI 15 – 38%) <strong>Manchikanti et al (2002)</strong> Prevalence = 67% (95% CI 58 – 75%) FPR = 63% (95% CI 48 - 78%) <strong>Manchikanti et al (2004)</strong> Prevalence = 55% (95% CI 49 – 61%) FPR = 63% (95% CI 54 - 72%) <strong>Manchukonda et al (2007)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Characteristics of included studies are provided Scientific quality of included studies assessed and documented Scientific quality of included studies assessed appropriately Appropriate methods used to combine individual study findings Likelihood of publication bias assessed Conflicts of interest declared Are results of study directly applicable to patient group targeted by guideline?</td>
<td></td>
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<tr>
<td></td>
<td>Y Y Y Y Y Y included studies.</td>
<td></td>
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</tbody>
</table>
### Study Methodology

- **Pain Physician, 16, S1-48**
- American Society of Interventional Pain Physicians (ASIPP): An Update of Comprehensive

  - Inclusion criteria:
    - RCTs
    - Non-randomised observational studies
  - Diagnostic accuracy studies
  - Case reports and reviews for complications
  - Diagnostic and therapeutic spinal interventions appropriately performed with proper technique under image guidance (fluoroscopy, computed tomography [CT], or magnetic resonance imaging [MRI])

**Part 2: Manchikanti et al (2013)**
- **Pain Physician, 16, S49 - 283**

- **American Society of Interventional Pain Physicians (ASIPP): An Update of Comprehensive**

### Outcomes & results

**Diagnostic Outcome Measures**

- **For cervical diagnostic facet joint injections:**
  - The primary outcome measure was pain relief concordant with the type of controlled diagnostic blocks performed.
  - The secondary outcome measure was the ability to perform previously painful movements without significant pain or complications.

**Pain relief thresholds:**

- Clinically meaningful pain relief of at least a 3-point change on an 11-point scale of 0 to 10, or 50% pain relief from the baseline, and/or a functional status improvement of 40% or more as clinically significant.

**Diagnostic cervical facet joint nerve block:**

- 3 randomised trials and 2 placebo-

### Paper Grading

**Clearly defined research question**

- **Y**

**Two people selected studies and extract data**

- **Y**

**Comprehensive literature search carried out**

- **Y**

**Authors clearly state how limited review by publication type**

- **Y**

**Included and excluded studies listed**

- **N**

**Characteristics of included studies are provided**

- **Y**

**Scientific quality of included studies assessed and documented**

- **Y**

**Scientific quality of included studies assessed appropriately**

- **Y**

**Appropriate methods used to combine**

- **Y**

**Reviewer comments & evidence level**

- Wide confidence intervals for both prevalence estimates and FPRs across studies

- The literature search seems sound but it is difficult at times to understand how the recommendations were derived from the evidence included in these guidelines.

---

**Prevalence**

- 39% (95% CI 32 – 45%)

- FPR = 45% (95% CI 37 - 52%)

**Manchikanti et al (2002)**

- Prevalence = 60% (95% CI 50 – 70%)

- FPR = 40% (95% CI 34 - 46%)

**Authors conclusions:**

The evidence for diagnostic facet joint blocks utilizing at least 75% pain relief as the criterion standard with controlled diagnostic blocks is good.
Evidence-Based Guidelines for Interventional Techniques in Chronic Spinal Pain.

**Funding:** Not clear

---

**Evidence-guided interventions or interventions without fluoroscopic or CT guidance were excluded.**

**Participants:**

Adults aged at least 18 years with chronic spinal pain of at least 3 months duration.

Patients must have failed previous pharmacotherapy, exercise therapy, etc., prior to starting interventional pain management techniques.

Quality appraisal by two authors using appropriate checklists (Cochrane, Newcastle-Ottawa scale for observational studies, QAREL).

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<table>
<thead>
<tr>
<th>Controlled studies of diagnostic accuracy:</th>
<th>Individual study findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>50 – 74% pain relief with single block, n=1</strong></td>
<td>Likelihood of publication bias assessed</td>
</tr>
<tr>
<td>Prevalence 55% with high volume and 25% with low volume</td>
<td>Conflicts of interest declared</td>
</tr>
<tr>
<td>Evidence - limited</td>
<td>Are results of study directly applicable to patient group targeted by guideline?</td>
</tr>
</tbody>
</table>

| **75 – 100% pain relief with single block, n=2** | | |
| Prevalence 25 - 64% | | |
| Evidence - limited | | |

| **50 – 74% pain relief with dual block, n=0** | | |
| | | |
| **75 - 100% pain relief with dual block, n=9** | | |
| Prevalence 36 - 67% | | |
| FPR 40 - 63% | | |
| Evidence – good | | |

**Authors recommendations**

Diagnostic cervical facet joint nerve blocks are recommended in patients with somatic or non-radiculocic pain or headache and upper extremity pain, with duration of pain of at least 3 months, without preponderance of evidence of discogenic pain, disc herniation, or evidence of radiculitis.

When 75 – 100% pain relief with controlled blocks is utilised, the evidence is good based on multiple high quality studies of diagnostic accuracy incorporating prevalence with or without false-positive rates. The evidence is limited or not available in all other categories.
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Society of Anesthesiologists</td>
<td>The guidelines apply to patients with chronic noncancer neuropathic, somatic</td>
<td>Diagnostic procedures: Intervventional diagnostic procedures should be performed</td>
<td>Clearly defined research question</td>
<td>Inadequate description of literature search or inclusion and exclusion criteria. Rationale for</td>
</tr>
<tr>
<td>Task Force (2010)</td>
<td>e.g., myofascial, or visceral pain syndromes</td>
<td>with appropriate image guidance.</td>
<td>Two people selected studies and extract data</td>
<td>final set of included papers unclear. Many of the recommendations seem to be developed without</td>
</tr>
<tr>
<td>Practice Guidelines for Chronic Pain</td>
<td>Covers a range of patient evaluation, diagnosis and treatment interventions</td>
<td>Diagnostic medial branch blocks or facet joint injections may be considered for</td>
<td>Comprehensive literature search carried out</td>
<td>clear links to the evidence base.</td>
</tr>
<tr>
<td>Management (update)</td>
<td>12 person task force developed guidance</td>
<td>patients with suspected facet-mediated pain to screen for subsequent therapeutic</td>
<td>Authors clearly state how limited review by publication type</td>
<td></td>
</tr>
<tr>
<td>Funding: American Society of Anesthesiologist</td>
<td>Literature review (databases not stated) from 1944 – 2009. Manual search of</td>
<td>procedures</td>
<td>Included and excluded studies listed</td>
<td></td>
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<td></td>
<td>the literature.</td>
<td></td>
<td>Characteristics of included studies are provided</td>
<td></td>
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<tr>
<td></td>
<td>Meta-analysis for some topics.</td>
<td></td>
<td>Scientific quality of included studies assessed and documented</td>
<td></td>
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<tr>
<td></td>
<td>Consensus statements developed as guidance through different methods – some</td>
<td></td>
<td>Scientific quality of included studies assessed appropriately</td>
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<td></td>
<td>surveys of ASA members</td>
<td></td>
<td>Appropriate methods used to combine individual study findings</td>
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<td>Likelihood of publication bias assessed</td>
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<td>Conflicts of interest declared</td>
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<td></td>
<td>Are results of study directly applicable to patient group targeted by guideline?</td>
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<tr>
<td>Canadian Agency for Drugs and Technologies in</td>
<td>Literature search of PubMed, Cochrane databases, CRD databases, ECRI,</td>
<td>Included studies for diagnostic cervical facet joint injections:</td>
<td>Clearly defined research question</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Euroscan, international health</td>
<td></td>
<td>Two people selected studies and extract data</td>
<td></td>
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<td></td>
<td>CADTH rapid reviews focus on the highest quality evidence – health</td>
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</tbody>
</table>
technology agencies from 2006 – 2011.
Inclusion criteria:
Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, safety data, economic studies, and guidelines
Studies that assessed the effectiveness of therapeutic and diagnostic facet joint injections in patients with neck or low back pain

1 systematic review Falco et al (2009) which summarised 9 primary studies:
Findings:
Findings from the primary studies were not pooled
Prevalence ranged from 36 – 67%
FPR ranged from 27 – 63%

Authors comments:
Lack of information about reference standard to which the FJIs were compared, drugs injected, injection technique, site of injection (intraarticular or nerve blocks)
Tests were not administered without knowledge of disease status
No rationale for not pooling data
Failure to report complication rates
The upper limit of the FPRs seems to contradict the conclusion that the tests are reliable.

Findings of the reviews were not clearly supported by the evidence summarised therein.
Caution should be used in applying the current body of literature to policy decisions about FJIs and decisions about individual patient management and its limitations should be considered.

---

**Study** | **Methodology** | **Outcomes & results** | **Paper Grading** | **Reviewer comments & evidence level**
---|---|---|---|---

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technology assessments, systematic reviews and meta-analyses were considered first, followed by controlled primary studies
The authors commented on the lack of evidence in this area, and that the systematic reviews tended to rely on a pool of studies by one group of authors. The findings of the reviews were not clearly supported by the evidence reported.
Sehgal et al (2005)

Pain Physician, 8, 211 – 224

Diagnostic utility of facet (zygopophysial) joint injections in chronic spinal pain: A systematic review of evidence.

Funding: Not clear


Included:
Prospective and retrospective studies in people with spinal pain of duration 3 months or more
Studies which utilized placebo-controlled or double-block comparative controlled studies
Studies which utilized at least 50% pain relief and the ability to perform previously painful activities

Excluded:
Single-block trials or blocks without radiological guidance
Studies reporting therapeutic facet joint procedures
Case reports, Book chapters, narrative reviews, guidelines, letters
Appraisal of study quality completed by 2 reviewers using AHRQ criteria and QUADAS criteria

Prospective studies with placebo-control or comparative-controlled local anaesthetic blocks were given priority over retrospective studies

Study characteristics:
<100 patients = 13 studies, 100 – 200 patients = 14 studies, >500 patients = 1 study

Spine region studied - Cervical = 10 studies, Thoracic = 2 studies, Lumbar = 17 studies

Cervical diagnostic medial branch block studies

Prevalence of cervical facet joint pain:
1 RCT and 4 prospective cohort studies
Manchikanti et al (2002), n=120, Double MBB with lidocaine 1% and bupivacaine 0.25%, Prevalence 67% (95% CI 58 – 75%), FPR 63% (95% 48 – 78%)
Manchikanti et al (2004), n=255, Double MBB with sedation with lidocaine 1% and bupivacaine 0.25%, Prevalence 55% (95% CI 49 – 61%), FPR 63% (95% CI 54 – 72%)
Barnsley et al (1995), n=50, 12 dropouts, Double MBB, Prevalence 54% (95% CI 40 – 68%), FPR
Lord et al (1996), n=68, 16 dropouts, Placebo-controlled double MBB with lidocaine 2% and bupivacaine 0.5%, Prevalence C2-3 pain 50% (95% CI 29 – 71%), Overall prevalence 60% (95% CI 46 – 73%)
Manchikanti et al (2002), n=106, Double MBB with lidocaine 1% and bupivacaine 0.25%, Prevalence 60% (95% CI 50 – 70%), FPR 40% (95% CI 25 – 56%)

Authors comments:
Based on this review the prevalence of facet joint pain in people with chronic neck pain

Clearly defined research question
Two people selected studies and extract data
Comprehensive literature search carried out
Authors clearly state how limited review by publication type
Included and excluded studies listed
Characteristics of included studies are provided
Scientific quality of included studies assessed and documented
Scientific quality of included studies assessed appropriately
Appropriate methods used to combine individual study findings
Likelihood of publication bias assessed
Conflicts of interest declared
Are results of study directly applicable to patient group targeted by guideline?

Y
Y
Y
N
Y
Y
Y
N
N
Y
is 54 – 67%. FPRs with double blocks are 40 – 63%.

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
</table>
| Sehgal et al (2007)           | Literature search of PubMed, Embase, CINAHL and Web of Knowledge from 2004 – 2006. Manual search of reference lists of systematic reviews and narrative reviews. Included: Double-block trials with fluoroscopy/image guidance Prospective and retrospective studies in people with spinal pain of duration 3 months or more Excluded: Single-block trials or blocks without radiological control Case reports, Book chapters, narrative reviews, guidelines, letters Appraisal of study quality completed by 2 reviewers using AHRQ criteria and QUADAS criteria Prospective studies with placebo-control or comparative-controlled local anaesthetic blocks were given priority over retrospective studies | Updated studies of diagnostic accuracy of facet joint injections from 2004 - 2006, including cervical MBBs Criterion standard for pain relief was at least 50% pain relief for the duration of local anaesthetic effect. Diagnostic accuracy (3 additional studies): Manchukonda et al (2007) retrospective cohort, N=251, Double MBB Prevalence = 39% (95% CI 32 – 45%); FPR = 45% (95% CI 37 – 52%); use of 80% pain reduction criteria Speldewinde et al (2001) retrospective cohort, n=97; Double MBB, prevalence = 36% (95% CI 27 – 45%)
Authors comments: Controlled comparative local anesthetic blocks of facet joints (medial branch or dorsal ramus) are reproducible, reasonably accurate and safe. | Clearly defined research question Two people selected studies and extract data Comprehensive literature search carried out Authors clearly state how limited review by publication type Included and excluded studies listed Characteristics of included studies are provided Scientific quality of included studies assessed and documented Scientific quality of included studies assessed appropriately Appropriate methods used to combine individual study findings Likelihood of publication bias assessed Conflicts of interest declared Are results of study directly applicable to patient group targeted by guideline? | Y Y Y Y Y Y N Y Y Y |

It was unclear what the reference standard was in the included studies – presuming outcomes from cervical RFN but may have been subsequent therapeutic MBB injections. The conclusions and recommendation are not clearly derived from the included studies.
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper Grading</th>
<th>Reviewer comments &amp; evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inclusion criteria: Studies evaluating spinal facet joint pain of cervical, thoracic, and lumbar facet joints</td>
<td>Included 10 primary studies – these were the same studies reported in previous systematic reviews – no additional studies were identified</td>
<td>Two people selected studies and extract data</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Exclusion criteria: Studies utilizing controlled diagnostic blocks either with placebo, comparative local anesthetic blocks or single blocks</td>
<td>Findings</td>
<td>Comprehensive literature search carried out</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Studies performed under fluoroscopic or CT guidance</td>
<td>Controlled comparative MBB block with at least 75% pain relief (n= 10 studies)</td>
<td>Authors clearly state how limited review by publication type</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Reports without an appropriate diagnosis, nonsystematic reviews, book chapters, and case reports</td>
<td>Prevalence 36 – 67%</td>
<td>Included and excluded studies listed</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Outcomes:</td>
<td>FPR 27 – 63%</td>
<td>Characteristics of included studies are provided</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>• The primary outcome parameter was pain relief.</td>
<td>Authors comments</td>
<td>Scientific quality of included studies assessed and documented</td>
<td>Y</td>
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<tr>
<td></td>
<td>• The secondary outcome measure was functional status improvement.</td>
<td></td>
<td>Scientific quality of included studies assessed appropriately</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>The primary studies were evaluated for methodological quality and data extracted by two authors.</td>
<td>Findings</td>
<td>Appropriate methods used to combine individual study findings</td>
<td>Y</td>
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<td></td>
<td>Likelihood of publication bias assessed</td>
<td>N</td>
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<td></td>
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<td></td>
<td>Conflicts of interest declared</td>
<td>Y</td>
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<td></td>
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<td></td>
<td>Are results of study directly applicable to patient group targeted by guideline?</td>
<td>Y</td>
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<tr>
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<td></td>
<td>Literature search was adequate</td>
<td>Y</td>
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<tr>
<td></td>
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<td></td>
<td>Studies were too heterogenous to allow for meta-analysis so the ranges of prevalence and FPRs were reported</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Conclusions regarding the accuracy of diagnostic MBB do not seem to reflect the FPRs reported in the studies</td>
<td>Y</td>
</tr>
</tbody>
</table>

- **Literature search**: Adequate
- **Studies were too heterogenous to allow for meta-analysis**: So the ranges of prevalence and FPRs were reported
- **Conclusions regarding the accuracy of diagnostic MBB**: Do not seem to reflect the FPRs reported in the studies

---

**Study**: Investigated diagnostic accuracy of facet joint injections, including medial branch blocks.

**Inclusion criteria**:
- Studies evaluating spinal facet joint pain of cervical, thoracic, and lumbar facet joints.
- Studies utilizing controlled diagnostic blocks either with placebo, comparative local anesthetic blocks or single blocks.
- Studies performed under fluoroscopic or CT guidance.

**Exclusion criteria**: Reports without an appropriate diagnosis, nonsystematic reviews, book chapters, and case reports.

**Outcomes**:
- The primary outcome parameter was pain relief.
- The secondary outcome measure was functional status improvement.

The primary studies were evaluated for methodological quality and data extracted by two authors.

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**Funding**: Not clear.

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**Authors comments**:
- Clearly defined research question
- Two people selected studies and extract data
- Comprehensive literature search carried out
- Authors clearly state how limited review by publication type
- Included and excluded studies listed
- Characteristics of included studies are provided
- Scientific quality of included studies assessed and documented
- Scientific quality of included studies assessed appropriately
- Appropriate methods used to combine individual study findings
- Likelihood of publication bias assessed
- Conflicts of interest declared
- Are results of study directly applicable to patient group targeted by guideline?
8.9 Excluded case series

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Outcomes &amp; results</th>
<th>Paper grading²</th>
<th>ACC reviewer comments &amp; evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacVicar et al 2012</td>
<td>N = 104 consecutive patients who underwent cervical RFN between 2004 and Dec 2009</td>
<td>N = 104 progressed to RFN Of those, 71 (68%) were classified as successes. Of the 71 who were successfully treated, 5 reported 80-90% relief of pain and all ADLs restored, the remainder reported 100% relief of pain and all ADLs restored Two practices were similar in outcomes: Practice A: 74% total success, 12.5% outright failures Practice B: 61% total success, 20% outright failures Practice B: 3 patients were classified as failures who had full relief of pain but ADLs not restored for other reasons Median 15 months relief of pain from first RFN if successful Average 19 months relief of pain for each successful RFN procedure Ongoing relief in 60% of patients</td>
<td>Clear objective described</td>
<td>Low grade evidence that RFN performed according to ISIS guidelines and following controlled, comparative double-blind diagnostic MBB, where a positive response is complete relief of pain, can result in a long duration of complete pain relief and full restoration of ADLs.</td>
</tr>
<tr>
<td></td>
<td>Patient Selection Complete relief of pain following controlled, diagnostic, cervical medial branch blocks <strong>Diagnostic MBB procedure</strong> Patients presented with neck pain with or without referred pain to the head or shoulder girdle Patients pain was mapped to segments according to Cooper et al (2007) If initial blocks were negative, further blocks were performed at adjacent levels in order to find the symptomatic segment Initial block positive in 48% patients, two blocks required in 20%, 3 blocks in 27%, more than 3 blocks in 5%</td>
<td></td>
<td>Study population described</td>
<td>Study population described</td>
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<td>Patients selected consecutively in an unbiased manner?</td>
<td>Patients selected consecutively in an unbiased manner?</td>
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<td>Were the characteristics of the cases not significantly different from the treated population?</td>
<td>Were the characteristics of the cases not significantly different from the treated population?</td>
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<td>Study conducted prospectively?</td>
<td>Study conducted prospectively?</td>
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<td>Key outcomes measured before and after the intervention using a priori criteria</td>
<td>Key outcomes measured before and after the intervention using a priori criteria</td>
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<td></td>
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<td></td>
<td>Response at main moment of follow-up is &gt;80% or non - response not selective</td>
<td>Response at main moment of follow-up is &gt;80% or non - response not selective</td>
</tr>
<tr>
<td></td>
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<td>Are losses to follow-up accounted for and included in final analysis</td>
<td>Are losses to follow-up accounted for and included in final analysis</td>
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<td></td>
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<td>Were outcomes measured using standardised protocols?</td>
<td>Were outcomes measured using standardised protocols?</td>
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<td></td>
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<td></td>
<td>Were assessors blind to the intervention status of the cases?</td>
<td>Were assessors blind to the intervention status of the cases?</td>
</tr>
</tbody>
</table>

² Y = yes, N = no, NA = not applicable, ? = can’t say (information is missing or unclear)
Lignocaine or bupivacaine Controlled, triple-blind procedure Positive response was classified as complete relief of pain for both blocks and able to perform daily activities which were usually restricted. Duration of pain relief was not a criterion for a positive response because it is only marginally superior as a diagnostic factor

**RFN procedure**
Completed according to ISIS guidelines Procedures carried out by two XX trained by Nikolai Bogduk according to ISIS guidelines 16 gauge (1.6mm diameter) Cosman RRE electrodes with 5mm exposed tips. Electrodes placed parallel to the medial branches. Multiple lesions to cover the likely location of the nerve.

**Exclusion**
Anything less than 100% relief of pain following the diagnostic medial branch blocks

**Outcomes**
VAS or verbal numerical pain rating score reported prior to treatment 4 ADLs nominated by patient, which were impeded by their pain and important to them Work status Current health care being used for

Lord et al (1996; 1998) and Bogduk (1998), and shows that over 60% of patients maintain complete relief of pain and return to ADLs for over 12 months following RFN using rigorous protocols for diagnosis (controlled, double-blind MBB) and operative technique. Complete relief of pain with no other need for healthcare is the benchmark for successful cervical RFN. No other studies indicate that the same outcomes can be achieved by any lesser or personalised variants of cervical RFN.

| Appropriate statistical models (univariate/multivariate) | NA |
| Measures of effectiveness included: interquartile range | N |
| Relevant to ACC report for effectiveness of diagnostic cervical MBB and lumbar RFN | Y |

MBBs was not reported Would like more information about pain relief and treatments utilised prior to MBB/RFN Grade: 3 -
their pain
Follow-up face-to-face or by phone. Pain scores and ADLs, work status and use of other health care.
Assessors were primary care physicians who were not involved in treatment of the patients
Duration of relief calculated as time from RFN procedure until time that pain had returned to 50% of its pre-treatment level

**Successful RFN:**
Complete, or at least 80% relief, of pain for at least 6 months and,
Restoration of ADLs and,
No other health care required for their pain and,
Return to work

*NB* Over-the-counter analgesics were acceptable, but any prescription meds for the pain were considered a failure