Evaluation of Infection/Inflammation: What is the Role of PET/CT?

Andrei Iagaru, MD
Holy Grail:

- The dish, plate or cup used by Jesus Christ at the Last Supper, said to possess miraculous powers
- Later became the object of many chivalrous quests
Nuclear Medicine: What is the Holy Grail?

Cancer or Inflammation? A Holy Grail for Nuclear Medicine

“Follow, follow, follow the gleam/of the chalice that is the Grail.”
Sally Hume Douglas

Memorial Sloan Kettering Cancer Center
New York, New York

TABLE 1
Neoplasms Concentrating FDG

Glioblastoma (14)
Meningioma (15)
Colon (16)
Breast (17–19)
Lung (4)
Hepatoma (20)
Sarcoma (21)
Head and neck tumor (22)
Ovarian (23)
Lymphoma (24)
Islet cell tumor (25)
Thyroid (26)

TABLE 2
Inflammatory Conditions Concentrating FDG

Sarcoid (1)
Tuberculosis (4)
Fungal infections (4)
Brain abscess (27)
Abdominal abscesses (28)
Pancreatitis (25)
PET/CT in Infection/Inflammation

✓ $^{18}$F FDG labeled WBC’s vs. $^{18}$F FDG

✓ Applications of $^{18}$F FDG PET/CT in infection and/or inflammation:
  - Fever of unknown origin
  - Prosthesis evaluation
  - Chronic osteomyelitis
  - Diabetic foot
  - Vasculitidies
$^{18}$F FDG labeled WBC’s vs. $^{18}$F FDG
$^{18}$F FDG labeled WBC’s vs. $^{18}$F FDG

- Specificity
- Risks associated with labeling
- Imaging at 3-5 hours… enough for WBC localization???
- How stable is the labeling
- Cost

- Non-specificity
- Can something (i.e., FDG) be good for everything???
- Cost
Biodistribution and dosimetry of $[^{18}\text{F}]$fluorodeoxyglucose labelled leukocytes in normal human subjects

L.A. FORSTROM,* W.L. DUNN, B.P. MULLAN, J.C. HUNG, V.J. LOWE and L.M. THORSON

- 4 normal adult volunteers
- WBC’s can be readily labeled with $^{18}$F FDG
- Labeled WBC’s show reasonable stability in vivo for several hours after injection
- Dosimetry data similar to $^{111}$In labeled WBC’s
- Good quality PET images can be obtained up to 6 hours after injection
- No GI uptake was appreciated on any of the scans
Imaging Infection with $^{18}$F-FDG–Labeled Leukocyte PET/CT: Initial Experience in 21 Patients

Nicolas Dumarey, MD¹; Dominique Egrise, PhD¹; Didier Blocklet, MD¹; Bernard Stallenberg, MD²; Myriam Remmelink, MD, PhD³; Véronique del Marmol, MD, PhD⁴; Gaëtan Van Simaeys, PhD¹; Frédérique Jacobs, MD⁵; and Serge Goldman, MD, PhD¹

✓ 21 patients (8 women, 13 men), 24-84 years-old (mean: 56)
✓ Inclusion criteria: suspected infection and FUO
✓ Exclusion criteria: WBC<2000, favorable response to antibiotics, pregnancy, age<18 years
✓ Results: median labeling efficiency 80% (24-96%; mean 75%) and mean labeling stability 90%
DIVERTICULITIS

OSTEOMYELITIS

ENDOCARDITIS

PET with FDG-labeled Leukocytes versus Scintigraphy with $^{111}$In-Oxine–labeled Leukocytes for Detection of Infection$^1$

- 51 patients (26 women, 25 men), 32-86 years-old (mean: 59)
- 8 subjects excluded: inadequate $^{18}$F labeling (6), camera malfunction (1), non-cooperant (1)
- Labeling efficiency 72% for $^{18}$F vs. 90% for $^{111}$In ($P < 0.001$)
- WBC’s viability of 98% for $^{18}$F vs. 97% for $^{111}$In
### $^{18}$F FDG labeled WBC’s

<table>
<thead>
<tr>
<th>Modality</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>$N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET (per patient)</td>
<td>86</td>
<td>86</td>
<td>21</td>
</tr>
<tr>
<td>PET (per patient)</td>
<td>100</td>
<td>57</td>
<td>21</td>
</tr>
<tr>
<td>PET (per lesion)</td>
<td>91</td>
<td>85</td>
<td>21</td>
</tr>
<tr>
<td>PET (per lesion)</td>
<td>96</td>
<td>69</td>
<td>21</td>
</tr>
<tr>
<td>PET (per patient)</td>
<td>87</td>
<td>82</td>
<td>43</td>
</tr>
<tr>
<td>$^{111}$In WBC</td>
<td>73</td>
<td>86</td>
<td>43</td>
</tr>
</tbody>
</table>


**FDG PET/CT in FUO**

**Definition:**

a) Petersdorf and Beeson (1961)
- recurrent fever of 38.3 or higher
- lasting 2-3 weeks or longer
- undiagnosed after 1 week of hospital evaluation (revised: after appropriate outpatient or inpatient evaluation)

b) Durack and Street (1991)
- classic FUO in non-immunocompromised patients
- nosocomial FUO
- neutropenic FUO
- FUO associated with HIV infection
Sources of FUO

- Infections: 13-43%
- Autoimmune/collagen vascular disease/neoplasm: up to 54%
- Unknown: 10-40%

67Ga citrate whole-body scan

18F FDG PET/CT
19 patients underwent $^{111}$In WBC scan and $^{18}$F FDG PET within 1 week

- Inclusion criteria: documented FUO
- Exclusion criteria: pregnancy, age < 18 years

Results:

- Final diagnosis in 12/19 cases
- 7 cases: infection/inflammation
- 1 case: neoplasm
- 4 cases: autoimmune disease
35 patients underwent $^{18}$F FDG PET

- Inclusion criteria: documented FUO
- Exclusion criteria: pregnancy, age < 18 years

- Results:
  - Final diagnosis in 19/35 cases
  - 6 cases: infection
  - 4 cases: neoplasm
  - 6 cases: inflammation
Value of FDG PET in patients with fever of unknown origin

J. LORENZEN,¹* R. BUCHERT² and K.H. BOHUSLAVIZKI²

- 16 patients underwent $^{18}$F FDG PET
- Inclusion criteria: documented FUO
- Exclusion criteria: pregnancy, age<18 years
- Results:
  - final diagnosis in 11/16 cases
18 patients underwent $^{18}$F FDG PET and $^{67}$Ga scintigraphy

Inclusion criteria: documented FUO

Exclusion criteria: pregnancy, age<18 years

Results:

- 8 cases: infection
- 2 cases: neoplasm
- 5 cases: auto-immune disorders
- 3 cases: unknown
### $^{18}$F FDG PET/CT in FUO

<table>
<thead>
<tr>
<th>Modality</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET</td>
<td>50</td>
<td>46</td>
<td>19</td>
</tr>
<tr>
<td>$^{111}$In WBC</td>
<td>71</td>
<td>92</td>
<td>19</td>
</tr>
<tr>
<td>PET</td>
<td>93</td>
<td>90</td>
<td>35</td>
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<tr>
<td>PET</td>
<td>92</td>
<td>75</td>
<td>16</td>
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<tr>
<td>PET</td>
<td>81</td>
<td>86</td>
<td>18</td>
</tr>
<tr>
<td>$^{67}$Ga(SPECT)</td>
<td>67</td>
<td>78</td>
<td>18</td>
</tr>
<tr>
<td>$^{67}$Ga (planar)</td>
<td>45</td>
<td>100</td>
<td>18</td>
</tr>
</tbody>
</table>

FDG PET/CT for Evaluation of Joint Prostheses

Definitions:
- Total joint replacement is a surgical procedure in which a diseased or damaged joint, such as a hip or knee, is removed and replaced with artificial components.
- Modern-day joint replacement surgery has been performed in the United States since the 1970s.
- More than 700,000 individuals had hip or knee replacement surgery in 2002.
- Infected prostheses have mostly an indolent course, with progressive joint pain; however, some present acutely, with high fever, joint pain, swelling, and erythema.
Normal Knee

Arthritic Knee

Replaced Knee

Metal and plastic components for Total Knee Replacement
Infection in Joint Prostheses

Risk factors:
- prior surgery at site of prosthesis
- rheumatoid arthritis
- corticosteroid therapy
- diabetes mellitus
- obesity
- malnutrition
- old age

Pathogenesis:
- Occurs in osseous tissue adjacent to prosthesis:
  - bone cement interface
  - bone contiguous with prosthesis (cement-less devices)
- Results from:
  - local inoculation at surgery or post-op spread from wound sepsis
  - hematogenous spread
Infection in Joint Prostheses

Management:

✓ Retain / replace prosthesis
  - simple debridement (retaining prosthesis) plus antibiotics - only successful in 20% of cases
  - removal of prosthesis, antibiotics for 6wks, re-implantation of prosthesis - 90%+ success
  - removal of prosthesis, immediate re-implantation, antibiotics - 70%+ success

✓ Resection arthroplasty

✓ Suppressive long-term antibiotics
The use of $[^{18}F]$fluorodeoxyglucose positron emission tomography to differentiate between synovitis, loosening and infection of hip and knee prostheses

N. MANTHEY, P. REINHARD, P. MOOG, P. KNESEWITSCH, K. HAHN and K. TATSCH

- 23 patients (14 women, 9 men), 35-83 years-old
- Inclusion criteria: painful hip or knee prosthesis
- Results:
  - PET was false negative for loosening in 1 case
- Conclusion:
  - PET can be useful in differentiating between loose and infected prosthesis
LOOSENING AND SYNOVITIS

INFECTION AND SYNOVITIS

50 patients (31 women, 19 men), 42-86 years-old

Inclusion criteria: painful hip prosthesis

Results:
- PET was 91% sensitive and 92% specific
- 3 phase bone scan was 78% sensitive and 70% specific
- No significant differences between cemented and uncemented

Conclusion:
- PET can better differentiate between aseptic loosening and infection
<table>
<thead>
<tr>
<th>Category</th>
<th>Glucose metabolism</th>
<th>Clinical correlate</th>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>No increased FDG uptake in the arthroplasty interface</td>
<td>No loosening</td>
</tr>
<tr>
<td>II</td>
<td>Increased FDG uptake in the femoral neck area</td>
<td>No loosening</td>
</tr>
<tr>
<td>III a</td>
<td>Increased FDG uptake in the femoral neck area and in parts of the cup-bone interface without covering the whole cup</td>
<td>No loosening</td>
</tr>
<tr>
<td>III b</td>
<td>Increased FDG uptake in the femoral neck area and in parts of the stem-bone interface (Gruen zones I and VII)</td>
<td>No loosening</td>
</tr>
<tr>
<td>III c</td>
<td>Category III a and III b</td>
<td>No loosening</td>
</tr>
<tr>
<td>IV a</td>
<td>Increased FDG uptake in the femoral neck area and in the whole cup-bone interface (DeLee zones I–III)</td>
<td>Cup loosening</td>
</tr>
<tr>
<td>IV b</td>
<td>Increased FDG uptake in the femoral neck area and in wide parts of the stem-bone interface (at least Gruen zones I, II, VI and VII)</td>
<td>Stem loosening</td>
</tr>
<tr>
<td>IV c</td>
<td>Category IV a and IV b</td>
<td>Cup and stem loosening</td>
</tr>
<tr>
<td>V</td>
<td>FDG uptake in the arthroplasty interface and additionally in the periprosthetic soft tissue</td>
<td>Inflammation</td>
</tr>
</tbody>
</table>
21 patients (13 women, 8 men), 33-78 years-old

Inclusion criteria: suspicion for infected knee prosthesis

Results:
- WBC scan alone was 100% sensitive and 53% specific
- PET alone was 100% sensitive and 73% specific
- in combination with 3PBS, sensitivities increased to 93% for WBC scan and 80% for PET

Conclusion:
- PET seems to offer no additional benefit
INFECTION

LOOSENING

Diagnosing Infection in the Failed Joint Replacement: A Comparison of Coincidence Detection $^{18}$F-FDG and $^{111}$In-Labeled Leukocyte/$^{99m}$Tc-Sulfur Colloid Marrow Imaging

Charito Love, MD$^1$; Scott E. Marwin, MD$^2$; Maria B. Tomas, MD$^1$; Eugene S. Krauss, MD$^3$; Gene G. Tronco, MD$^1$; Kuldeep K. Bhargava, PhD$^1$; Kenneth J. Nichols, PhD$^1$; and Christopher J. Palestro, MD$^1$

✔ 59 patients (37 women, 22 men), 35-89 years-old
✔ Inclusion criteria: painful prosthesis (40 hip, 19 knee)
✔ Results:
  ➢ PET sensitivity was 100, 96, 52, 36% and specificity was 9, 35, 44, 97% based on different interpretation criteria
  ➢ WBC/sulphur colloid scan was 100% sensitive and 91% specific
✔ Conclusion:
  ➢ PET is less accurate and can’t replace WBC/SC scanning
**PET interpretation criteria:**

<table>
<thead>
<tr>
<th>Positive criterion</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive criterion 1:</td>
<td>100%</td>
<td>9%</td>
</tr>
<tr>
<td>Any periprosthetic activity, regardless of location or intensity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive criterion 2 (PET &amp; SC scan):</td>
<td>96%</td>
<td>35%</td>
</tr>
<tr>
<td>Any periprosthetic activity on PET, without corresponding uptake on SC scan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive criterion 3:</td>
<td>52%</td>
<td>44%</td>
</tr>
<tr>
<td>Only activity at the bone-prosthesis interface (femoral or tibial components), regardless of intensity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive criterion 4:</td>
<td>36%</td>
<td>97%</td>
</tr>
<tr>
<td>Semi-quantitative analysis of FDG uptake at the bone-prosthesis interface</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chronic osteomyelitis is a severe, persistent, and sometimes incapacitating infection of bone and bone marrow that results when the inflammatory process continues over time, leading to bone sclerosis and deformity.

It is often a recurring condition because it is difficult to treat definitively.

It may result from:
- inadequately treated acute osteomyelitis;
- hematogenous osteomyelitis;
- trauma;
- iatrogenic causes such as joint replacements and the internal fixation of fractures;
- compound fractures;
- infection with organisms, such as *Mycobacterium tuberculosis* and *Treponema* species (syphilis);
- contiguous spread from soft tissues, as in diabetic ulcers or ulcers in peripheral vascular disease.
33 patients (7 women, 26 men), 17-80 years-old (mean: 50)

- Inclusion criteria: suspected chronic osteomyelitis (>6 weeks)
- Exclusion criteria: trauma/surgery within 6 months of PET, antibiotic therapy, pregnancy, age<18 years

PET/CT had overall sensitivity of 94% and specificity of 87%

For lesions in the axial PET/CT was 88% sensitive and 100% specific, while for the appendicular skeleton it was 100% sensitive and 85% specific
OSTEOMYELITIS

OSTEOMYELITIS

FRACTURE

Osteomyelitis of the foot is a challenging diagnosis and affects up to 15% of diabetic patients, often as a result of direct contamination from a soft tissue lesion.

Early diagnosis of osteomyelitis in the diabetic foot is crucial because antibiotic therapy can be curative and prevent amputation.

Plain radiograph is the first-line imaging modality to evaluate the foot, BUT...

MRI is considered the modality of choice to evaluate for diabetic foot osteomyelitis and associated soft-tissue abnormalities.
14 patients (4 women, 10 men), 29-70 years-old (mean: 54)

Inclusion criteria: suspected infected diabetic foot

Exclusion criteria: preganancy, age<18 years

PET/CT correctly localized 8 foci in 4 patients to bone, indicating osteomyelitis

PET/CT excluded osteomyelitis in 5 foci in 5 patients, indicating soft tissue uptake only
SOFT TISSUE INFECTION

17 patients (6 women, 11 men) with Charcot’s neuro-arthropathy, 59.4 ± 8.6 year-old

Inclusion criteria: Charcot’s neuro-arthropathy

Exclusion criteria: pregnancy, age<18 years

PET/CT had a sensitivity of 100% and specificity of 93.8%

MRI had a sensitivity of 76.9% and specificity of 75%

Soft tissue infection was diagnosed in 7/17 patients (43.7%)
OSTEOMYELITIS

18F FDG PET/CT in Vasculitides

Definition:
Presence of leukocytes in the vessel wall with reactive
damage to mural structures
Loss of integrity → bleeding
Compromise of lumen → ischemia

When to suspect?
Systemic symptoms
+ Single or multi-organ dysfunction

Pathophysiology of vessel damage in vasculitic syndromes:
✓ Pathogenic immune complex formation and/or deposition
✓ Production of antineutrophilic cytoplasmic antibodies
✓ Pathogenic T lymphocyte responses and granuloma formation
Classification of Vasculitides

**Large Vessel**
- ✓ Takayasu arteritis
- ✓ Giant Cell Arteritis

**Medium Vessel**
- ✓ PAN
- ✓ Kawasaki’s
- ✓ Isolated CNS vasculitis

**Small Vessel**
- ✓ Churg-Strauss
- ✓ Wegener’s
- ✓ Microscopic Polyangiitis
- ✓ HSP
- ✓ Essential Cryoglobulinemia
- ✓ Hypersensitivity vasculitis
- ✓ Vasculitis 2\textsuperscript{nd} to CTD
- ✓ Vasculitis 2\textsuperscript{nd} to viral infection
Primary Vasculitis Syndromes
- Wegener's granulomatosis
- Churg-Strauss syndrome
- Polyarteritis nodosa
- Microscopic polyangiitis
- Giant cell arteritis
- Takayasu's arteritis
- Henoch-Schönlein purpura
- Idiopathic cutaneous vasculitis
- Essential mixed cryoglobulinemia
- Behçet's syndrome
- Isolated vasculitis of the central nervous system
- Cogan's syndrome
- Kawasaki disease

Secondary Vasculitis Syndromes
- Drug-induced vasculitis
- Serum sickness
- Vasculitis associated with other primary diseases
- Infection
- Malignancy
- Rheumatic disease
Other disorders mimicking vasculitis

Infectious Diseases
- Bacterial endocarditis
- Disseminated gonococcal infection
- Pulmonary histoplasmosis
- Coccidioidomycosis
- Syphilis
- Lyme disease
- Rocky Mountain spotted fever
- Whipple's disease

Drug toxicity
- Cocaine
- Amphetamines
- Ergot alkaloids
- Methysergide
- Arsenic

Coagulopathies/thrombotic diseases
- Antiphospholipid antibody syndrome
- Thrombotic thrombocytopenic purpura

Neoplasms
- Atrial myxoma
- Lymphoma
- Carcinomatosis

Sarcoidosis

Atheroembolic disease

Goodpasture's syndrome

Amyloidosis

Migraine

Cryofibrinogenemia
35 patients (25 women, 10 men), 72.7±6.7 years-old

Inclusion criteria: biopsy proven GCA

Results:
- vascular FDG uptake was noted in 29 patients (83%)
- the patients who relapsed had similar decrease in uptake after therapy as the ones who were in remission

Conclusion:
- GCA relapse cannot be predicted by PET
GIANT CELL ARTERITIS

The role of $2^{18}$F-fluoro-2-deoxy-D-glucose positron emission tomography in the diagnosis of giant cell arteritis of the temporal arteries

M. Brodmann, R. W. Lipp$^1$, A. Passath$^1$, G. Seinost, E. Pabst and E. Pilger

- 22 patients (16 women, 6 men), 73.3±7.5 years-old
- Inclusion criteria: clinical GCA; major vessel U/S examination
- Results:
  - all patients with signs of GCA on U/S had FDG uptake on PET
  - when U/S was only positive in the temporal arteries, PET was completely negative
- Conclusion:
  - PET is not suitable for diagnosis of temporal arteritis
The impact of $^{18}$F-FDG PET on the management of patients with suspected large vessel vasculitis

Martin Fuchs • Matthias Briel • Thomas Daikeler • Ulrich A. Walker • Helmut Rasch • Scott Berg • Quinn K. T. Ng • Heike Raatz • David Jayne • Ina Kötter • Daniel Blockmans • Maria C. Cid • Sergio Prieto-González • Peter Lamprecht • Carlo Salvarani • Zaharenia Karageorgaki • Richard Watts • Raashid Luqmani • Jan Müller-Brand • Alan Tyndall • Martin A. Walter

✅ 30 patients with large vessel vasculitis and 31 controls

✅ Results:

- Sensitivity of 73.3% (95% CI 54.1-87.7%), specificity of 83.9% (95% CI 66.3-94.5%), PPV of 81.5% (95% CI 61.9-93.7%) NPV of 76.5% (95% CI 58.8-89.3%)

- The diagnostic accuracy was higher in patients not receiving immunosuppressive drugs (93.3 vs 64.5%, p = 0.006)

- FDG PET increased the clinical diagnostic accuracy from 54.1 to 70.5% (p = 0.04)
NORMAL vs. ABNORMAL

TAKAYASU’S

The role of $^{18}$F-FDG PET in characterising disease activity in Takayasu arteritis

Myles Webb$^1$, Anthony Chambers$^1$, Adil AL-Nahhas$^1$, Justin C. Mason$^2$, Lucy Maudlin$^1$, Lucy Rahman$^1$, John Frank$^1$

18 patients (17 women, 1 man), 23-64 years-old

Inclusion criteria: Takayasu’s arteritis

Results:

- Sensitivity was 92% and specificity was 100%
- NPV of 85% and PPV of 100% in initial evaluation of patients with suspected vasculitis

Conclusion:

- FDG PET can be used to diagnose early disease, to detect active disease and to monitor the effectiveness of therapy
TAKAYASU’S

TAKAYASU’S

Early diagnosis and follow-up of aortitis with [$^{18}$F]FDG PET and MRI

J. Meller$^1$, F. Strutz$^2$, U. Siefker$^1$, A. Scheel$^2$, C. O. Sahlmann$^1$, K. Lehmann$^1$, M. Conrad$^1$, R. Vosshenrich$^3$

- 15 patients (9 women, 6 men), 26-76 years-old
- Inclusion criteria: early aortitis (FUO, elevated ESR/CRP, FDG uptake in the aorta); MRI available
- Results:
  - at baseline PET was abnormal in 56% of the cases, while MRI was abnormal in 53%
  - 80% showed normalization on PET after therapy
- Conclusion:
  - PET and MRI have comparable results, but PET showed more areas of disease involvement, with better evaluation of response to therapy
GIANT CELL ARTERITIS

TAKAYASU’S

TB before/after treatment
TB before/after treatment
TAKAYASU’S
## Stanford Charges

<table>
<thead>
<tr>
<th>Modality</th>
<th>Technical</th>
<th>Professional</th>
<th>Radiotracer</th>
<th>Total</th>
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<tbody>
<tr>
<td>In111 WBC</td>
<td>$2150</td>
<td>$283</td>
<td>$295</td>
<td></td>
</tr>
<tr>
<td>3 phase bone scan</td>
<td>$1914</td>
<td>$334</td>
<td>$252</td>
<td>$7007</td>
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<tr>
<td>Tc99m SC scan</td>
<td>$1294</td>
<td>$233</td>
<td>$252</td>
<td>$2712</td>
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<tr>
<td>Ga-67 scan</td>
<td>$2150</td>
<td>$283</td>
<td>$279</td>
<td>$2712</td>
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<tr>
<td>PET/CT</td>
<td>$6219</td>
<td>$524</td>
<td>$1774</td>
<td>$8517</td>
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</table>
“FDG’s exquisite sensitivity suggests that it may be useful in a FUO, an entity with diverse etiologies. In addition to tumor and infection, other conditions that may present as a FUO, including vasculitis, thromboembolic disease, sarcoidosis and chronic granulomatous disease, are associated with increased FDG uptake. FDG PET appears to be sensitive for detecting focal infection and may be useful for detecting infected prosthetic vascular grafts, mycotic aneurisms, lung abscesses and intra-abdominal infections. FDG PET also may be useful for diagnosing musculoskeletal infection, especially in the setting of previous trauma and metallic implants. The fact that increased FDG uptake occurs in many neoplasms is both a relative advantage and a relative disadvantage.”
SUBJECT: FDG PET for Infection and Inflammation

I. SUMMARY OF CHANGES: CMS reconsidered the current, de facto non-coverage for FDG PET imaging for off-label indications chronic osteomyelitis, infection of hip arthroplasty, and fever of unknown origin, each in lieu of bone, leukocyte, and/or gallium scintigraphy. CMS determines it will continue its national non-coverage policy for FDG PET for the requested indications. Additionally, CMS determines that this request is not appropriate for the coverage with evidence development paradigm. This addition of section 220.6.16 is an NCD. NCDs are binding on all carriers, fiscal intermediaries, quality improvement organizations, qualified independent contractors, the Medicare appeals council, and administrative law judges (ALJs) (see 42 CFR section 405.1060(a)(4) (2005)). An NCD that expands coverage is also binding on a Medicare advantage organization. In addition, an ALJ may not review an NCD. (See section 1869(f)(1)(A)(i).)
THANK YOU!

http://nuclearmedicine.stanford.edu