CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Positron Emission Tomography–Computed Tomography for Cardiovascular Indications: Diagnostic Accuracy, Clinical Utility, Cost-Effectiveness, and Guidelines

Service Line: Rapid Response Service
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Research Questions

1. What is the diagnostic test accuracy of positron emission tomography–computed tomography (PET-CT) in patients with cardiac sarcoidosis, prosthetic vascular graft infection, or infective endocarditis?

2. What is the clinical utility of PET-CT in patients with cardiac sarcoidosis, prosthetic vascular graft infection, or infective endocarditis?

3. What is the cost-effectiveness of PET-CT in patients with cardiac sarcoidosis, prosthetic vascular graft infection, or infective endocarditis?

4. What are the evidence-based guidelines regarding the use of PET-CT in patients with cardiac sarcoidosis, prosthetic vascular graft infection, or infective endocarditis?

Key Findings

Three systematic reviews (two with meta-analysis), one meta-analysis, and seven non-randomized studies were identified regarding positron emission tomography–computed tomography in patients with cardiac sarcoidosis, prosthetic vascular graft infection, or infective endocarditis. No relevant evidence-based guidelines were identified.

Methods

A limited literature search was conducted on key resources including PubMed, the Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2013 and July 27, 2018. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.
Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Patients with cardiac sarcoidosis, prosthetic vascular graft infection, or infective endocarditis</th>
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<tbody>
<tr>
<td>Intervention</td>
<td>Fluorodeoxyglucose Positron Emission Tomography–Computed Tomography (FDG PET-CT)</td>
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<tr>
<td>Comparators</td>
<td>Q1-3: Alternative diagnostic modalities (e.g., single-photon emission computed tomography [SPECT], electrocardiogram [EKG], magnetic resonance imaging [MRI], myocardial perfusion scan); Biopsy</td>
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<td>Q4: No comparator</td>
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<tr>
<td>Outcomes</td>
<td>Q1: Diagnostic accuracy</td>
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<td></td>
<td>Q2: Clinical utility</td>
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<td>Q3: Cost-effectiveness</td>
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<td>Q4: Evidence-based guidelines</td>
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<tr>
<td>Study Designs</td>
<td>Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations, evidence-based guidelines</td>
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</table>

**Results**

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, economic evaluations, and evidence-based guidelines.

Three systematic reviews (two with meta-analysis), one meta-analysis, and seven non-randomized studies were identified regarding PET-CT in patients with cardiac sarcoidosis, prosthetic vascular graft infection, or infective endocarditis. No relevant health technology assessments, randomized controlled trials, economic evaluations, or evidence-based guidelines were identified.

Additional references of potential interest are provided in the appendix.

**Overall Summary of Findings**

Three systematic reviews (SRs)\(^1\)\(^2\)\(^4\) (two with meta-analysis\(^1\)\(^3\)), one meta-analysis (MA)\(^3\) and seven non-randomized studies\(^5\)\(^-\)\(^11\) were identified regarding positron emission tomography–computed tomography (PET-CT) in patients with cardiac sarcoidosis, prosthetic vascular graft infection, or infective endocarditis.

Conflicting evidence was identified in the SRs and MAs, with one SR stating that (18)F-fluorodeoxyglucose (FDG) PET-CT had good accuracy, sensitivity, and specificity in the diagnosis of infective endocarditis (IE)\(^1\) while another SR noted that its sensitivity was low in patients with IE.\(^4\) The authors of two other SRs noted that (18)F-FDG PET-CT should be considered as an adjunctive imaging technique in challenging\(^3\) cases of IE,\(^2\)\(^3\) particularly in cases of prosthetic valve endocarditis.\(^3\)

Of the identified non-randomized studies, it was observed that (18)F-FDG PET-CT may be useful in the diagnosis of cardiac sarcoidosis in patients with new onset atrioventricular block,\(^6\) IE\(^8\) (including transcatheter aortic valve replacement IE\(^8\)), and prosthetic valve endocarditis.\(^11\) (18)F-FDG PET-CT was also observed to identify metabolically active disease in patients presenting with persistent cardiac inflammatory symptoms.\(^10\) In addition,
the uptake of (18)F-FDG was observed to be greater in cardiac lesions when compared to (18)F-3'-deoxy-3'-(18)F-fluorothymidine (FLT).5

Detailed trial characteristics and conclusions are presented in Table 2.

<table>
<thead>
<tr>
<th>Table 2: Detailed Study Characteristics of Included Studies</th>
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<tbody>
<tr>
<td><strong>First Author, Year</strong></td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td><strong>Systematic Reviews and Meta-Analyses</strong></td>
</tr>
<tr>
<td>Juneau, 20181</td>
</tr>
<tr>
<td>Gomes, 20172</td>
</tr>
<tr>
<td>Mahmood, 20173</td>
</tr>
<tr>
<td>Yan, 20164</td>
</tr>
<tr>
<td><strong>Non-Randomized Studies</strong></td>
</tr>
<tr>
<td>Norikane, 20175</td>
</tr>
<tr>
<td>First Author, Year</td>
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<tr>
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<tr>
<td>Ohira, 2016&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Danwade, 2018&lt;sup&gt;7&lt;/sup&gt;</td>
</tr>
<tr>
<td>Salaun, 2018&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
<tr>
<td>Lauridsen, 2017&lt;sup&gt;9&lt;/sup&gt;</td>
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<tr>
<td>First Author, Year</td>
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<tr>
<td>Saponjki, 2017¹⁰</td>
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<td>Pizzi, 2015¹¹</td>
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</table>

AE = adverse event; AVB = atrioventricular block; BMIPP = (123)I-radiiodinated 15-(p-iodophenyl)-3(R,S)-methylpentadecanoic acid; CMR = cardiac magnetic resonance; CS = cardiac sarcoidosis; CSD = conduction system disease; CT = computed tomography; CV = cardiovascular; FDG = fluorodeoxyglucose; (18)F-FLT = 3'-deoxy-3'(18)F-fluorothymidine; ECG = electrocardiogram; Ga = gallium; IE = infective endocarditis; MA = meta-analysis; MDCTA = electrocardiogram-gated multidetector CT angiography; MRI = magnetic resonance imaging; NA = not applicable; NVA = native valve endocarditis; PET-CT = Positron Emission Tomography-computed tomography; PET-CTA = (18)F-FDG PET/CT angiography; PVE = prosthetic valve endocarditis; PVGI = prosthetic vascular graft infection; SPECT = single photon emission computed tomography; SUVmax = maximum standardized uptake value; TAVR = transcatheter aortic valve replacement; TL = thallium-201; WBC = white blood cell.

¹⁰ No (67)Ga citrate study met the inclusion criteria.

References Summarized

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses

*Infective Endocarditis and/or Prosthetic Vascular Graft Infection*


Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

**Cardiac Sarcoidosis**


**Infective Endocarditis**


Infective Endocarditis and/or Prosthetic Vascular Graft Infection


Prosthetic Vascular Graft Infection


Economic Evaluations

No literature identified.

Guidelines and Recommendations

No literature identified.
Appendix — Further Information

Previous CADTH Reports


Systematic Reviews and Meta-Analyses – Alternative Outcome


Scoping Review

16. Kelly J. Does the addition of positron emission tomography/computed tomography (PET/CT) to the routine investigation and assessment of patients with sarcoidosis yield clinical and economic benefits? (Technologies scoping report). Glasgow: Health Improvement Scotland; 2013 Jan. CDR abstract: [https://www.crd.york.ac.uk/CRDWeb/ShowRecord.asp?AccessionNumber=32013000485&UserID=0]

Non-Randomized Studies – No Comparator

Cardiac Sarcoidosis


**Infective Endocarditis**


**Prosthetic Vascular Graft Infection**


Economic Evaluations – Costing Study


Clinical Practice Guidelines – Methodology Not Specified


See: PET, PET/CT, AND PET/MR INSTRUMENTATION; PET AND PET/CT OR PET/MR IMAGING QC; Combined PET/CT QC Procedures


Position Statements


Expert Consensus