Clinical Usefulness of 18F-Fluorodeoxyglucose Positron Emission Tomography in the Management of Giant Cell Arteritis: A Systematic Review and Meta-analysis

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OBJECTIVES

To evaluate the diagnostic value and clinical management usefulness of the PET and PET/CT compared to US and MRI in GCA

MATERIALS AND METHODS

- Systematic review (PRISMA guidelines)
- Databases searched:
  - MEDLINE, Sciencedirect, Scopus, Cochrane Library, The Centre for Reviews and Dissemination (CRD)
- Grey literature
- Reference lists of retrieved studies
- Literature search up to November 2014

- Criteria:
  - Studies using FDG PET, FDG PET/CT, ultrasonography (US) or MRI
  - Diagnosis as per ACR criteria, or positive temporal artery biopsy, or clinical impression (eg. response to steroids, clinical follow up)
- Quality of publications based on GRADE methodology

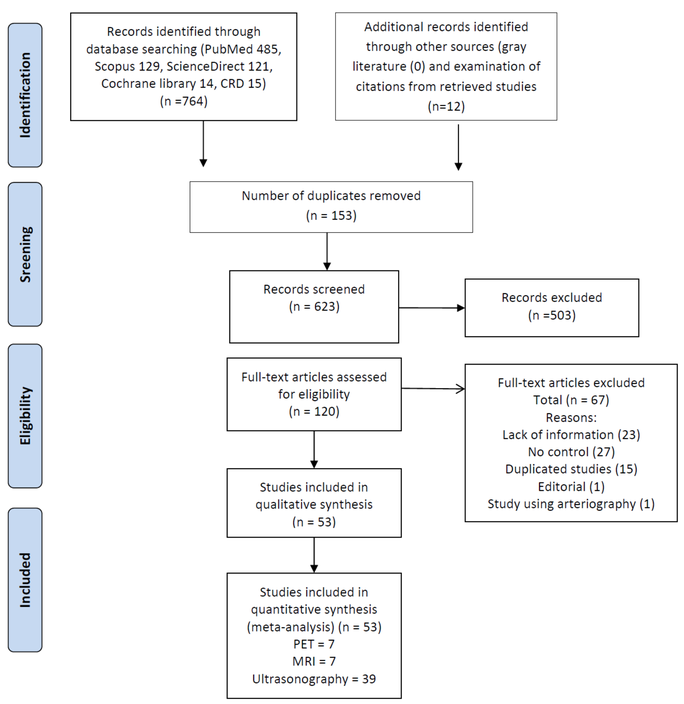
RESULTS.

- **No direct comparison** among imaging modalities
- **PET:** Diagnostic criteria based on qualitative, semi quantitative or combination of both methods.
- **MRI:** 2 studies used 1.5 T instruments; 3 studies used 3T; 2 studies used both; 1 used 1T machine.
- **US:** Dx based on halo sign in 38 studies; 22 studies defined stenosis/occlusion as a sign of GCA; 18 used a combination of halo, stenosis and or occlusion.

Imaging modalities -Diagnostic criteria (reference standard)	**No of patients (studies)**	**Quality of the evidence (GRADE)**	**Sensitivity (95% CI)**	**Specificity (95% CI)**	**Post-test probability (95% CI)**	
					Test ⊕	*Test ⊖*
PET-Qualitative/semi-quantitative (multiple criteria)†	*47 GCA + 48 controls (3 studies)*	⊕⊖⊖⊖ Very low[1,2,4,5]	**0,68 (0,41-0,86)**	**0,95 (0,83-0,99)**	90% (62-98%)	18% (9-32%)
PET/CT-Qualitative/semi-quantitative (multiple criteria)†	*75 GCA + 83 controls (4 studies)*	⊕⊖⊖⊖ Very low[1,2,4,5]	**0,78 (0,64-0,86)**	**0,90 (0,72-0,97)**	84% (60-95%)	14% (9-25%)
MRI-Mural thickening/mural contrast enhancement (vs ACR criteria)	*92 GCA + 65 controls (5 studies)*	⊕⊖⊖⊖ Very low[3,4,6]	**0,63 (0,40-0,81)**	**0,84 (0,68-0,93)**	72% (45-89%)	23% (12-37%)
MRI-Mural thickening/mural contrast enhancement (vs biopsy)	*132 GCA + 78 controls (8 studies)*	⊕⊖⊖⊖ Very low[3,4,5]	**0,82 (0,64-0,92)**	**0,77 (0,66-0,86)**	70% (56-81%)	13% (6-27%)
Ultrasonography-Halo (vs ACR criteria)	*374 GCA + 751 controls (14 studies)*	⊕⊕⊖⊖ Low[4,6]	**0,69 (0,55-0,80)**	**0,89 (0,80-0,94)**	81% (65-90%)	19% (12-27%)
Ultrasonography-Stenosis or occlusion (vs ACR criteria)	*201 GCA + 577 controls (8 studies)*	⊕⊕⊖⊖ Low[4,6]	**0,40 (0,23-0,60)**	**0,88 (0,77-0,94)**	69% (40-87%)	31% (22-44%)
Ultrasonography-Halo, stenosis or occlusion (vs ACR criteria)	*282 GCA + 623 controls (8 studies)*	⊕⊕⊖⊖ Low[4,6]	**0,71 (0,52-0,85)**	**0,86 (0,77-0,92)**	77% (60-88%)	18% (10-29%)
Ultrasonography-Halo (vs biopsy)	*492 GCA + 692 controls (25 studies)*	⊕⊕⊖⊖ Low[4,6]	**0,76 (0,66-0,83)**	**0,79 (0,72-0,85)**	71% (61-79%)	17% (12-24%)
Ultrasonography-Stenosis or occlusion (vs biopsy)	*213 GCA + 368 controls (15 studies)*	⊕⊕⊖⊖ Low[4,6]	**0,64 (0,48-0,77)**	**0,74 (0,63-0,83)**	62% (46-75%)	24% (16-35%)
Ultrasonography-Halo, stenosis or occlusion (vs biopsy)	*205 GCA + 238 controls (10 studies)*	⊕⊕⊖⊖ Low[4,6]	**0,83 (0,65-0,92)**	**0,76 (0,62-0,86)**	70% (53-81%)	13% (6.0-27%)

Post-test probability (95% CI)			
Pretest probability 10%		**Pretest probability 90%**	
Test ⊕	*Test ⊖*	*Test ⊕*	*Test ⊖*
60% (21-91%)	3.6% (1.5-7.3%)	99% (96-100%)	75% (56-86%)
46% (20-76%)	2.6% (1.6-5.3%)	99% (95-100%)	69% (57-82%)
30% (12-56%)	4.7% (2.2-8.9%)	97% (92-99%)	80% (65-89%)
28% (17-42%)	2.5% (1.0-10%)	97% (94-98%)	68% (46-83%)
41% (23-60%	3.7% (2.3-5.9%)	98% (96-99%)	76% (66-84%)
27% (10-53%)	7.0% (4.5-1.0%)	97% (90-99%)	86% (79-90%)
36% (20-54%)	3.6% (1.8-6.5%)	98% (95-99%)	75% (59-85%)
29% (21-38%)	3,3% (2.2-5.0%)	97% (95-98%)	73% (64-81%)
21% (13-33%)	5,1% (3.0-8.4%)	96% (92-98%)	81% (71-88%)
28% (16-42%)	2,4% (1.0-5.9%)	97% (94-98%)	67% (46-84%)

Figure 1. PRISMA flow diagram of citations reviewed



DISCUSSION

- The results from this review suggest that PET has similar diagnostic performance compared to temporal and axillary artery ultrasonography and MRI for GCA. However,
- no head-to-head study
- Different Dx gold standards used in PET and PET/CT subgroups and in MRI and ultrasonography groups
- Various duration of corticosteroids prior to imaging
- PET does not assess temporal arteries; however, could be cost-effective when large vessels only are involved

CONCLUSION

- Large vessel involvement is frequent in GCA and PET appears as a valid diagnostic modality;
- The prognostic value of the identification of large vessel involvement remains to be determined through prospective studies.

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