

# PET-CT: Oncologic Applications in the Abdomen

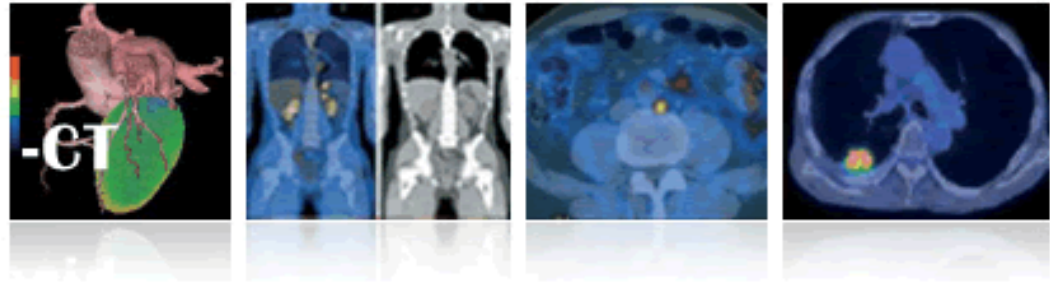
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**2nd** ★ ★  
**Barcelona PET-CT**  
★ ★  
**and Hybrid**  
★ ★  
**Imaging Course**

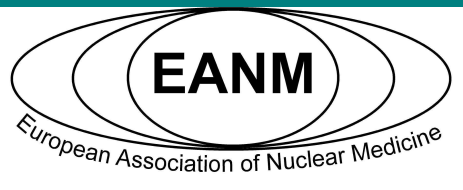


Barcelona, November 12 and 13, 2009

# 2nd PET-CT and Hybrid Imaging Course

Barcelona, November 12 and 13, 2009

HOTEL BARCELONA PLAZA



# Acknowledgements

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# PET-CT: Oncologic Applications in the Abdomen

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- Primary Imaging Technique
- Rivals CT/MRI
- Abdominal oncologic imaging
  - Primary diagnosis
  - Staging and restaging
  - Monitor therapeutic response



# PET-CT: Oncologic Applications in the Abdomen

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- Advantage
  - Less dependent of peristalsis or variable filling status of hollow organs than CT/MRI
- Limitations
  - Low or variable glycolytic activity of some tumor entities (mucinous tumors)
  - Physiologic bowel uptake and urinary excretion
  - Brown fat
  - Misregistration



# PET-MDCT

## in Abdominal Oncologic Imaging: Technical and Legal Aspects

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- Low dose CT scan for attenuation correction
- The CT unit is a modern MDCT
- Potential to include a diagnostic quality MDCT scan
- Issues:
  - IV and oral contrasts
  - Study interpretation (dual certification?)

“Take care of your best PET - your CAT”



# PET-MDCT

## in Abdominal Oncologic Imaging: Technical and Legal Aspects

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- CT scan might provide important data for the care of the patient (even low dose CT)
- Radiation exposure
- Training of personnel for contrast administration/reactions
- If not reviewed, the CT portion of PET/CT...
  - Extremely vulnerable to legal consequences



# Full PET-MDCT: Advantages

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- Single diagnostic procedure for the oncologic patient (one-stop-shop)
- Potential reduction in radiation dose
- Potential reduction in cost



# Full PET-MDCT: Disadvantages

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- Potential increase in false positives and artifacts
  - Overestimation of PET attenuation due to enhanced CT-based attenuation correction
- May lead to artifacts and false positives
- Potential income decrease



# Positive oral contrast agents

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- Abnormal increase in oral contrast density (HU):
  - Patients with gastrointestinal stenoses
  - Patients with compromised gastrointestinal motility
- May lead to severe inaccuracies in PET tracer quantification



# LHV (or neutral) oral contrast agents

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- Use of a neutral (water density) or low Hounsfield value (LHV) oral contrast agent
- Water is not the right answer since it gets rapidly absorbed in the small bowel
- Commercial preparation:
  - 0.1% barium sulfate, sorbitol, natural gums





# Colorectal Cancer

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- Helpful in evaluation
  - complex anatomy (e.g. pelvis)
  - peritoneal implants
  - incidental discovery
- Mucinous cancer: less FDG-avid
- False (+): inflammation or granuloma
- False (-): small tumor, after therapy



# PET-MDCT in Abdominal Oncologic Imaging: Gastrointestinal Tract

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## 2. Esophageal Cancer

- Initial staging
- Whole body (neck, chest, abdomen)
- Surgical planning



# PET-MDCT in Abdominal Oncologic Imaging: Gastrointestinal Tract

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## 3. Gastrointestinal Stromal Tumor (GIST)

- Mesenchymal tumor
- Entire length GI tract
- 90% have activating mutation in the gene encoding *KIT*
- One-third of GISTs lacking *KIT* mutations have activating mutations in the gene encoding PDGFR- $\alpha$



# PET-MDCT in Abdominal Oncologic Imaging: Gastrointestinal Tract

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4. Lymphoma in the abdomen
  - GI tract
  - Lymph nodes
  - Spleen
  - Pancreas
  - Liver



# PET-MDCT in Abdominal Oncologic Imaging: Gastrointestinal Tract

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- Colorectal cancer
- Anal cancer
- Esophageal cancer
- GIST
- Lymphoma
  
- Differentiation with Inflammatory Diseases



# PET-CT: Oncologic Applications in the Abdomen

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- Primary Imaging Technique
- Superior to CT and MRI (sensitivity)
- Abdominal Oncologic Imaging affected by PET-CT
- Benefits from full diagnostic MDCT (oral and IV contrast)
- Many Abdominal oncologic applications
- Advantages, Limitations
- Full Diagnostic PET-CT scans



# FUTURE DIRECTIONS

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- PET-MRI
- Radiation treatment planning
- Other isotopes for PET/CT
- Applications other than oncology:
  - Inflammatory diseases
    - Pancreatitis
    - IBD
  - Endometriosis

