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YUNIBESITHI YA PRETORIA
Faculty of Health Sciences

ISORBE

molecular imaging of atherosclerosis, thrombosis, inflammation and infection

European evidence-based consensus on the use of imaging techniques in inflammatory bowel disease diagnosis and management

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Spain

- **THE EUROPEAN SOCIETY O… GASTROINTESTINAL AND ABDOMINAL RADIOLOGY**
- **As a European Subspecialty Society, ESGAR is an institutional member of the European Society of Radiology (ESR).**

European
Crohn's and Colitis
Organisation

Is the largest forum for specialists in IBD in the world

United European Gastroenterology Federation (UEG) and United European Gastroenterology Week (UEG Week).

The European Association of Nuclear Medicine (EANM) is the umbrella organisation of nuclear medicine in Europe

European Crohn's and Colitis Organisation

Independent society

European Society ESGAR Gastrointestinal and Abdominal Radiology

part of the ESR

EANM • European Association of Nuclear Medicine •

Infection Committee

CONSENSUS STRATEGY

1.- The consensus organizing committee identified 7 main topics on the use of imaging in IBD
2.- The working groups performed a systematic literature search using Medline/Pubmed and the Cochrane database, as well as their own files
3.- Revised statements on their topic were then written by the Chairs, based on answers from their working party, as well as the literature evidence and were circulated first among their working party and then among all participants.
4.- All working groups met in Vienna on 2012 to the final version of each statement. Consensus was defined as agreement by > 80% of participants,
5.- The final document on each topic was written by the Chairs in conjunction with their working party.

Oxford Centre for Evidence Based Medicine (2011)

Table 1.1 Levels of evidence and grades of recommendation based on the Oxford Centre for Evidence Based Medicine. For details see http://www.cebm.net/levels_of_evidence.asp#refs.

Level	Individual study	Technique
1a	Systematic review (SR) with homogeneity of Level 1 diagnostic studies	Systematic review (SR) with homogeneity of randomised controlled trials (RCTs)
1b	Validating cohort study with good reference standards	Individual RCT (with narrow Confidence Interval)
1c	Specificity is so high that a positive result rules in the diagnosis ("SpPin") or sensitivity is so high that a negative result rules out the diagnosis ("SnNout")	All or none
2a	SR with homogeneity of level >2 diagnostic studies	SR (with homogeneity) of cohort studies
2b	Exploratory cohort study with good reference standards	Individual cohort study (including low quality RCT; e.g., <80% follow up)
2c		"Outcomes" research; ecological studies
3a	SR with homogeneity of 3b and better studies	SR with homogeneity of case–control studies
3b	Non-consecutive study; or without consistently applied reference standards	Individual case–control study
4	Case–control study, poor or non-independent reference standard	Case-series (and poor quality cohort and case–control studies)
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"

Grades of recommendation	
A	Consistent level 1 studies
B	Consistent level 2 or 3 studies or extrapolations from level 1 studies
C	Level 4 studies or extrapolations from level 2 or 3 studies
D	Level 5 evidence or troublingly inconsistent or inconclusive studies of any level

European Crohn's and Colitis Organisation

European Society ESGAR Gastrointestinal and Abdominal Radiology

15 delgates of each society worked for almost 2 years in 7 diferent groups

Nuclear Medicine was incorporated in the last decisory meeting

EANM • European Association of Nuclear Medicine •

SGAR-ECCO-EANM consensus

GE GE GE GE GE GE GE GE GE GE

CONSENSUS

NM NM

RX RX RX RX RX RX RX RX RX

21 VOTES

Inflammatory bowel disease
Role of labelled WBC scintigraphy

1.- Is it an IBD
2.- Is it CD or UC
3.- Is SPECT necessary
4.- Is late scan necessary
5.- Is the test able to identify small bowel disease
6.-What happens in rectal disease
7.- Does the test provide accurate information on disease extensión
8.- Can the test be applied in children
9.- Is the attack mild, moderate or severe
10.- Is able to evaluate response to therapy

- WG1. General principles. Technical aspects. Radiation safety
- WG2: Upper GI tract & small bowel
- WG3: Colon and rectum, CD and UC excluding cancer.
- WG4: Perineum including anus, genital tract.
- WG5: Liver and biliary tract.
- WG6: Special situations: Emergency situation (acutely ill patients to be investigated)
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MRI of the small bowel and colon requires fast imaging techniques and luminal distension [EL 2]

MR enterography /enteroclysis has similar diagnostic accuracy and similar indications to CT, but with the major advantage of not imparting ionising radiation [EL 1]

WG1. General principles. Technical aspects. Radiation safety

2E.- NM procedures especially WBC scintigraphy are an alternative to cross-sectional imaging for evaluation of disease activity and extent in specific situations (EL2) .

Radiation exposure is the major limitation (EL2).

PET/CT with FDG is poorly specific for inflammation and for assessing disease activity (EL3)

2I.- CT, US and SBFT are generally more available and less expensive than MRI and scintigraphy (EL4).

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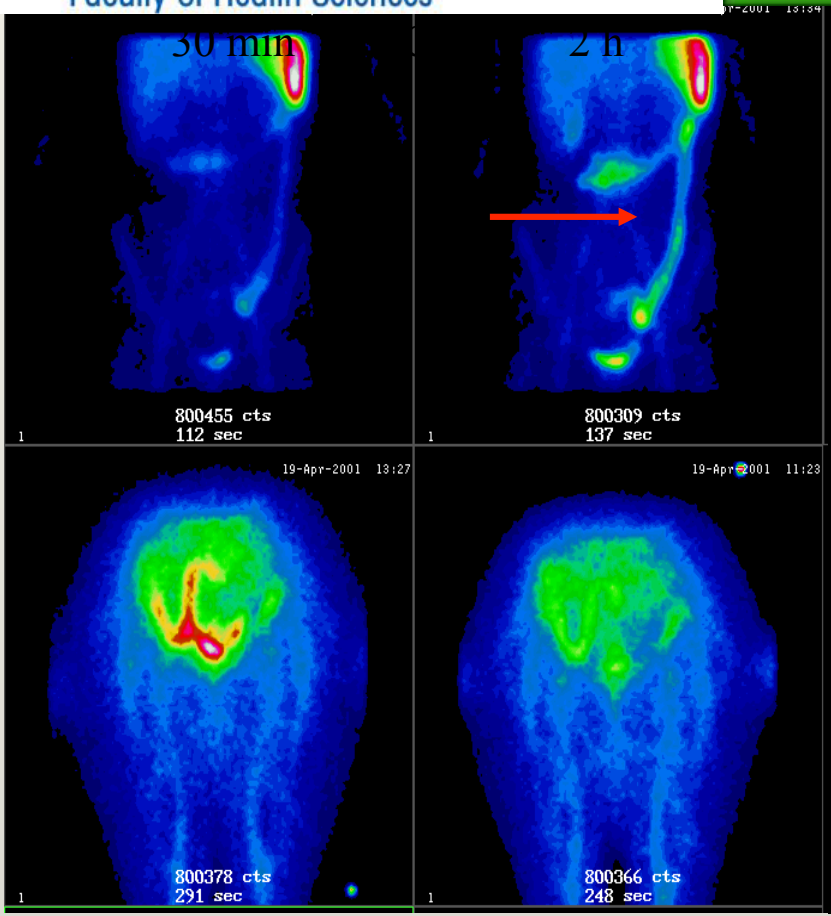

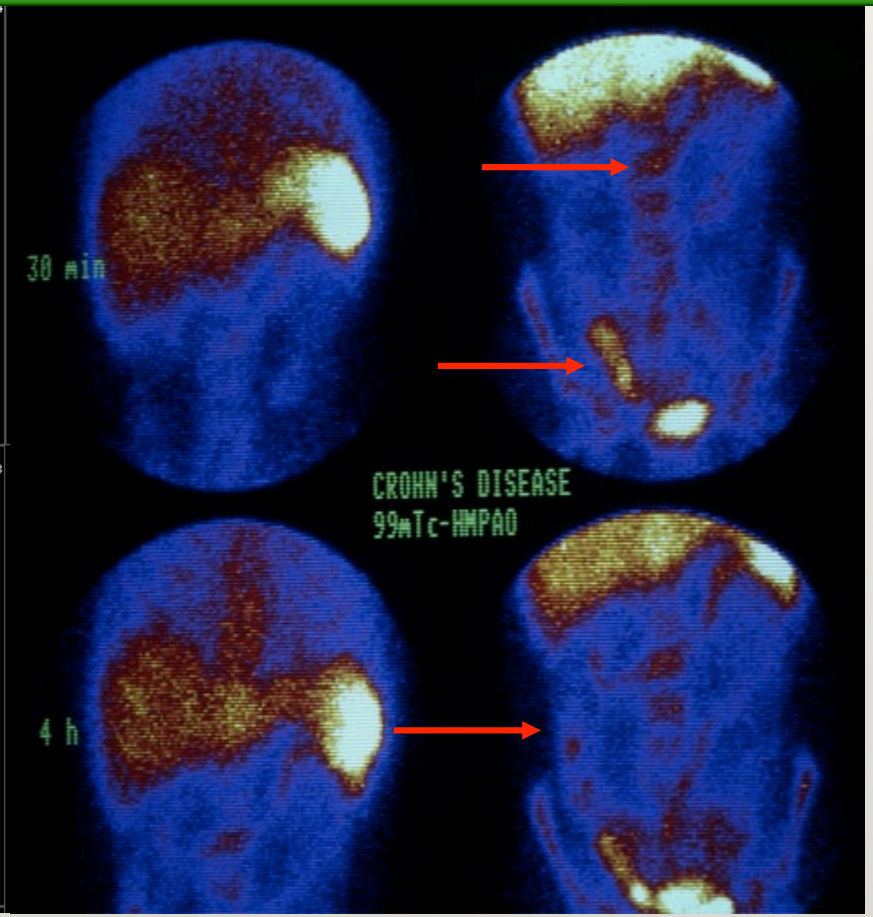

Radiation
Dabritz et al. EJGH 2011

- 45 children
- 35 CD, 10 UC
- 18F-FDG PET & low dose CT
- Radiation:
  - 0.1 mSv scout
  - 1,9 mSv low dose CT
  - 5 mSv 18F-FDG

EXAM	DOSIS mSv	THORAX Rx EQUIVALENCE	NATURAL RADIATION
Bone scan	8,8	352	3,86 years
MYOCARDIAL PERFUSIONSPECT	5,08	203	2,2 2years
LUNG SCAN (V)	0,6	24	96 days
LUNG SCAN (P)	2,64	105	423 days
99mTc-WBC SCAN	2,4	98	390 days
PET-18F-FDG	7,8	312	3,4 years
BRAIN SPECT (P)	8,14	326	3,57 years
THYROID SCAN	2,88	115	460 days
SEHCAT	0,26	10	40 days
MUGA	2,29	92	366 days
SENTINEL NODE (breast)	0,83	33	133 days
CT (thorax)	6,8	272	2,7 years
CT (Abdomen)	12	480	4,86 years

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WG2: Upper GI tract & small bowel

3A. SBE, SBFT, US, CT, MRI and WBC scintigraphy are able to detect signs of Crohn's disease [EL 1), and MRI have a high and comparable diagnostic accuracy at the initial presentation of terminal ileal CD. [EL1). SBE and SBFT have an acceptable accuracy for mucosal disease but are less accurate for mural disease and extramural complications. [EL3]

3B. US, CT, MRI and WBC scintigraphy can be used to assess disease activity in Crohn's disease of the terminal ileum [EL1]. MRI; CT and WBC scintigraphy are able to explore the entire length of the small bowel whereas US has a more limited coverage. [EL4]

3C. US, CT and MRI and SBE SBFT have a high sensitivity and specificity for the diagnosis of stenosis affecting the small bowel [EL 2]

Diagnostic accuracy of MRI and CT for stenosis is based on the use of luminal contrast. In partially obstructing stenosis, enteroclysis may provide higher sensitivity than enterography [EL 2]

Cross-sectional imaging using CT, US, MRI [EL 2] and WBC scintigraphy [EL 3] may assist in differentiating between predominantly inflammatory or fibrotic strictures [EL 5]

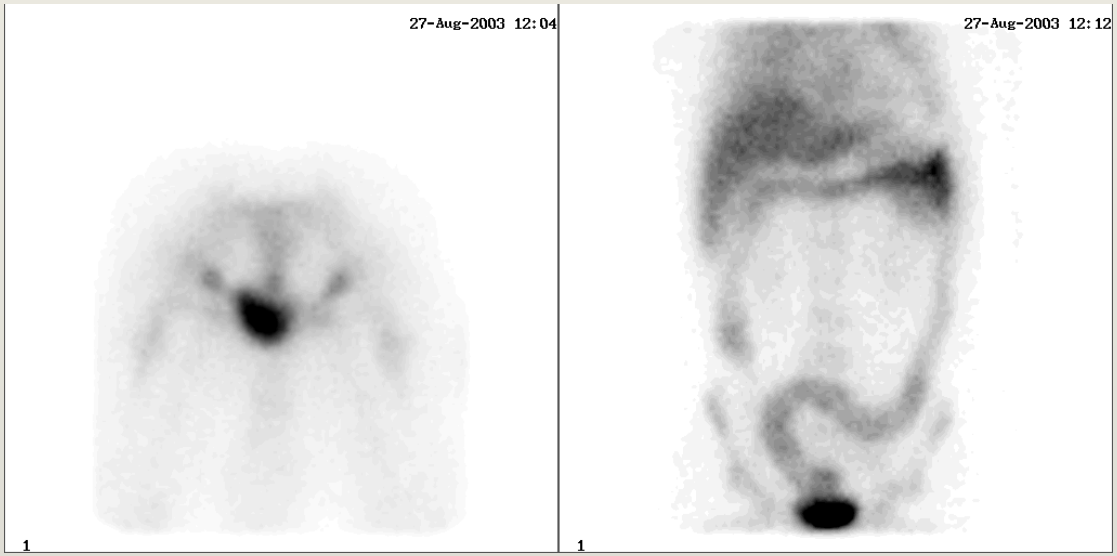
3D. US, CT, and MRI have a high accuracy for the assessment of penetrating complications (i.e., fistula, abscess) [EL 1] and for monitoring disease progression [EL 4]

For deep-seated fistulas MRI and CT are preferable to US [EL 4]

US and CT are widely available and facilitate early abscess drainage [EL 4]

WBC scintigraphy may provide useful information when cross sectional

Whole bowel exam



51 y/o man.
1 month CD
Endoscopy:
Pancolitis.

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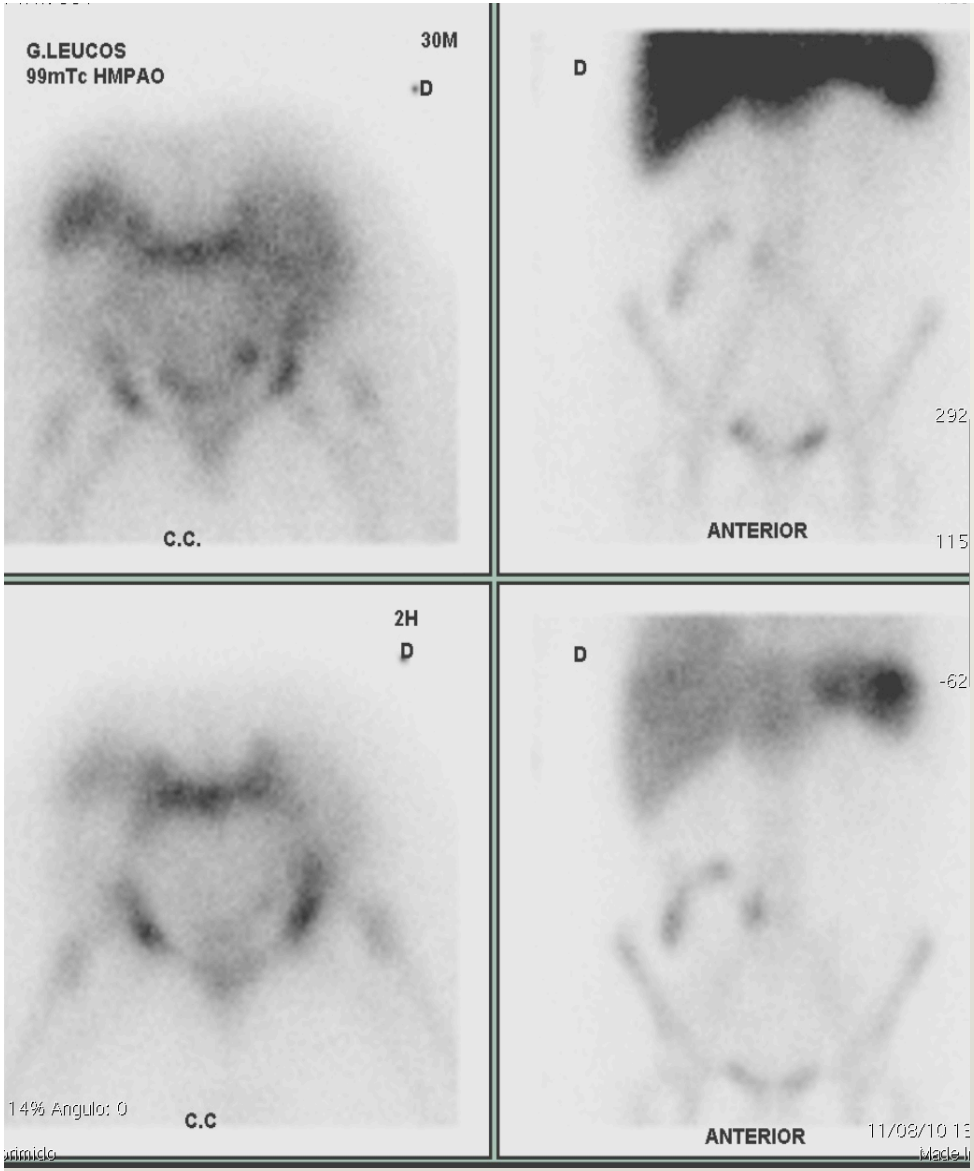
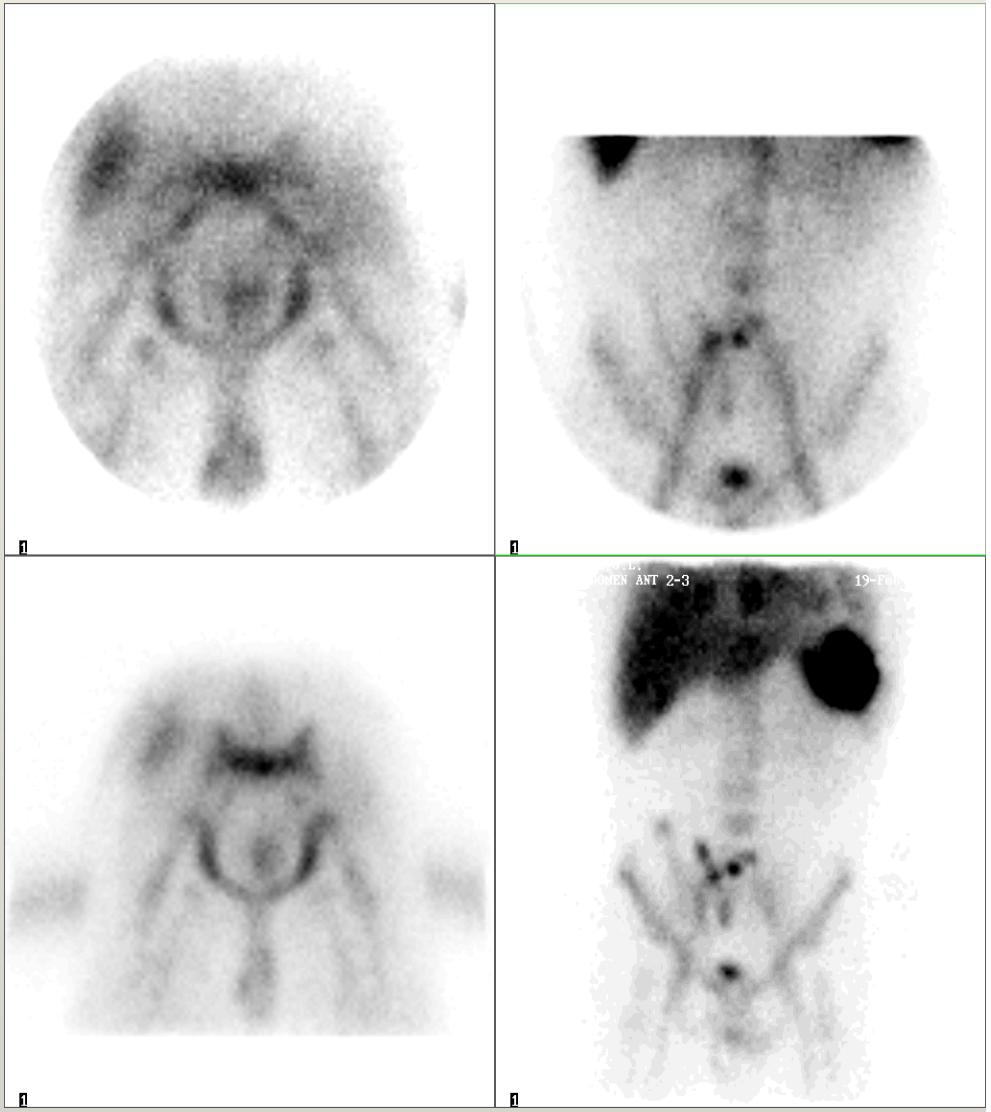


99mTc-HMPAO-WBC

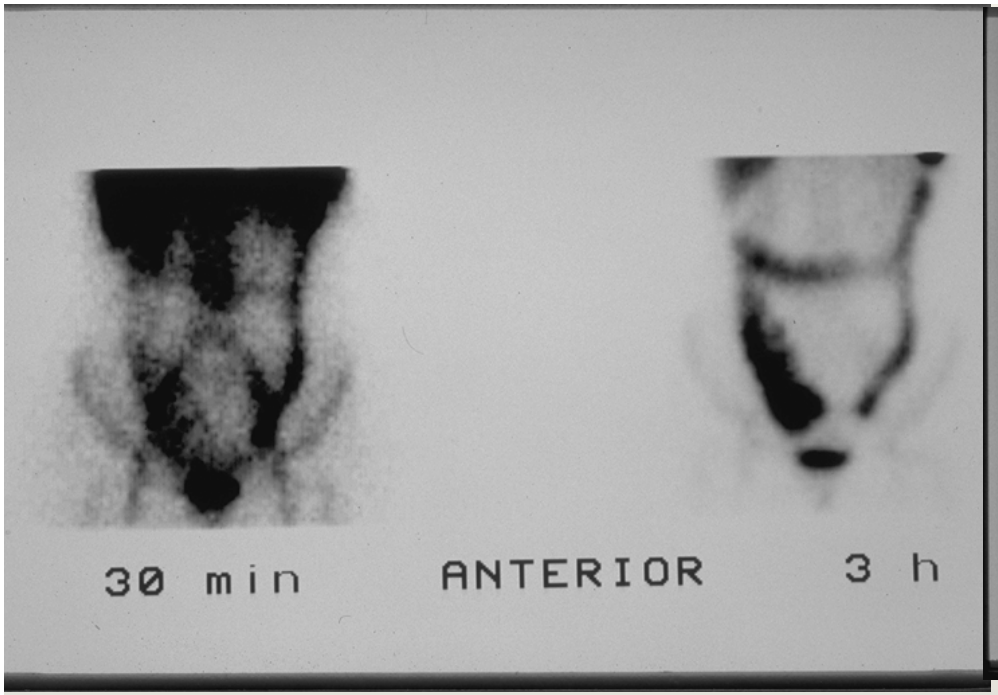
Small bowel disease

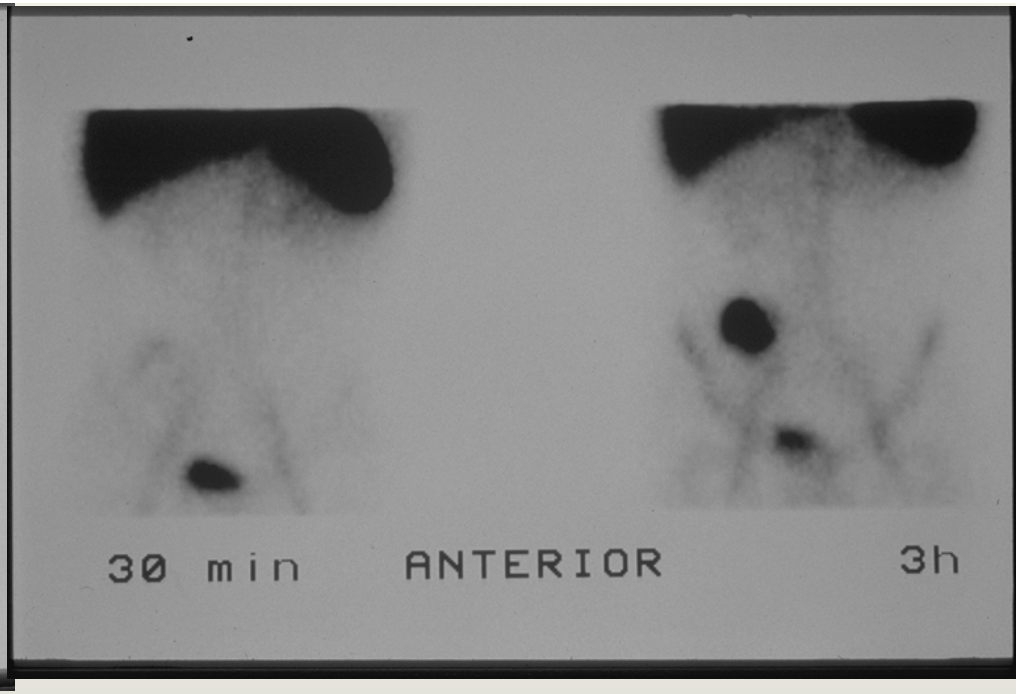


30 y, male
3rd exam
Pancolitis

Early

late





IBD: distribution follows the bowel shape
Early image shows uptake

No IBD: distribution is focal.
Early image may be almost normal

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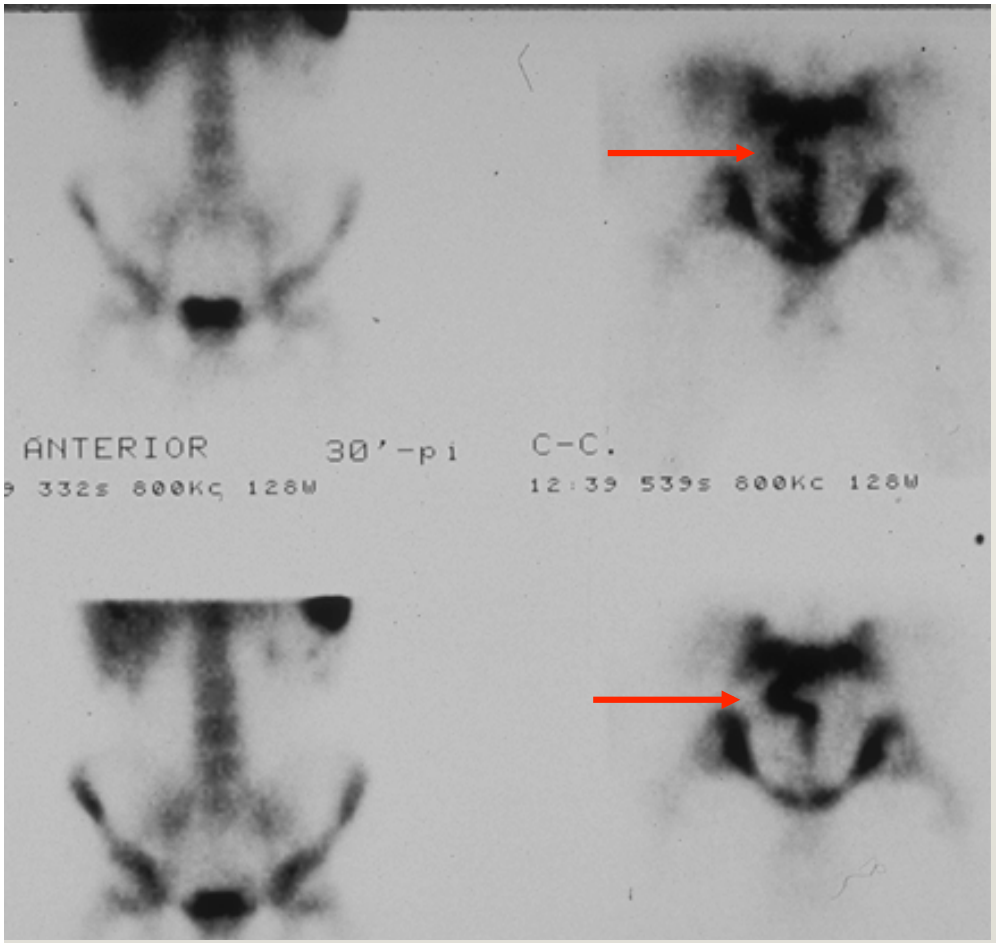
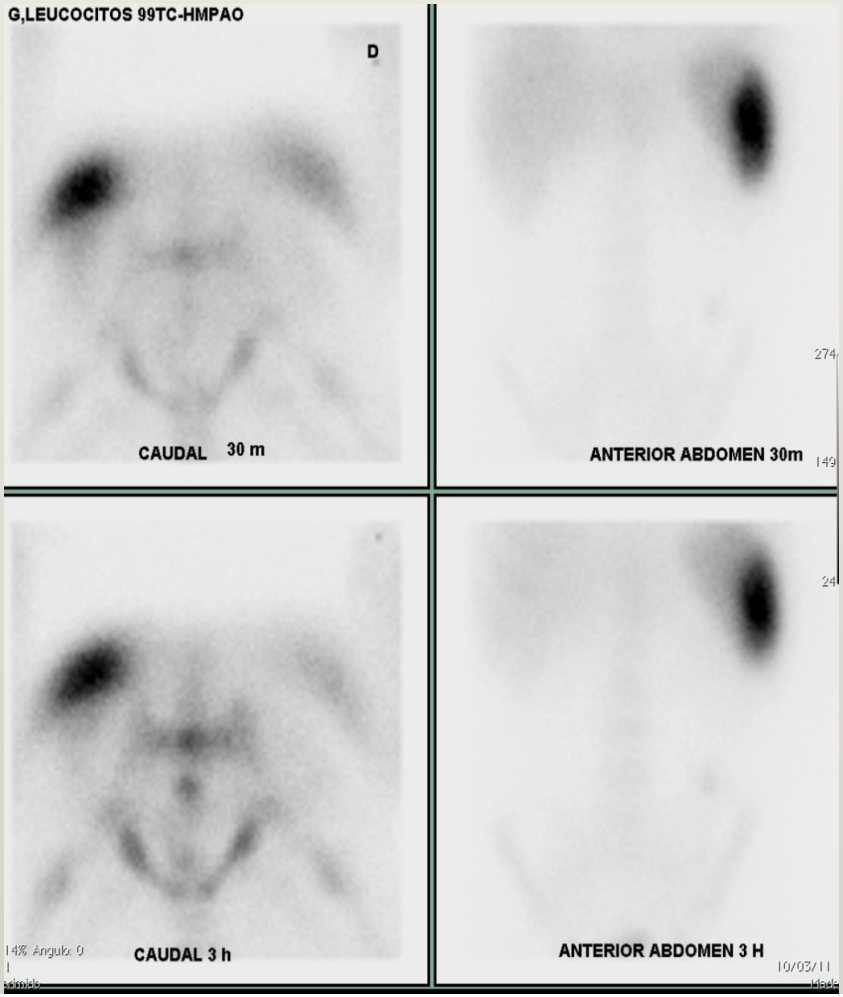
WG3: Colon and rectum, CD and UC excluding cancer

4B. The performance of imaging depends on the type of colitis and severity (EL1b). Transabdominal US and MRI have a high accuracy for assessing the activity and severity of Crohn' s colitis [EL:1b, RG:A]; the performance in UC is less clear. The role of CT for distinguishing quiescent from active colonic IBD is currently not defined.
White blood cell scintigraphy can detect colon inflammation and can be used as an additional technique (EL2).

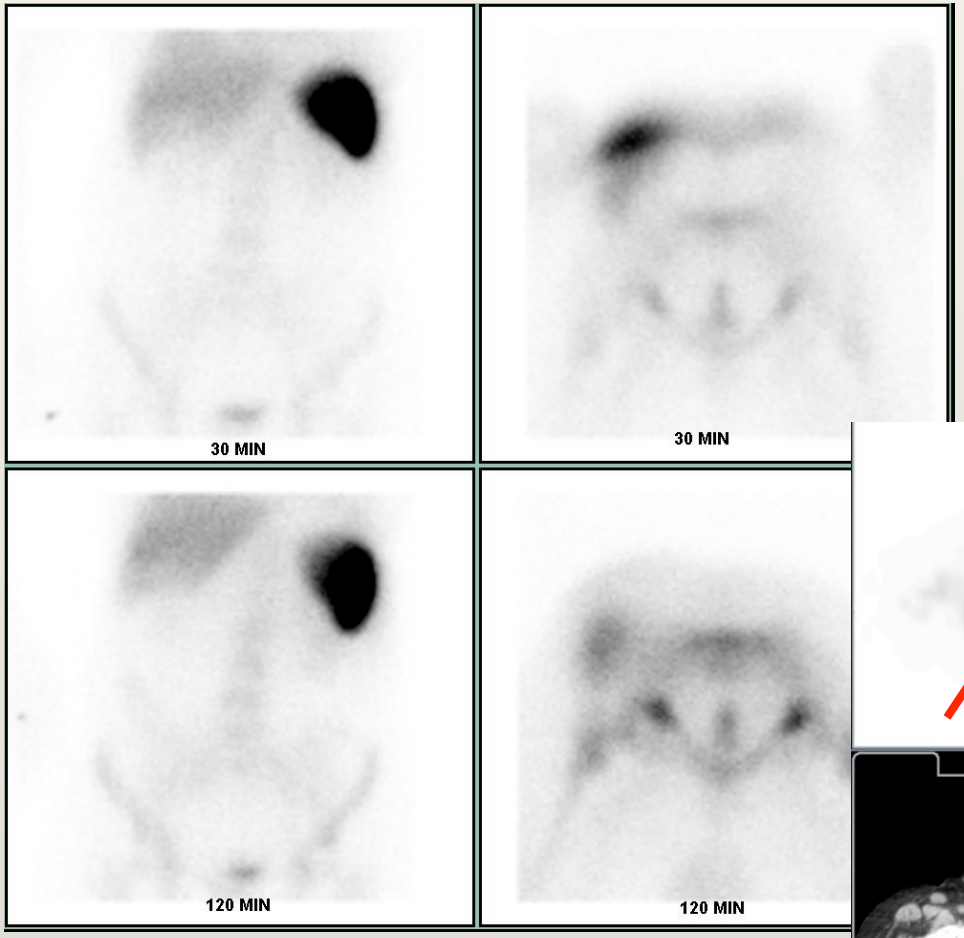


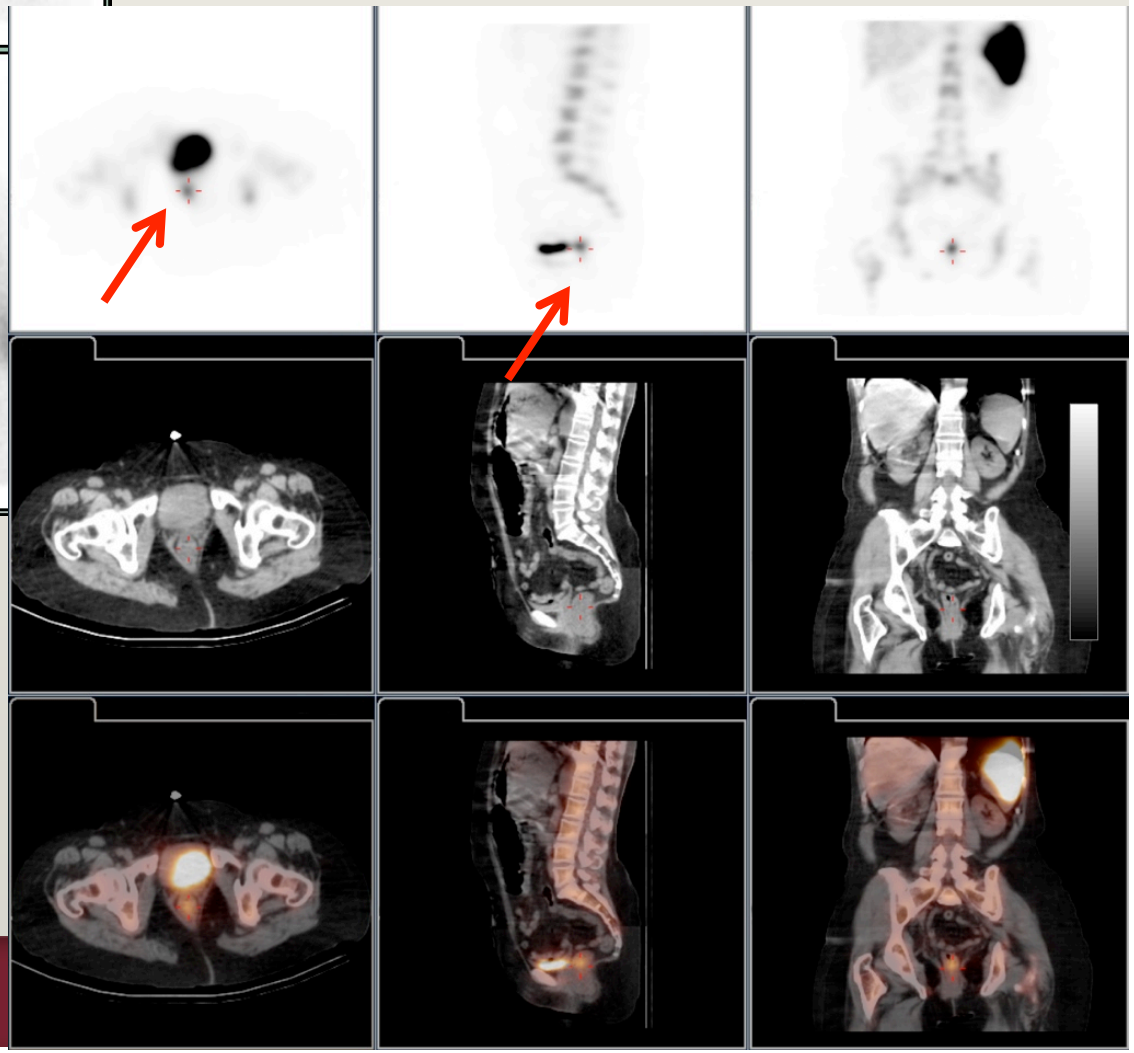
Rectal disease

Importance of caudo-cranial (sitting) view



PROCTITIS





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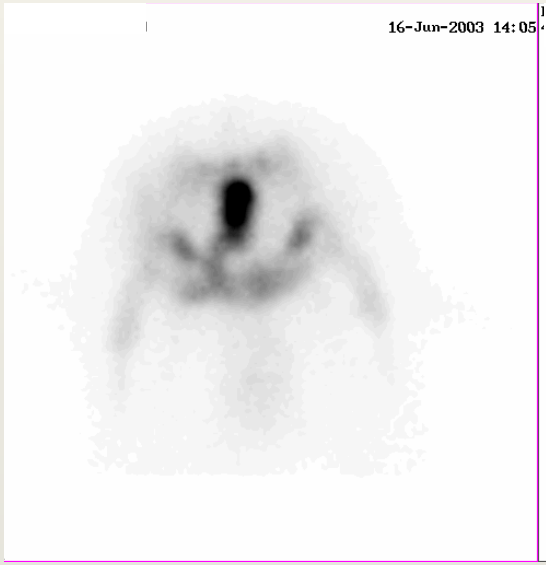
WG7: Special situations nor emergencies: postsurgery, cancer surveillance, ileoanal pouch

8A. US, CT, MRI, SBFT and WBC scintigraphy detect recurrence of CD after ileocolonic resection and are complementary to endoscopy (EL2). US, CT, MRI, SBFT and WBC scintigraphy can be useful as a follow-up method in patients after small bowel surgery (EL2).



37 old man.
10 days UC
Rectoscopy:
UC

Basal SAI: 19

3 weeks SAI: 0

Patient remained asymptomatic during the follow-up (1 year)

Inflammatory bowel disease
Role of labelled WBC scintigraphy

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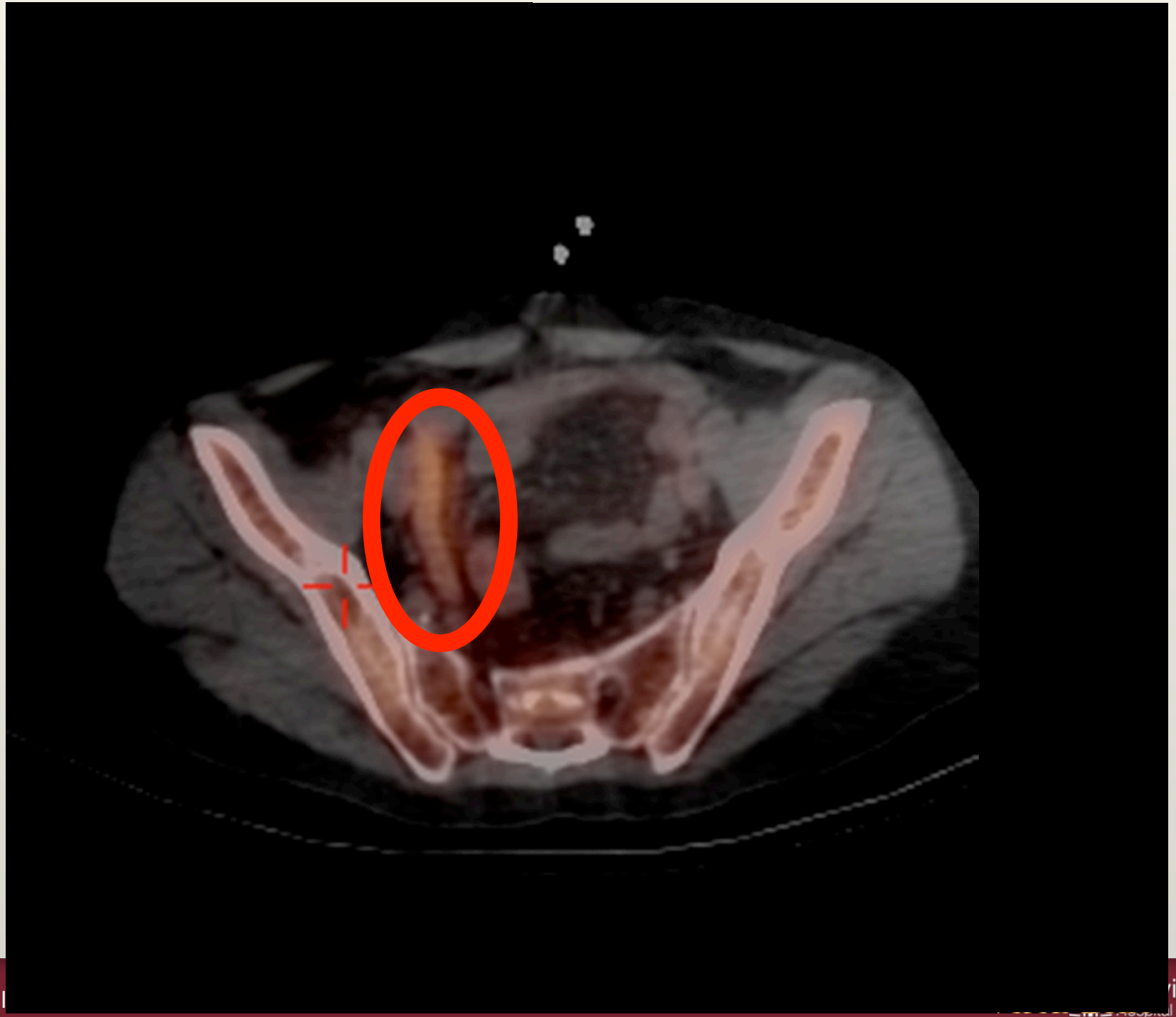
Indications

- **Diagnostic**
  - Extent of active disease
  - Disease activity
- **Follow-up**
  - Early evaluation of therapy efficacy
  - Prediction of disease relapse
- **Complications**
  - Stenosis: Fibrosis vs relapse

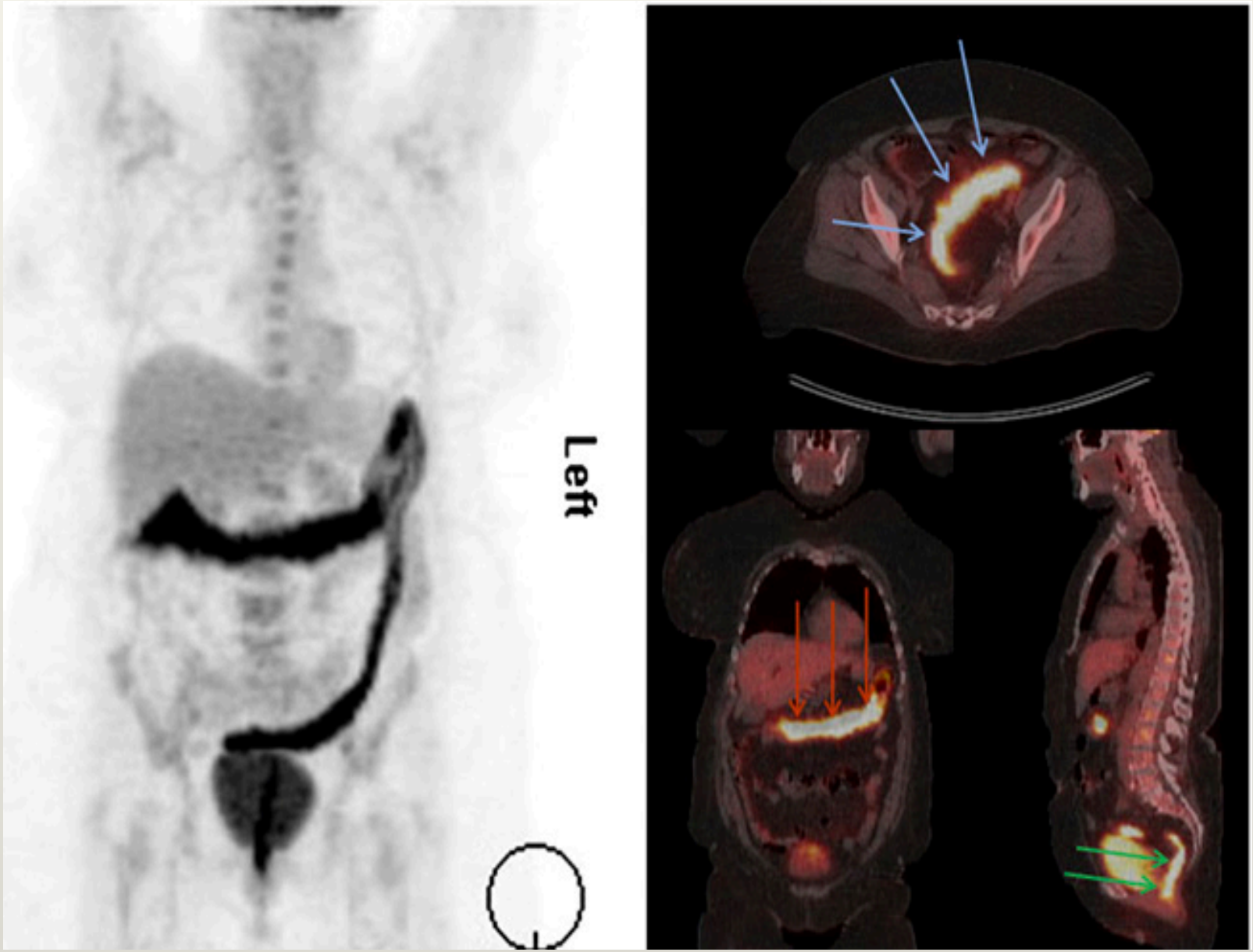
The role of SPECT and PET deserves further evaluation



Puig et al 2012
HUB

33/44 (75%) SPECT modified results	33 extent	24 increases
		9 decreases
	22 activity	12 increases
		10 decreases

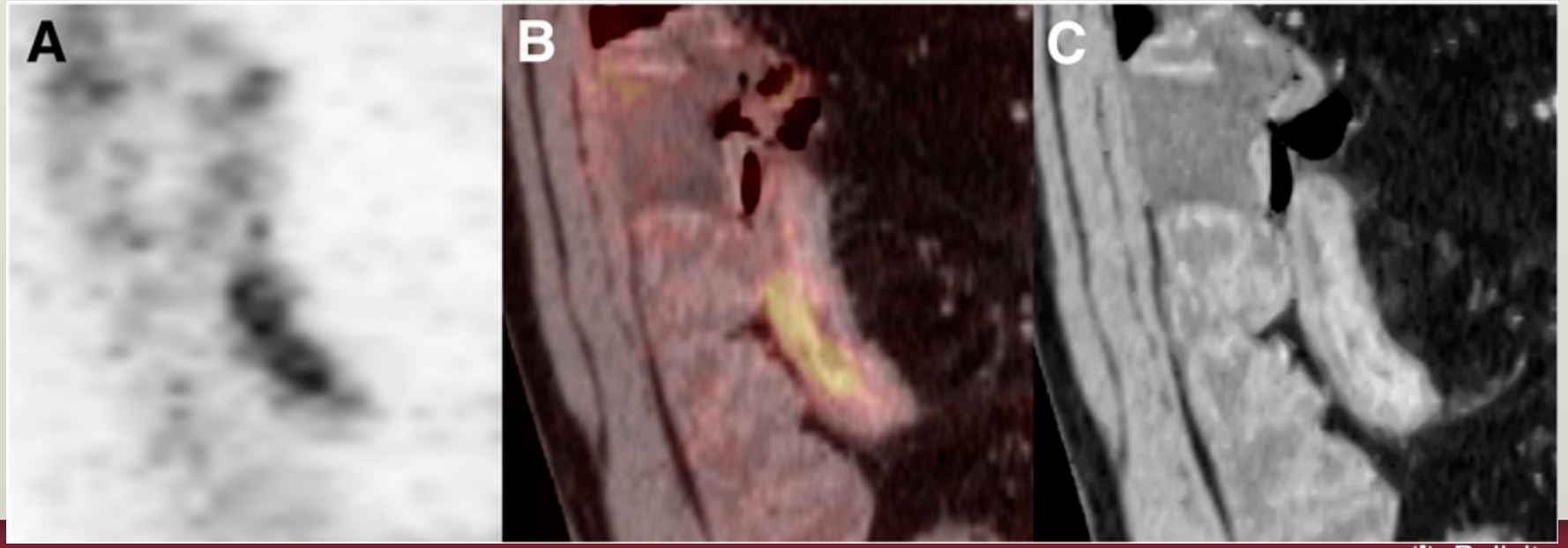
3 patients SPECT change from normal to positive



Gotthardt et al. JNM 2010
18F-FDG. Ulcerative colitis

Questions to answer: PET
Groshar et al J. Nucl. Med. 2010

- 28 CD pat.
- 22 had 85 abnormal segments
- 6 had no abn. Seg.
- SUV max: 5.0 ± 2.5 vs 2.1 ± 0.69

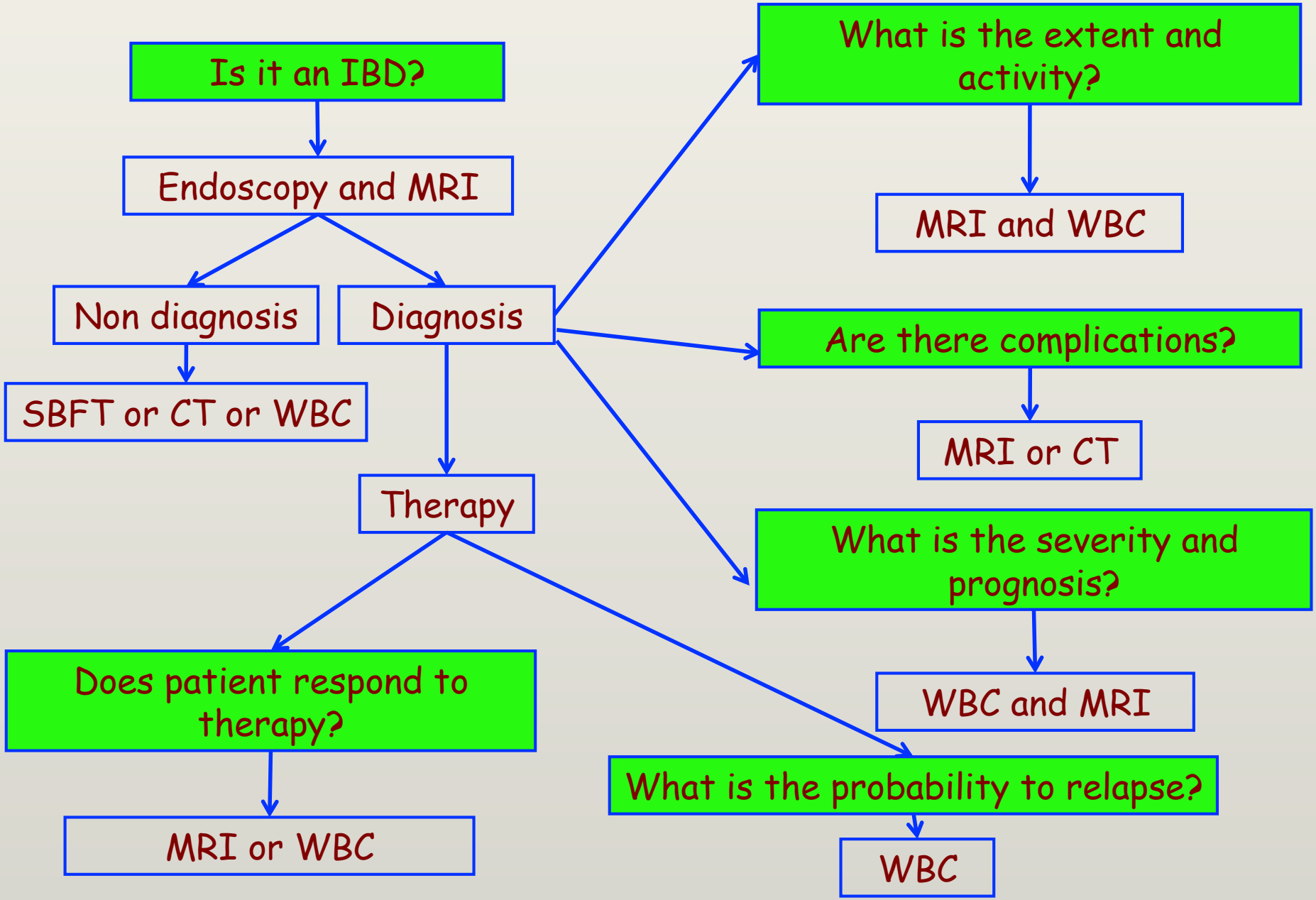


Dabritz et al. EJGH 2011

45 children
35 CD, 10 UC
18F-FDG PET & low dose CT

	Endoscopy								
	Positive			Negative			Total		
PET/CT	PET	PET–CT	All	PET	PET–CT	All	PET	PET–CT	All
Positive (number)	21	12	33	0	0	0	21	12	33
% of PET/CT	100	100	100	0	0	0	100	100	100
% of endoscopy	100	92	94	0	0	0	100	86	94
Negative (number)	0	1	1	0	1	1	0	2	2
% of PET/CT	0	50	50	0	50	50	100	100	100
% of endoscopy	0	8	3	0	100	100	0	14	6
Total	21	13	34	0	1	1	21	14	35
Sensitivity (%)							100	92	97
Specificity (%)							100	100	100

IBD: diagnostic and management flow-chart



Thank you