

Incontro Congiunto Sezioni SIRM  
Radiologia Pediatrica  
Radiologia Addominale e Gastroenterologica

Imaging Gastro-intestinale: L'adulto e il Bambino  
Aula Magna AOU di Ferrara  
5 Febbraio 2016

# Patologia neoplastica dell'intestino tenue

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Radiologia Interaziendale

Azienda Ospedaliero Universitaria - FE

Direttore Dott. Giorgio Benea



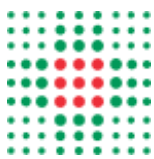
# Diagnostic Challenge...



account for 1–6% of all gastrointestinal tract malignancies<sup>[3]</sup>. Early diagnosis of small bowel tumours is a diagnostic challenge for both clinicians and radiologists for two main reasons. First, patients with these neoplasms

**S**mall-bowel neoplasms are rare entities and often pose a challenge to radiologists, gastroenterologists, and oncologists. The an-

The diagnosis of small intestinal tumours is difficult due to the rarity of these lesions and the nonspecific and variable nature of the presented symptoms. The most common



# Diagnostic Challenge...

- ***Low incidence (1-6% of all GI malignancies)***
- ***Non-specific symptoms and signs***
- ***Small intestine is difficult to investigate***



***Delayed diagnosis***

# Symptoms and Signs

***GI bleeding (often obscure)***

***Weight loss***

***Malabsorption***

***Obstruction***

***Vomiting***

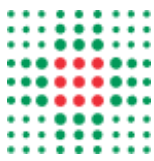
***Perforation***

***Nausea***

***Abdominal pain***

***Anemia***

***Diarrhoea***





# Endoscopic techniques

EGDS

Push enteroscopy

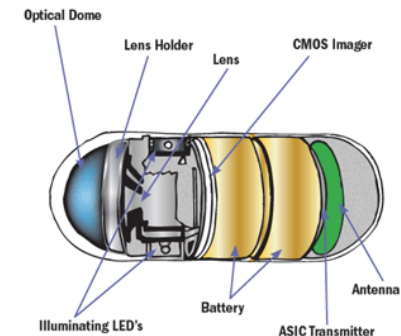
Sonde enteroscopy

Double-balloons enteroscopy

Intraoperative enteroscopy

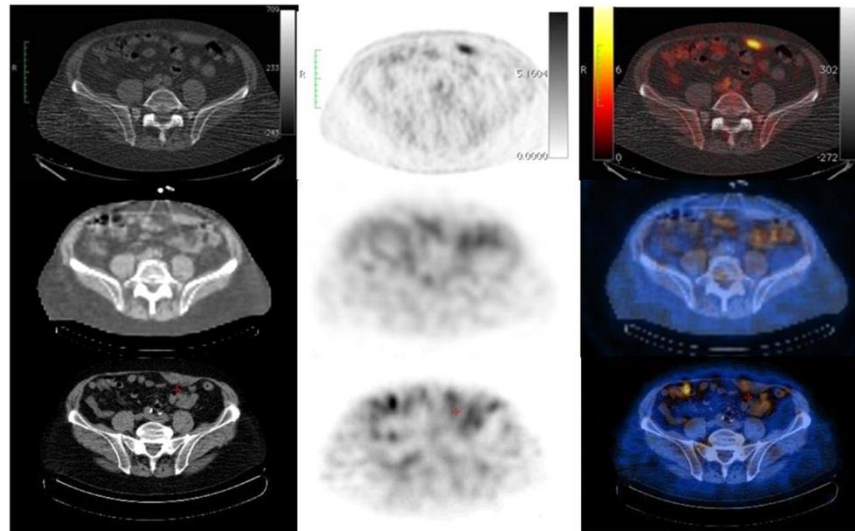
Ileocolonoscopy

Wireless capsule endoscopy (WCE)



# Functional Imaging

- PET (18F-FDG)
- PET-TC
- Somatostatin receptor scintigraphy
- Iobenguane scintigraphy



# Ultrasound

Dilatation of intestinal loops

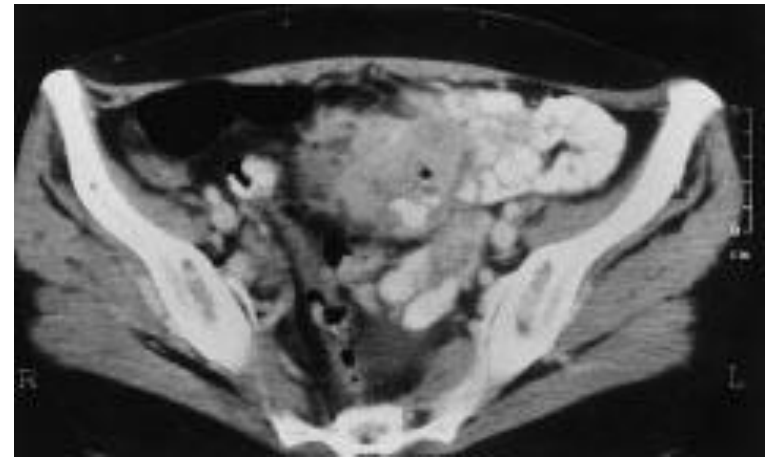
Wall thickening

Exophytic or intraperitoneal masses

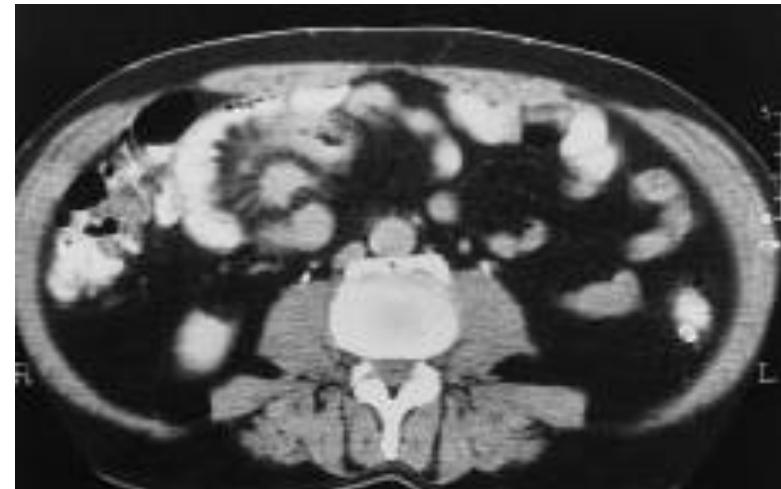


Ileal NHL

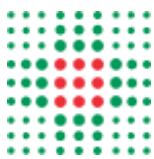
# Ultrasound



**Leiomyosarcoma of the jejunum**



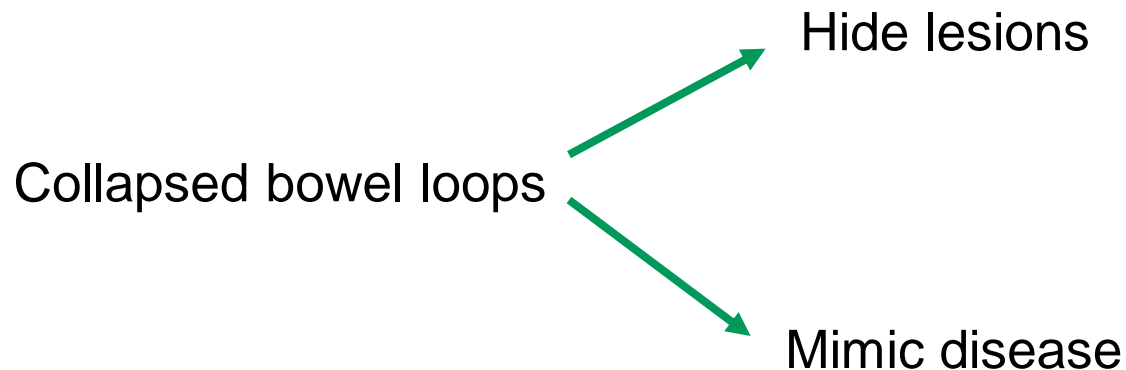
**Ileal carcinoid**

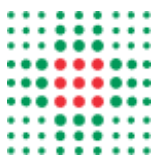


# CT and MRI

Detection of both intra- and extraluminal abnormalities !

Optimal distention of small bowel loops is crucial





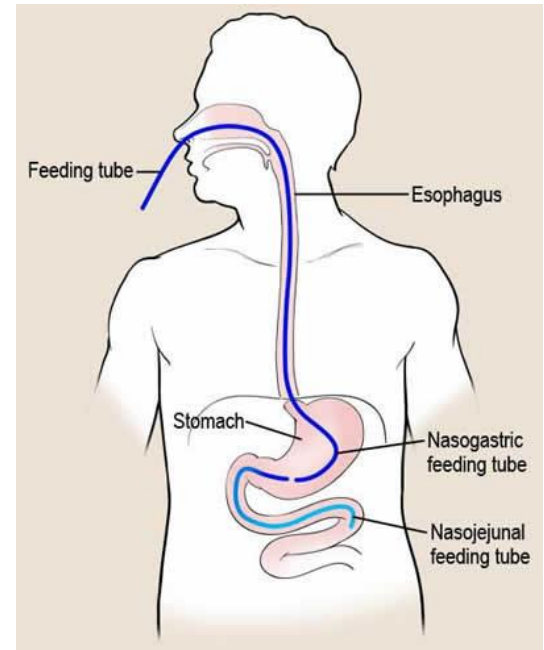
# CT and MRI

- No consensus about contrast agent
- Neutral contrast agents for CT
- Biphasic contrast agents for MR (low T1, high T2)

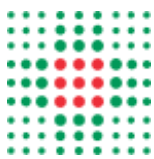


Water, Methylcellulose, Water mixture, Polyethylene glycol, VoLumen

# Enterography Vs Enteroclysis



“The choice depends on the clinical indications, the patient population, the radiologic practice and the diagnostic algorithms of different center”



# Enterography



- Better patient acceptance
- Obviates the need for nasoenteric intubation
- Ileum is usually well demonstrated





- Jejunal distention suboptimal
- Ability to assume a sufficient volume of oral contrast
- Inter-individual variation in bowel transit time



# Enterography



 SERVIZIO SANITARIO REGIONALE EMILIA-ROMAGNA <small>Azienda Capofila per l'Università di Ferrara</small>	<b>U.O. Interaziendale di Radiologia Diagnostica ed Interventistica</b>	<u>Documento</u> MOD-005-UOIRadDI Rev. 0	Pag. 1/1 data 11/11/2013
 SERVIZIO SANITARIO REGIONALE EMILIA-ROMAGNA <small>Azienda Unità Sanitaria Locale di Ferrara</small>			

## EnteroTC ed EnteroRM

### NORME DA SEGUIRE PER LA PREPARAZIONE ALL'INDAGINE

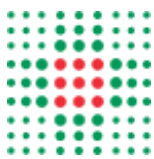
Nei 3 giorni precedenti l'esame è necessario tenere una DIETA priva di scorie/liquida come sotto descritto:

Primo e Secondo giorno: dieta priva di scorie (evitare cibi integrali,

carne rossa, burro, frutta, cereali, legumi,  
prodotti con latte intero, ecc.)

Terzo giorno: dieta liquida (brodo, the, caffè, succhi di frutta,  
ghiaccioli)

Il giorno dell'esame presentarsi a **digiuno** da almeno 6 ore.



# Enterography



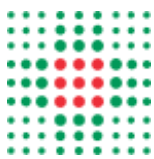
*SELG (Isocolan)*

*3 doses in 1,5 Liter of water*

*1 Liter 40' before examination*

*0,5 Liter 10' before examination*





# MR-Enterography



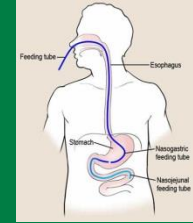
## **Prospective evaluation of magnetic resonance enterography for the detection of mesenteric small bowel tumours**

Elisa Amzallag-Bellenger • Philippe Soyer •  
Coralie Barbe • Marie-Danièle Diebold •  
Guillaume Cadiot • Christine Hoeffel

# Overall Accuracy 96 %



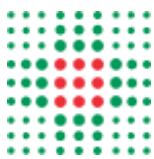
# Enteroclysis



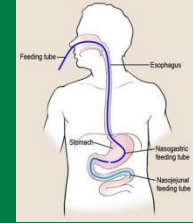
- Better bowel distention
- Better depiction of mucosa
- Better visualization of jejunum



- Nasoenteric intubation
- Long time procedure
- RX exposure



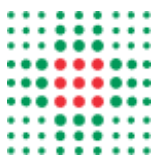
# CT-Enteroclysis



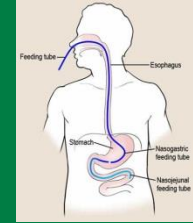
## Helical CT-enteroclysis in the detection of small-bowel tumours: a meta-analysis

Philippe Soyer • Mounir Aout • Christine Hoeffel •  
Eric Vicaud • Vinciane Placé • Mourad Boudiaf

- ✓ 22 Published Articles from 1992 to 2010
- ✓ 696 patients
- Sensitivity 92.8%
- Specificity 99.2%



# MR-Enteroclysis

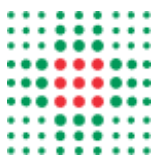


Gabriele Masselli, MD  
Elisabetta Poletti, MD  
Emanuele Casciani, MD  
Luca Bertini, MD  
Amorino Vecchioli, MD  
Gianfranco Gualdi, MD

## Small-Bowel Neoplasms: Prospective Evaluation of MR Enteroclysis<sup>1</sup>

Overall Accuracy 97 %

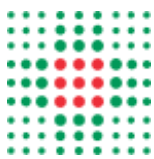
19 lesions in 150 Patients



# Small Bowel Tumors

## **We Prefer CT...**

- Elderly patients
- Patients with breath-hold difficulty
- Acute and emergency setting



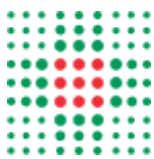
# Small Bowel Tumors

## **We Prefer MRI...**

- Children, pregnant woman and IBD
- Follow-up
- Patients with renal dysfunction

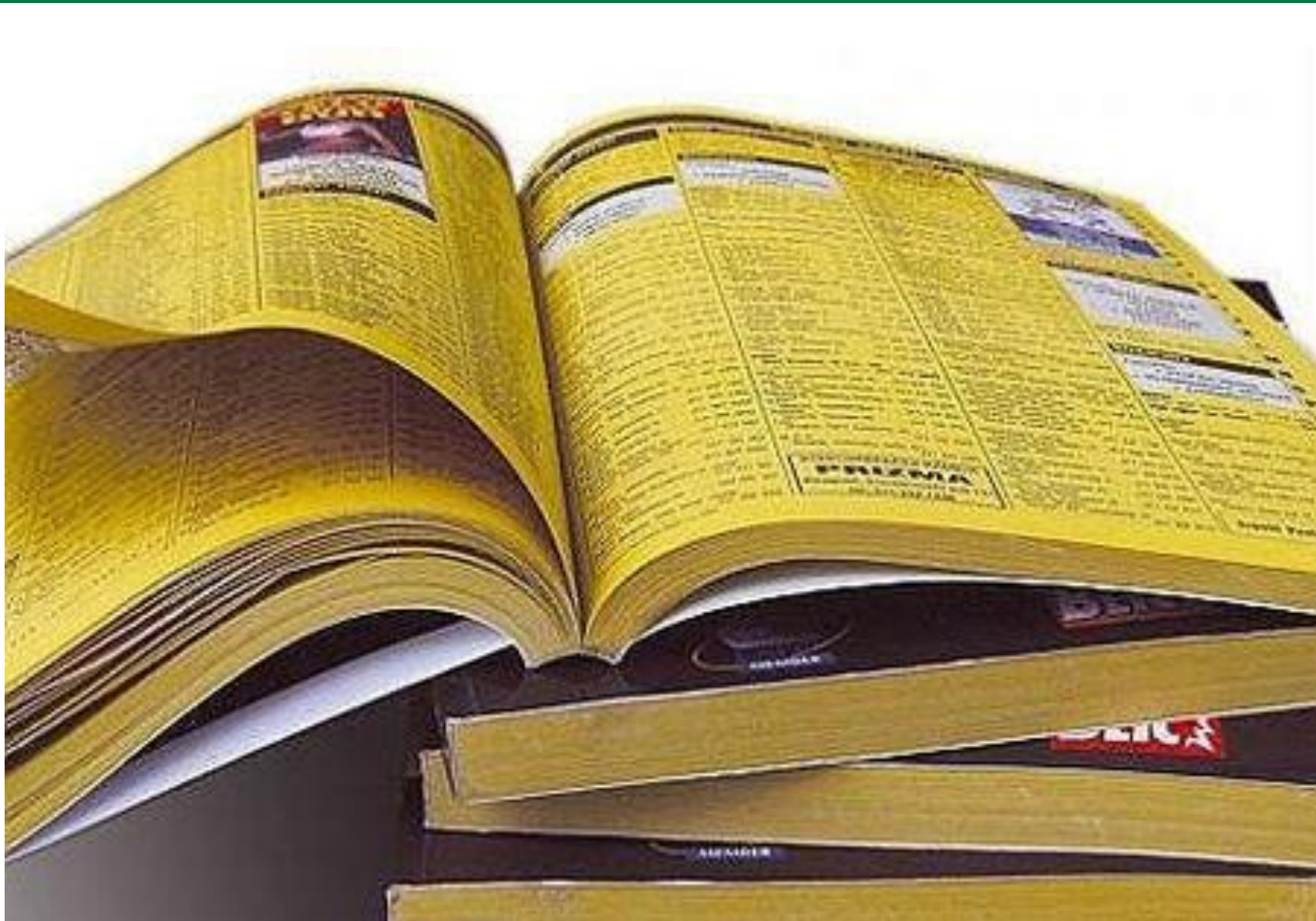
(good accuracy without contrast agent)





# Small Bowel Tumors

# Small Bowel Tumors



# Classification

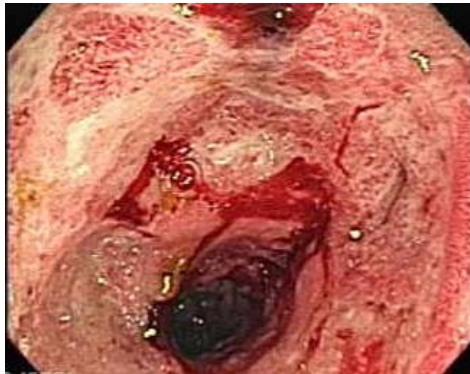
## Adenocarcinoma (45%)



## Carcinoid (30%)

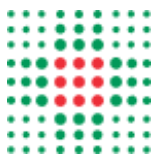


## Lymphoma (15%)

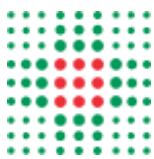


## GISTs (10%)





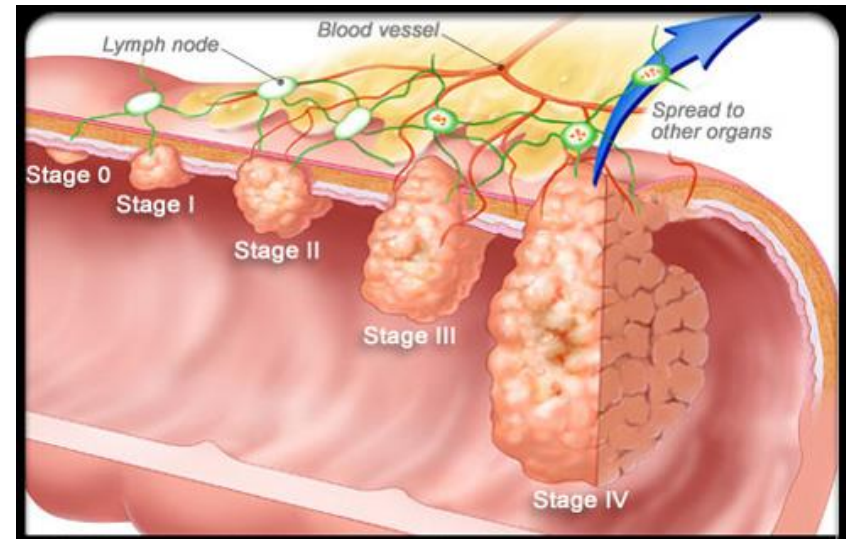
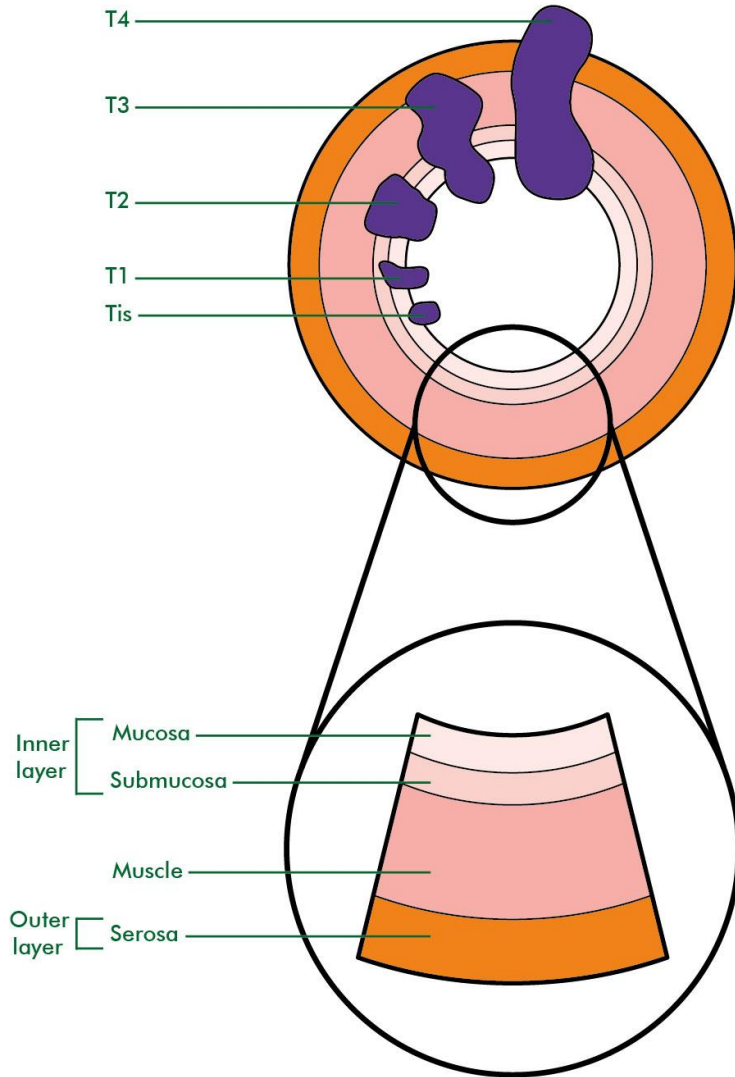
# Adenocarcinoma



# Adenocarcinoma

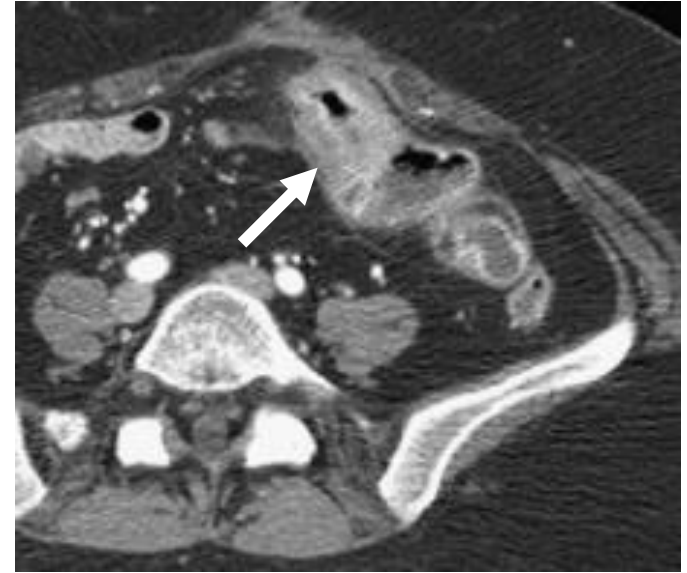
- Most common Small Bowel malignancy
- Duodenum 45-50%
- Distal ileum less frequently affected
- 12% survival at 2 years, 8% at 5 years

# Adenocarcinoma



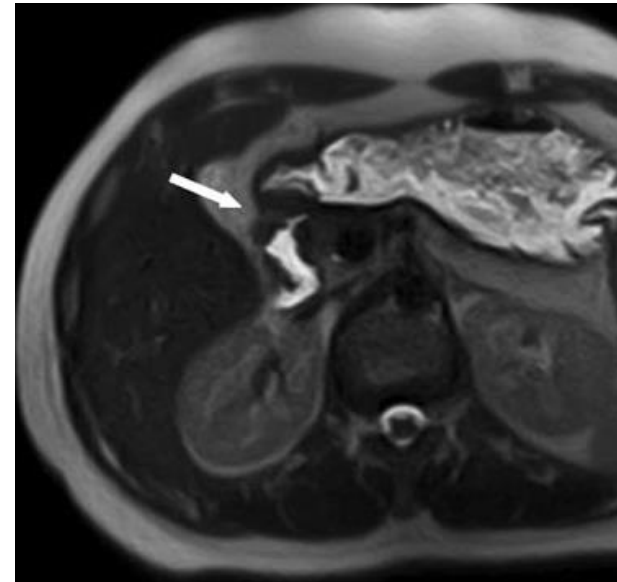
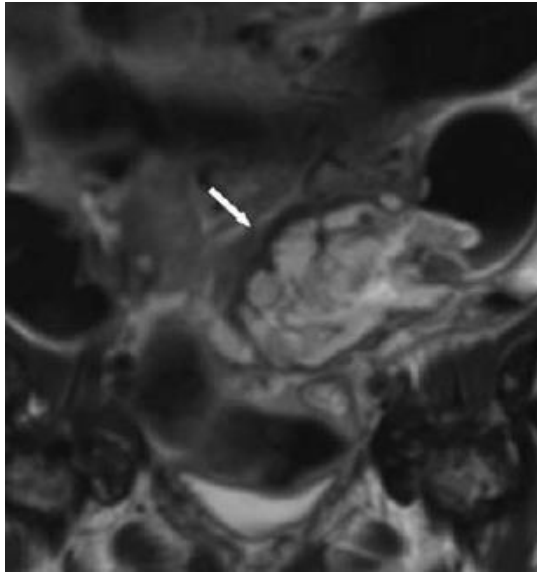


# Adenocarcinoma: CT features



- Purely stenotic lesions
- Concentrically growing soft tissue mass
- Eccentric wall thickening ( $>3$  cm)
- Ulcerative lesion
- Short segment involved
- Regional lymph nodes
- Mesenteric vessels invasion
- Bowel obstruction-intussusception

# Adenocarcinoma: MRI features

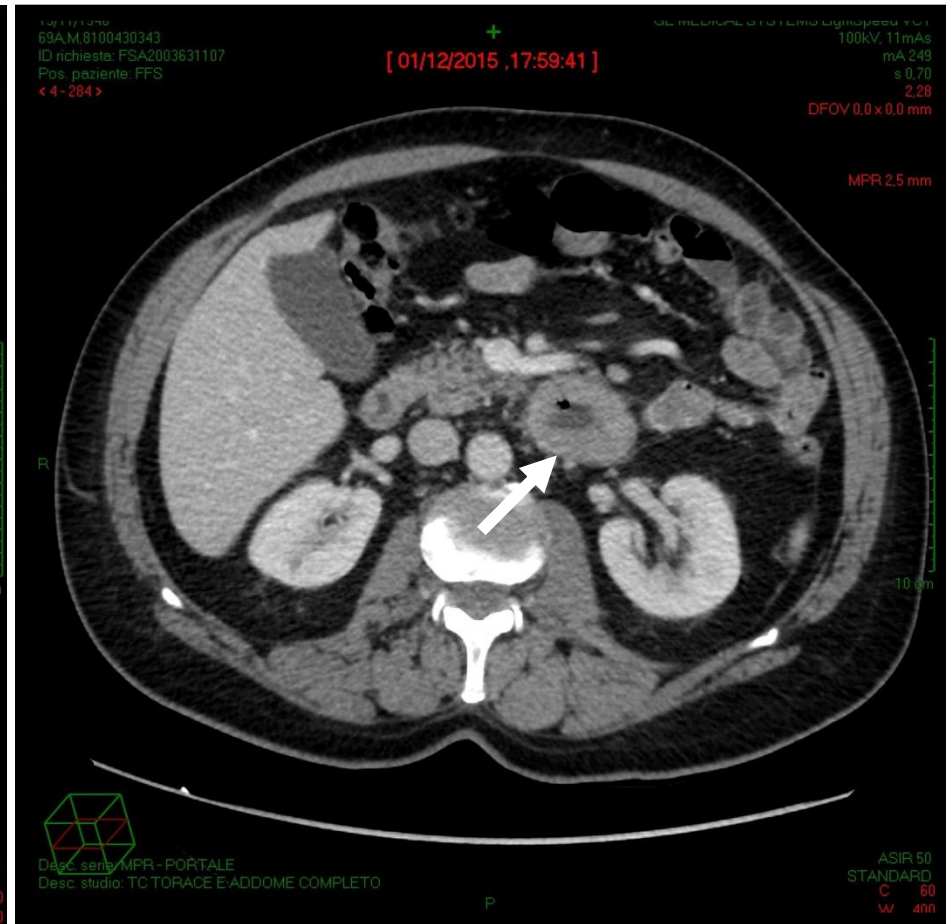
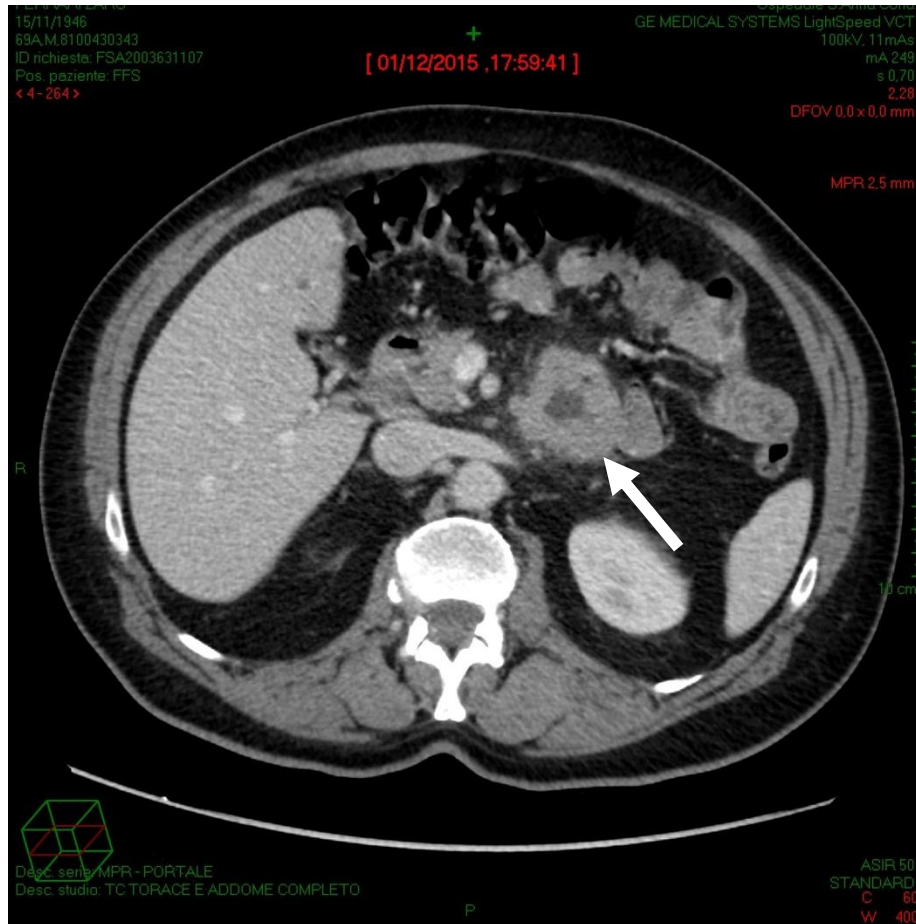


- Circumferential anular lesion
- Focal mass with intraluminal growth
- Narrowing and stenosis of the lumen
- Proximal obstruction
- Short segment involved
- Ulceration with intussusception

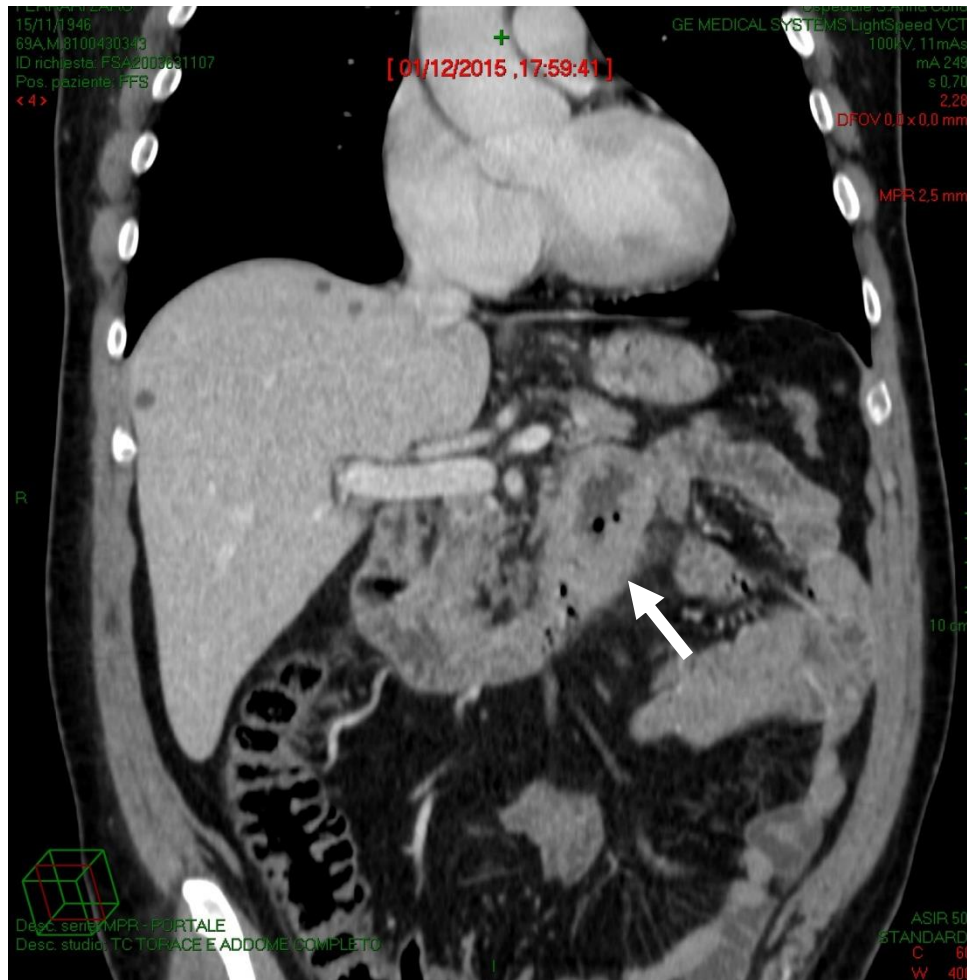


# Adenocarcinoma

Male, 69 Yrs



# Adenocarcinoma



## Informazioni cliniche

NEOFORMAZIONE STENOSANTE DUODENO III PORZIONE

## Sede e Procedura

Duodeno, Biopsia endoscopica

## Materiale inviato

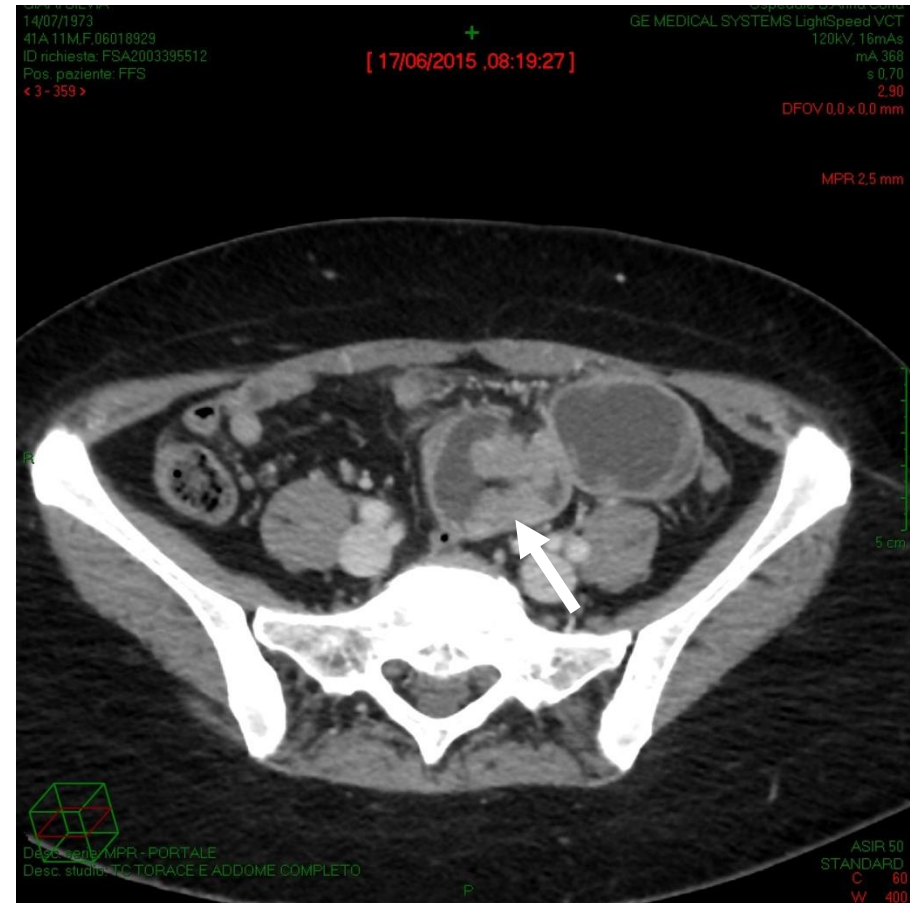
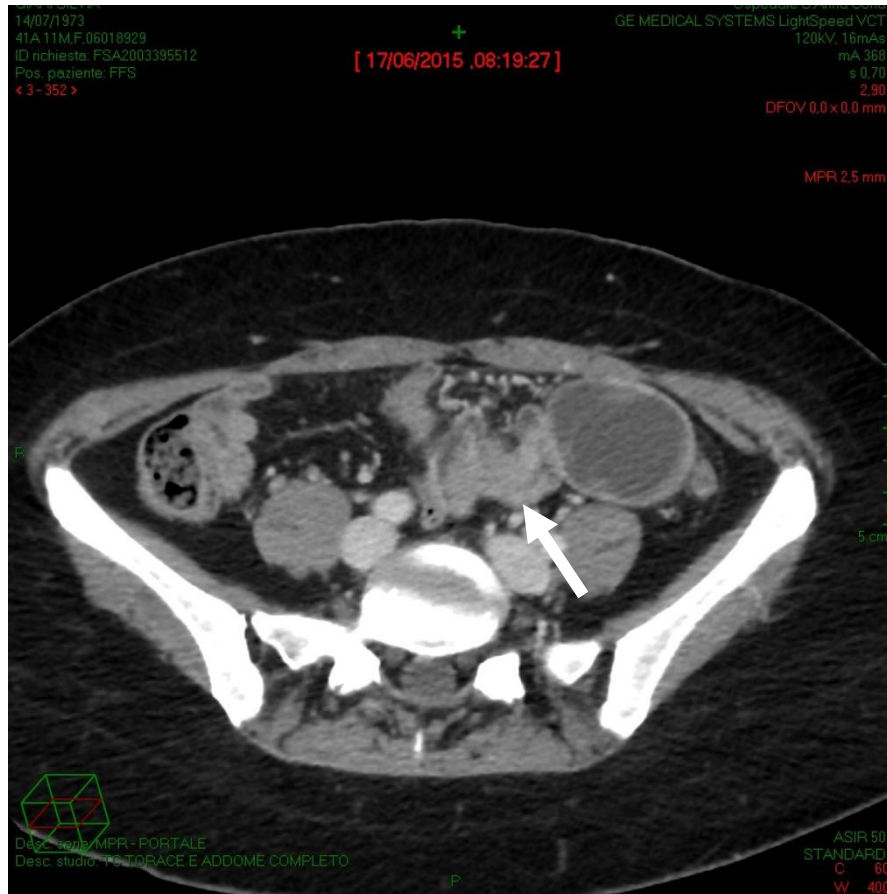
DUODENO III PORZIONE

## Diagnosi

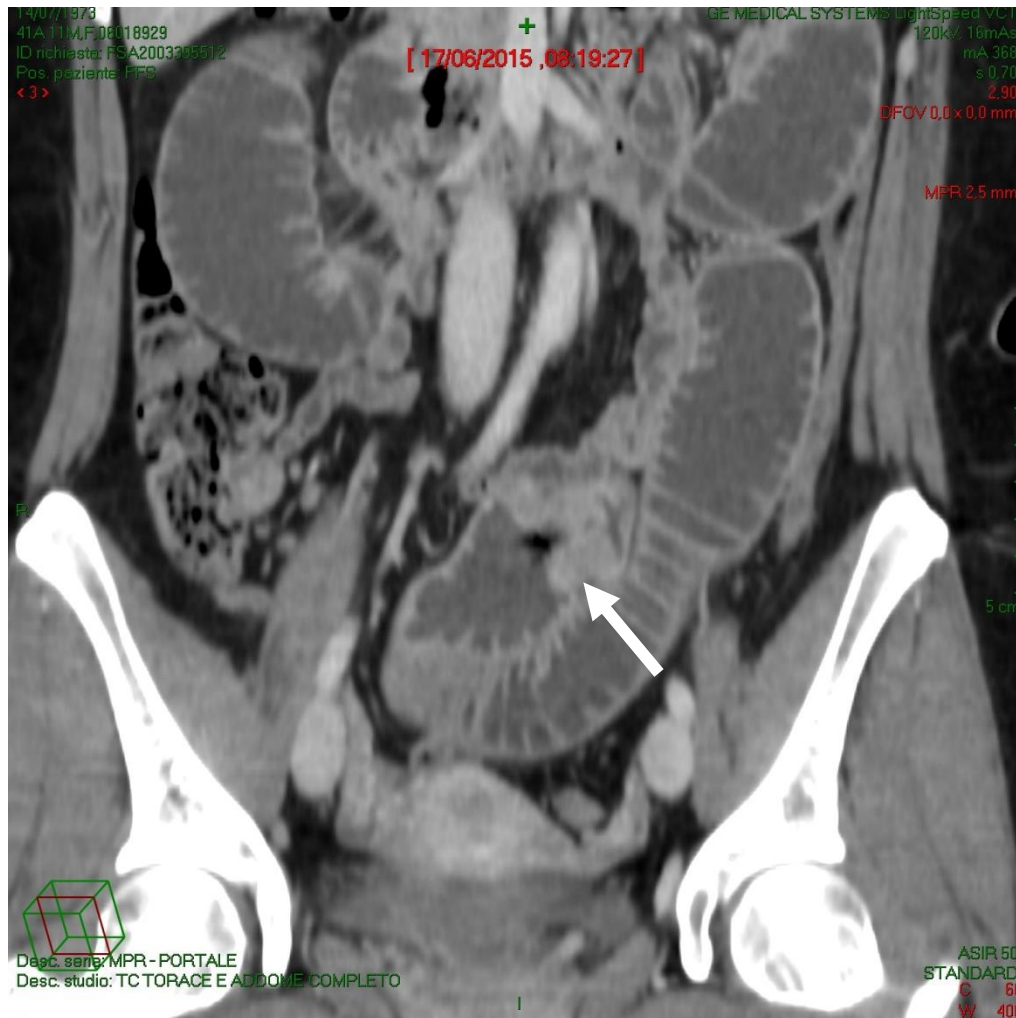
Adenocarcinoma infiltrante.

# Adenocarcinoma

Male, 42 Yrs



# Adenocarcinoma



## Materiale Inviato

ileo

## Caso di Riferimento

B2015-003812

## Diagnosi Istologica

Adenocarcinoma moderatamente differenziato, pT3 - pN0.

Letto/Controllato:- GL

## Diagnosi Bio Tecnologica

### ESPRESSIONE PROTEINA MLH1

RISULTATO ANALISI IMMUNOISTOCHIMICA: PRESENTE  
(CLONE M1)

### ESPRESSIONE PROTEINA MSH2

RISULTATO ANALISI IMMUNOISTOCHIMICA: PRESENTE  
(CLONE G219-1129)

### ESPRESSIONE PROTEINA MSH6

RISULTATO ANALISI IMMUNOISTOCHIMICA: PRESENTE  
(CLONE 44)

### ESPRESSIONE PROTEINA PMS2

RISULTATO ANALISI IMMUNOISTOCHIMICA: PRESENTE  
(CLONE A16-4)



# Adenocarcinoma in IBD

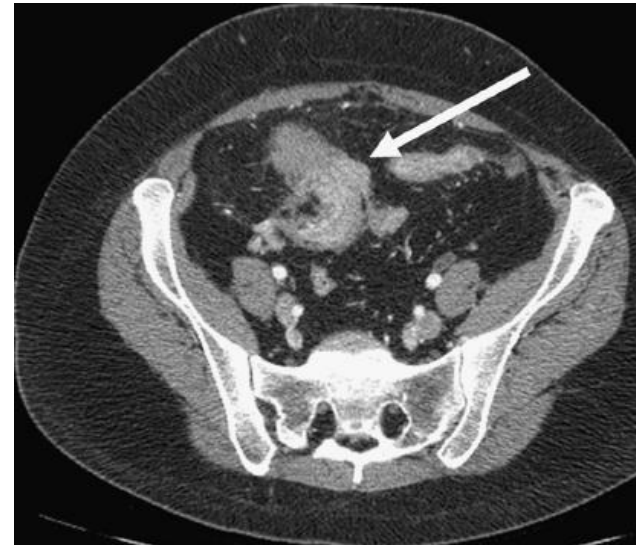
Abdominal  
Imaging

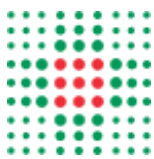
© Springer Science+Business Media New York 2014  
Published online: 24 April 2014

Abdom Imaging (2015) 40:1060–1067  
DOI: 10.1007/s00261-014-0144-7

## Clinical characteristics and imaging features of small bowel adenocarcinomas in Crohn's disease

Nicholas K. Weber,<sup>1</sup> Joel G. Fletcher,<sup>2</sup> Jeff L. Fidler,<sup>2</sup> John M. Barlow,<sup>2</sup> Shiv Pruthi,<sup>2</sup>  
Edward V. Loftus Jr.,<sup>1</sup> Darrell S. Pardi,<sup>1</sup> Thomas C. Smyrk,<sup>3</sup> Brenda D. Becker,<sup>1</sup>  
Shabana F. Pasha,<sup>4</sup> David H. Bruining<sup>1</sup>





# Adenocarcinoma

## Differential Diagnosis

### Soft tissue mass

Lymphomas (rarely cause obstruction)

Leiomyosarcoma (larger mass, local invasion)

Adenoca Pancreas

### Stenotic tumours

Carcinoids (serotonin-related symptoms)

### Benign stenosis (adhesive band or inflammatory strictures)

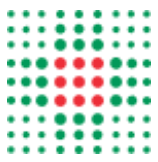
Mild transition from dilated and non dilated loop

Fibro-fatty proliferation

Longitudinal extension

Abscess or fistulas

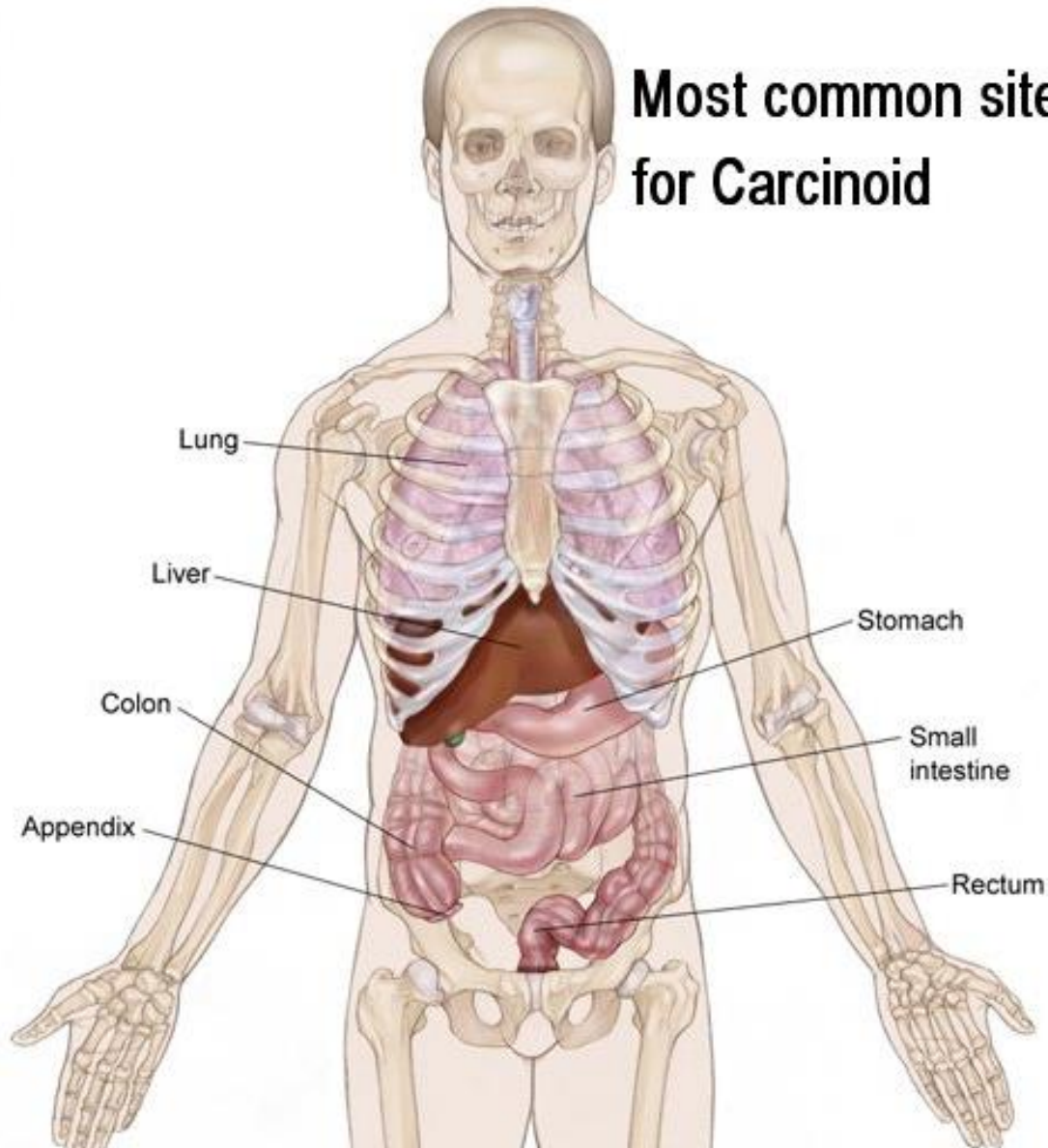
Distal ileum



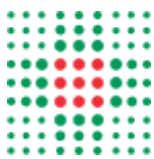
# Carcinoid

# Carcinoid (NET)

**Most common sites  
for Carcinoid**







# Carcinoid (NET)

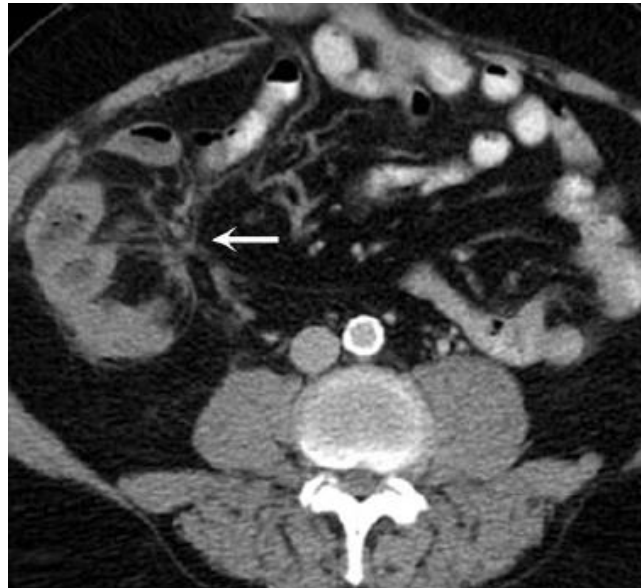
## Role of Imaging

- Localizing the primary tumour
- Identifying sites of metastatic disease
- Assessing response to treatment



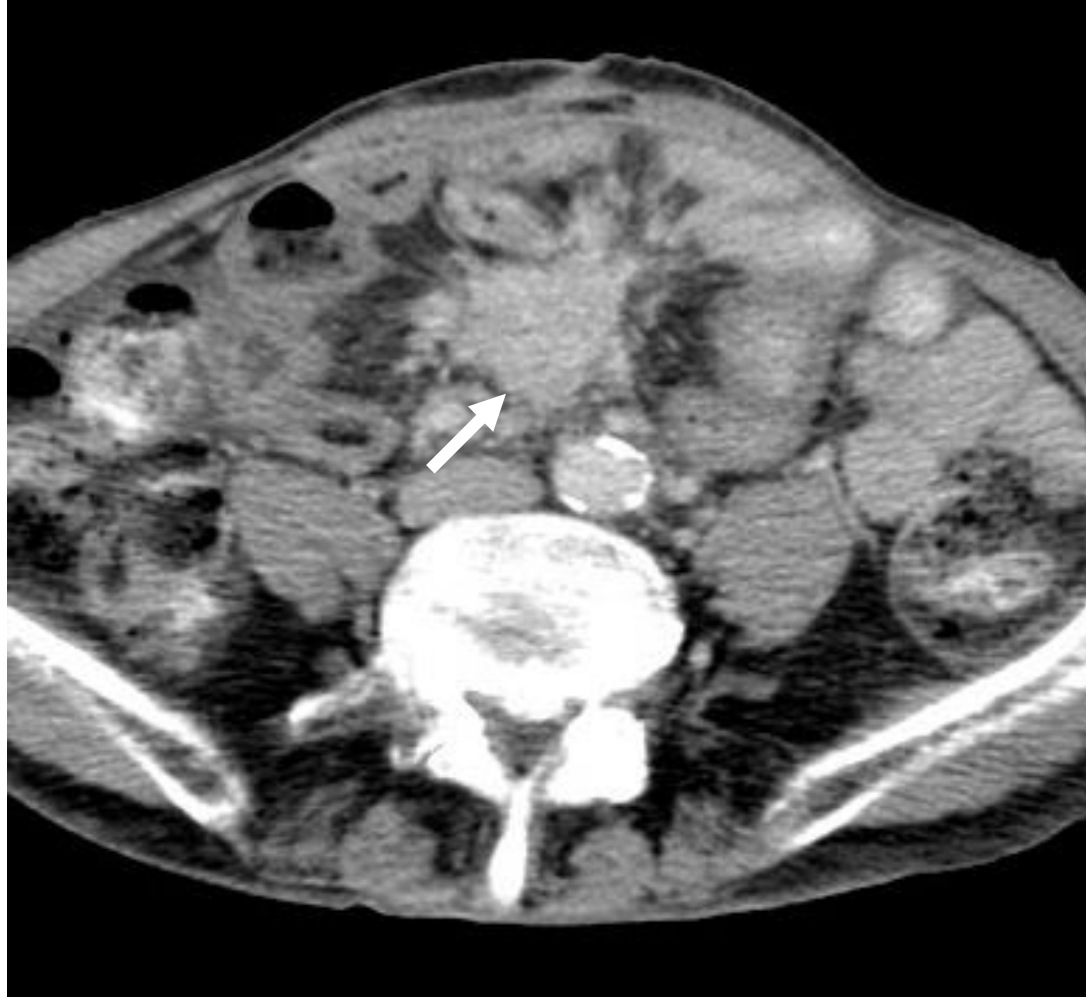
# Carcinoid: CT features

- Polypoid hypervascular lesion
- Tickening secondary to infiltrating tumor and desmoplastic submucosal fibrosis
- Coronal CT reformation plane necessary
- Mesenteric stranding secondary to fibrosis - **sunburst sign**
- Vessels invasion with ischemia (low attenuation tickening, target sign, halo sign)



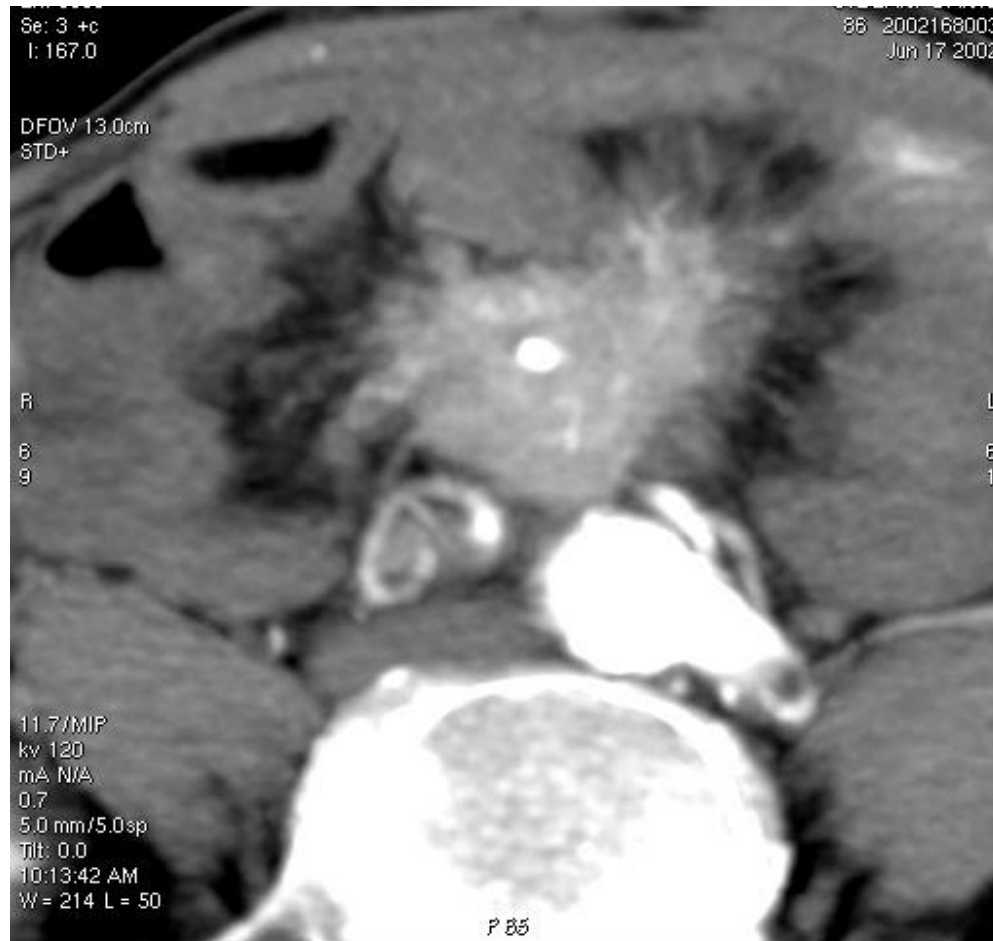
Mesenteric stranding

# Carcinoid: CT features



Sunburst sign

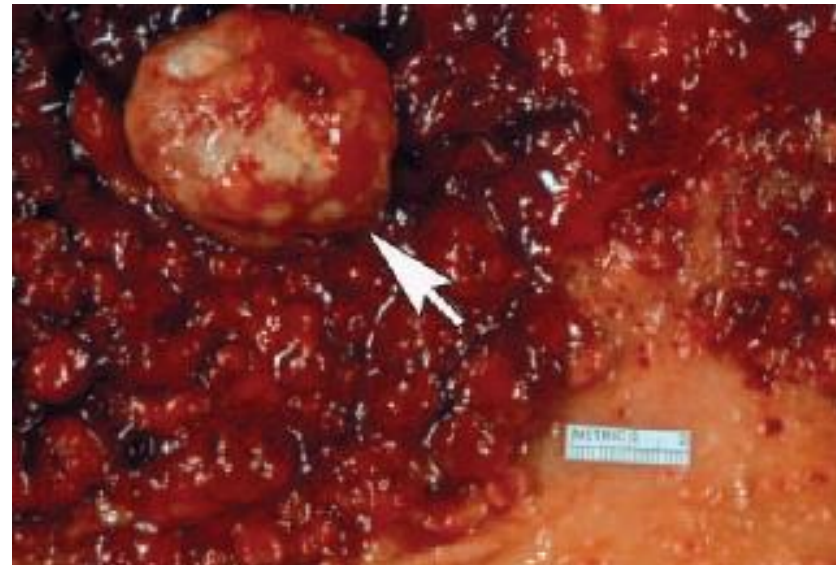
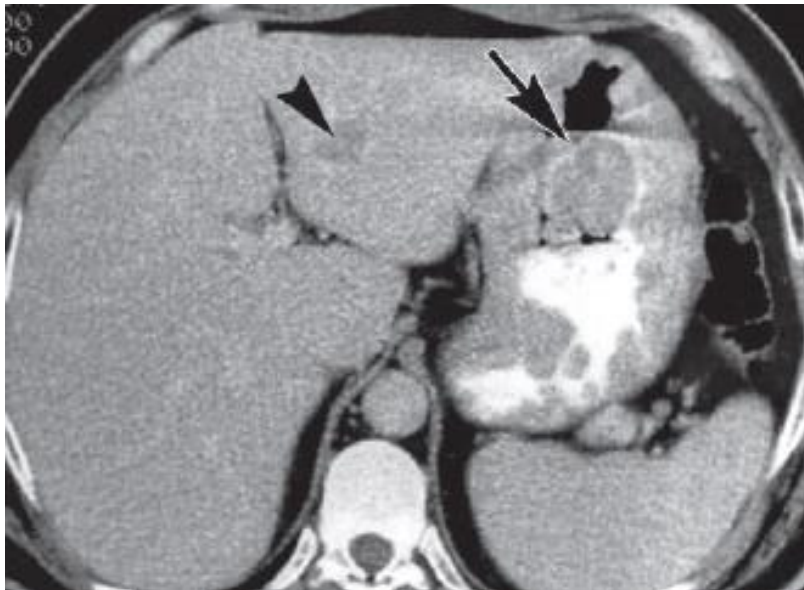
# Carcinoid: CT features



Sunburst sign

# Carcinoid

## Single Gastric Carcinoid





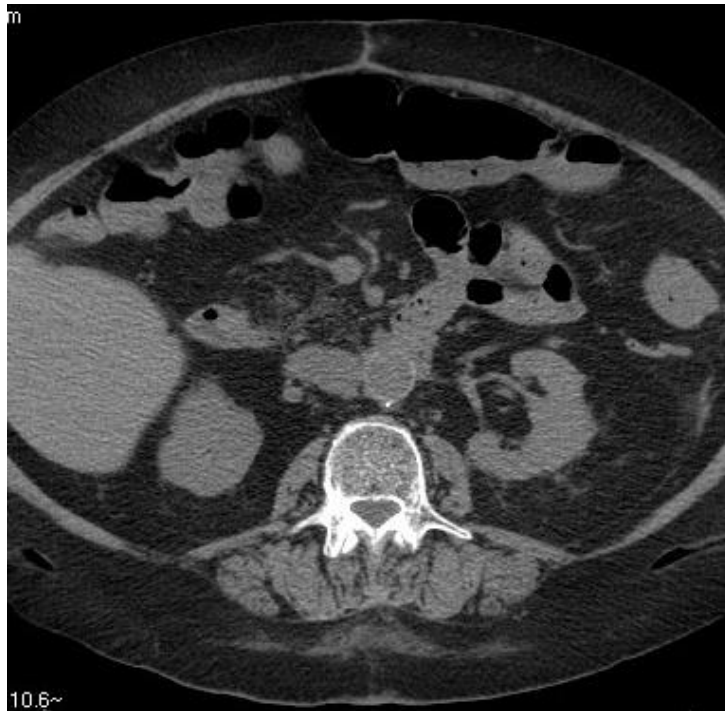
# Carcinoid

## Multiple Gastric Carcinoids



# Carcinoid

Female 62 yrs - Duodenal Carcinoid



***Before CM***



***30'' After CM***

# Carcinoid

## Duodenal Carcinoid: MPR



***Before CM***

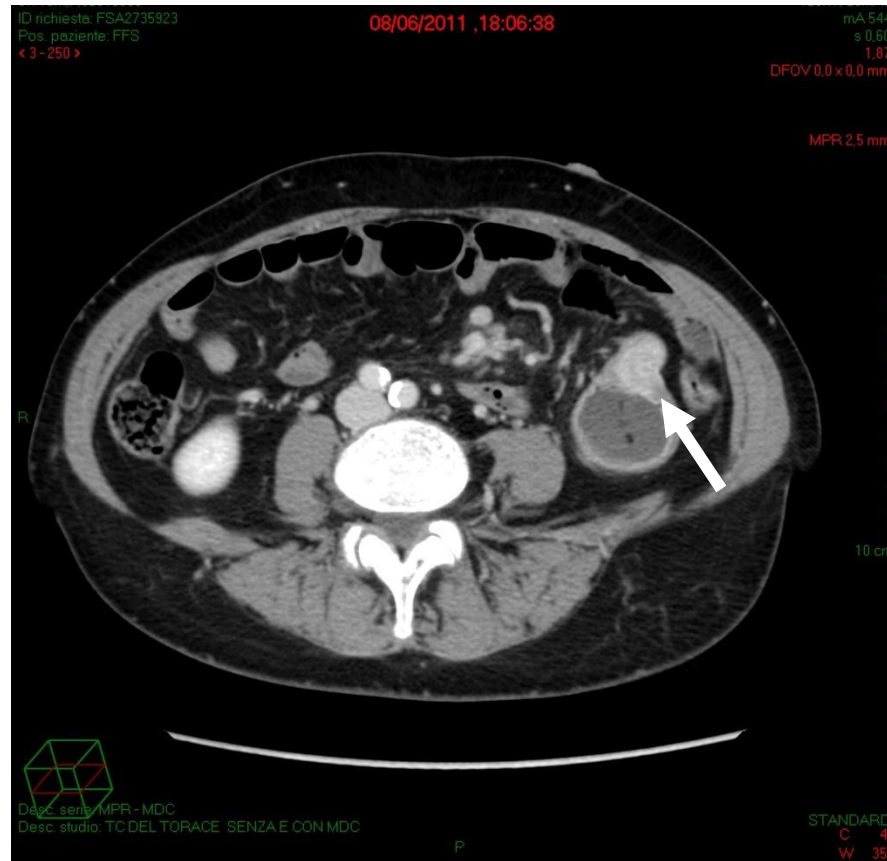


***30" After CM***



# Carcinoid

Male, 57 yrs - Ileal Carcinoid

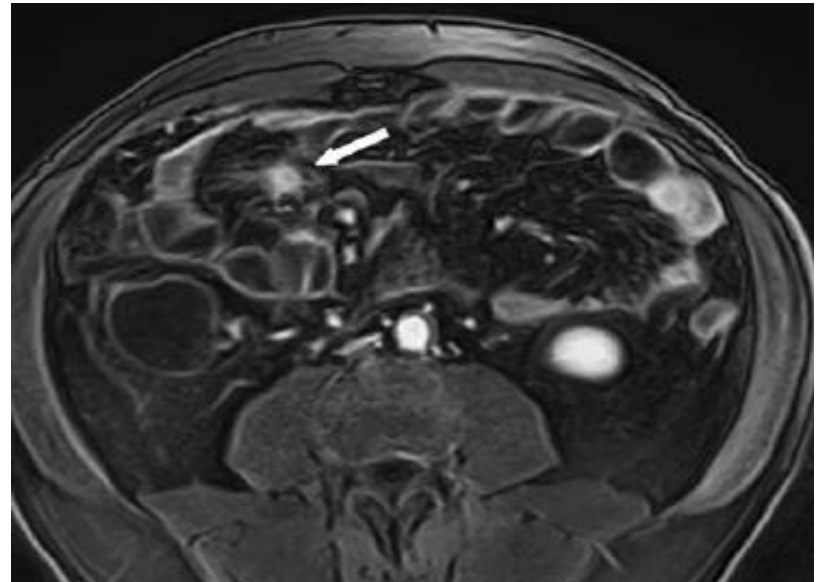
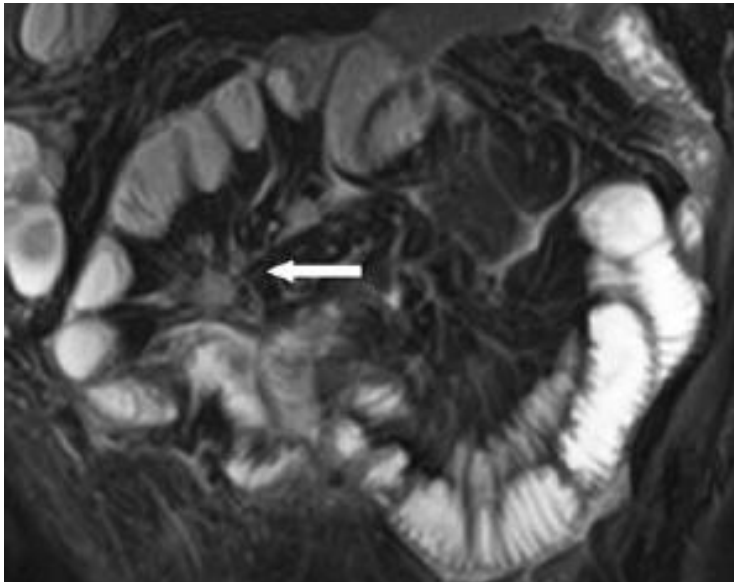


## Diagnosi Istologica

**1-2-3-4-6-7)** Carcinoma neuroendocrino bene differenziato, G1 (WHO 2000), (tumore neuroendocrino G2, secondo WHO 2010) infiltrante la parete ileale a tutto spessore e la sierosa con carcinosi endolinfatica e endovascolare. Metastasi in 5 dei 7 linfonodi periviscerali reperiti, ai tessuti molli in (3,

# Carcinoid: MRI features

- Nodules or mural thickening
- Moderate /Intense enhancement in T1-W Fat-sat after Gd



# Carcinoid: Metastases

Mesenteric lymph nodes metastases (70% calcifications)

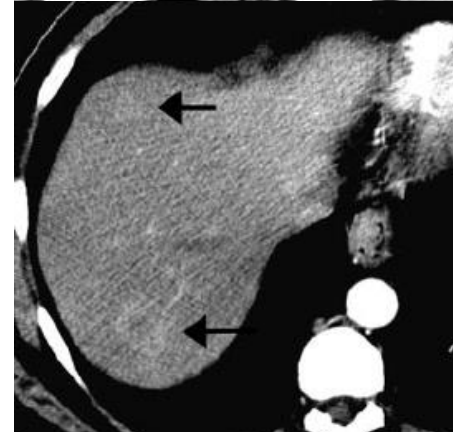
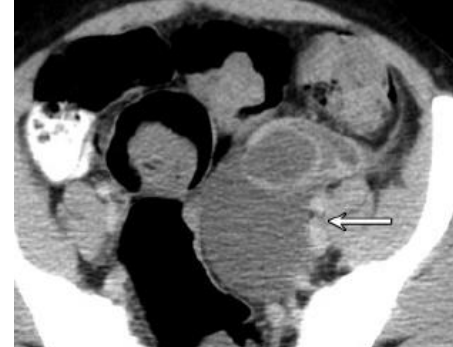
Miliary peritoneal implants

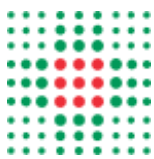
Large masses or mesenteric caking

Liver metastases generally hypervascular

Intra-abdominal organs metastases

Bone metastases are rare

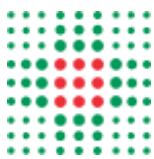




# Carcinoid: The Great Problem

Metastatic Carcinoid of  
Unknown Primary Site (CUP)





# Carcinoid of Unknown primary site

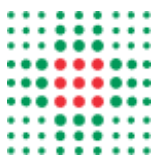
750 neuroendocrine tumor patients



82 pts. (10.9 %) → Unknown primary site

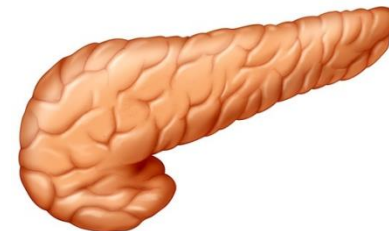
## Conclusions:

- Incidence is higher than previously reported
- Prognosis remains unfavorable



# Identification of Primary Site

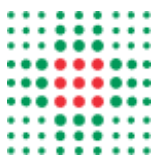
Identification of Unknown Primary Tumors in Patients with Neuroendocrine Liver Metastases  
Arch Surg 2010



***NET Liver Metastases & Primary PANCREATIC Tumor***

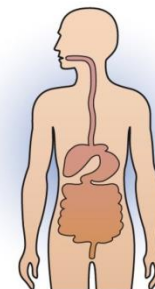


***CT Successfully localized the primary tumor in ALL cases***



# Identification of Primary Site

Identification of Unknown Primary Tumors in Patients with Neuroendocrine Liver Metastases  
Arch Surg 2010

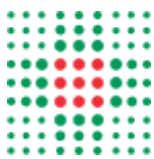


## ***NET Liver Metastases & Primary GI Tract Tumor***



***CT Successfully localized the primary tumor in 34.6 %***

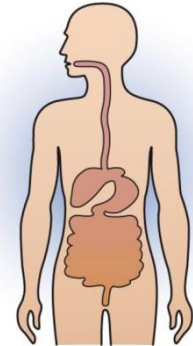




# Small Bowel Carcinoid

***Detected on CT → 2.09 cm***

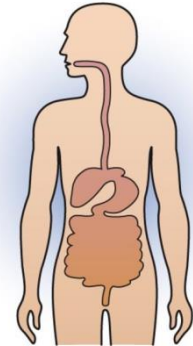
***Not Detected on CT → 1.60 cm***



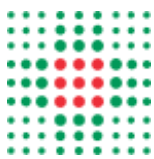
# Small Bowel Carcinoid

***Detected on CT → 2.09 cm***

***Not Detected on CT → 1.60 cm***



small is   
NOT beautiful

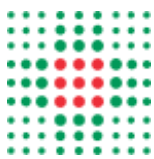


# Carcinoid of Unknown primary site

***Potential Imaging clues might suggest the Origin of Unknown Primary Site Carcinoid***

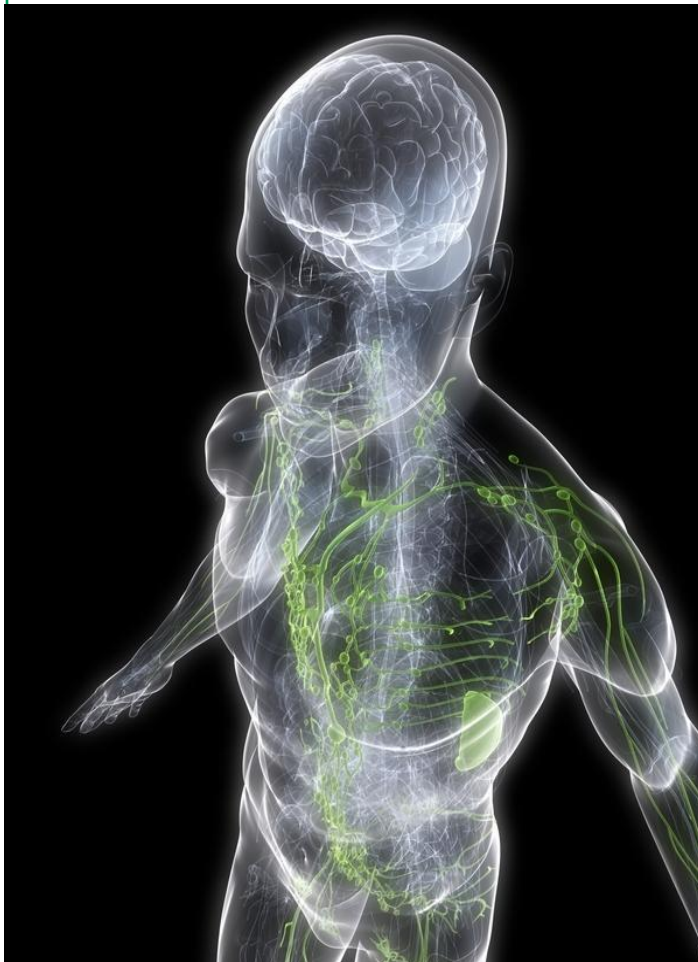


~~FAILURE~~  
SUCCESS

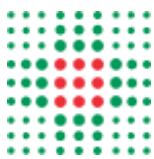


# Carcinoid of Unknown primary site

## Potential Imaging Clues: Lymph Nodes



Regional Lymph node metastases are usually seen close to primary tumour !



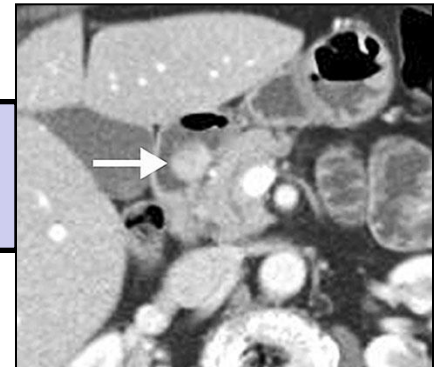
# Duodenal Carcinoid

## Abdominal Imaging

Tsai SD, et al. (2015): Duodenal neuroendocrine tumors: retrospective evaluation of CT imaging features and pattern of metastatic disease on dual-phase MDCT with pathologic correlation.

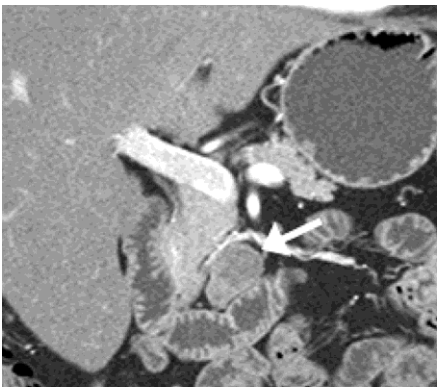
**28 Patients**

**19 Polypoid**

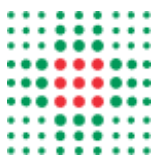


**4 Wall thickening**

**5 NOT VISUALIZED**  
**- All Tumors < 8 mm**

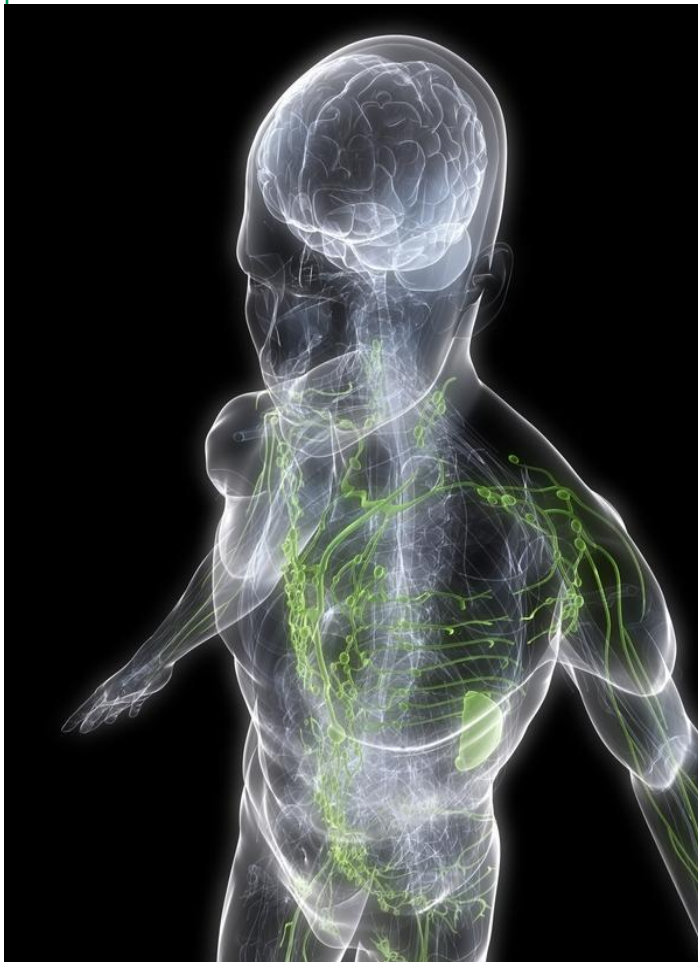


“Regional lymphadenopathy may be more pronounced than the primary lesion”

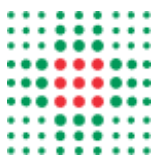


# Carcinoid of Unknown primary site

## Potential Imaging Clues: SITE of Metastases



Role of the site of  
metastases in the diagnosis  
of primary tumor location !

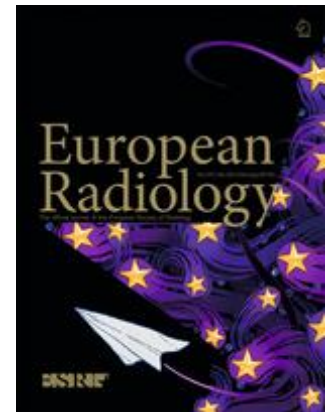


# Carcinoid of Unknown primary site

## Role of Sites of Metastases

### OBJECTIVES:

To predict the location of the primary neoplasm based on the sites of metastase



250 Pts. with NET from a single center



# Role of SITE of Metastases

## Percentage of Metastases from 6 different Primaries

### 5 Mts Site

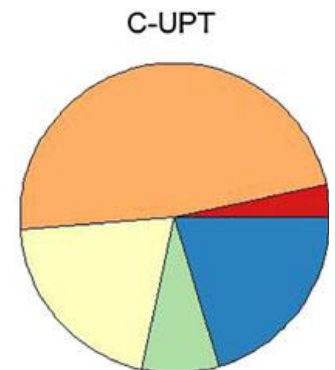
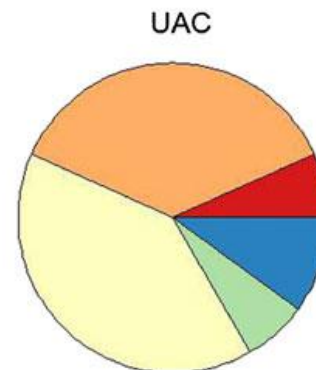
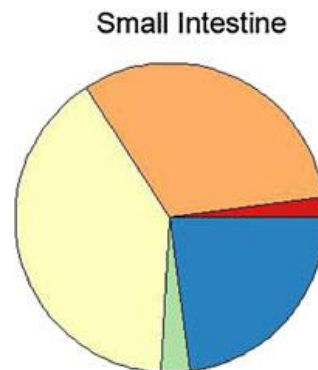
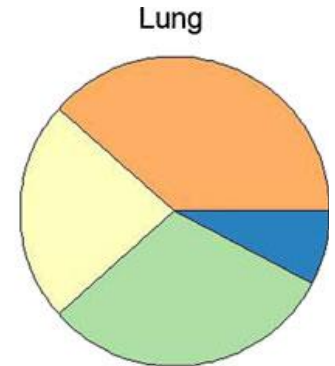
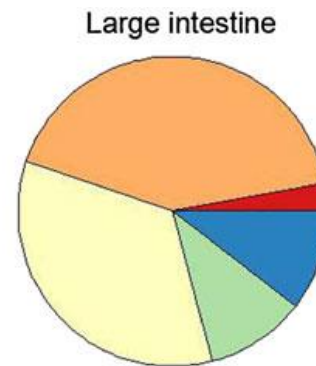
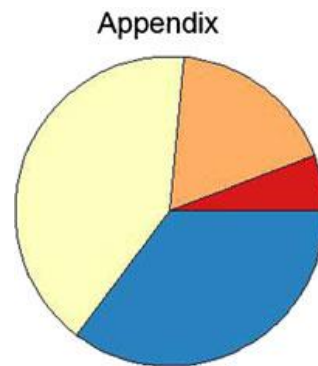
Liver

Lymph Nodes

Peritoneum

Bone

Lung





# Role of SITE of Metastases

Observed metastatic site	Predicted probability of primary site					
	C-UPT	UAC	Small intestine	Large intestine	Appendix	Lung
None of the below <sup>a</sup>	0.26	0.066	0.438	0.164	0	0.072
Lymph node alone	0.12	0.093	0.587	0.151	0.026	0.023
Bone alone	0.337	0.058	0.1	0.168	0	0.337
Peritoneum alone	0.404	0.029	0.453	0.05	0.053	0.011
Lymph node+bone	0.096	0.088	0.243	0.31	0	0.263
Lymph node+peritoneum	0.078	0.03	0.749	0.062	0.075	0.006
Bone+peritoneum	0.42	0.035	0.243	0.132	0	0.17
All three sites	0.105	0.046	0.52	0.213	0	0.116



# Role of SITE of Metastases

## Patient with adenopathy and peritoneal disease

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	C-UPT	UAC	Small intestine	Large intestine	Appendix	Lung
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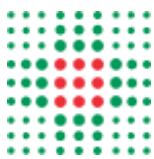
# Role of SITE of Metastases

Patient with adenopathy and peritoneal disease



Probability that primary tumour is located in the small bowel is  $\approx 75\%$

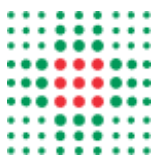
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Bone+peritoneum	0.42	0.035	0.243	0.132	0	0.17
All three sites	0.105	0.046	0.52	0.213	0	0.116



# Carcinoid of Unknown primary site

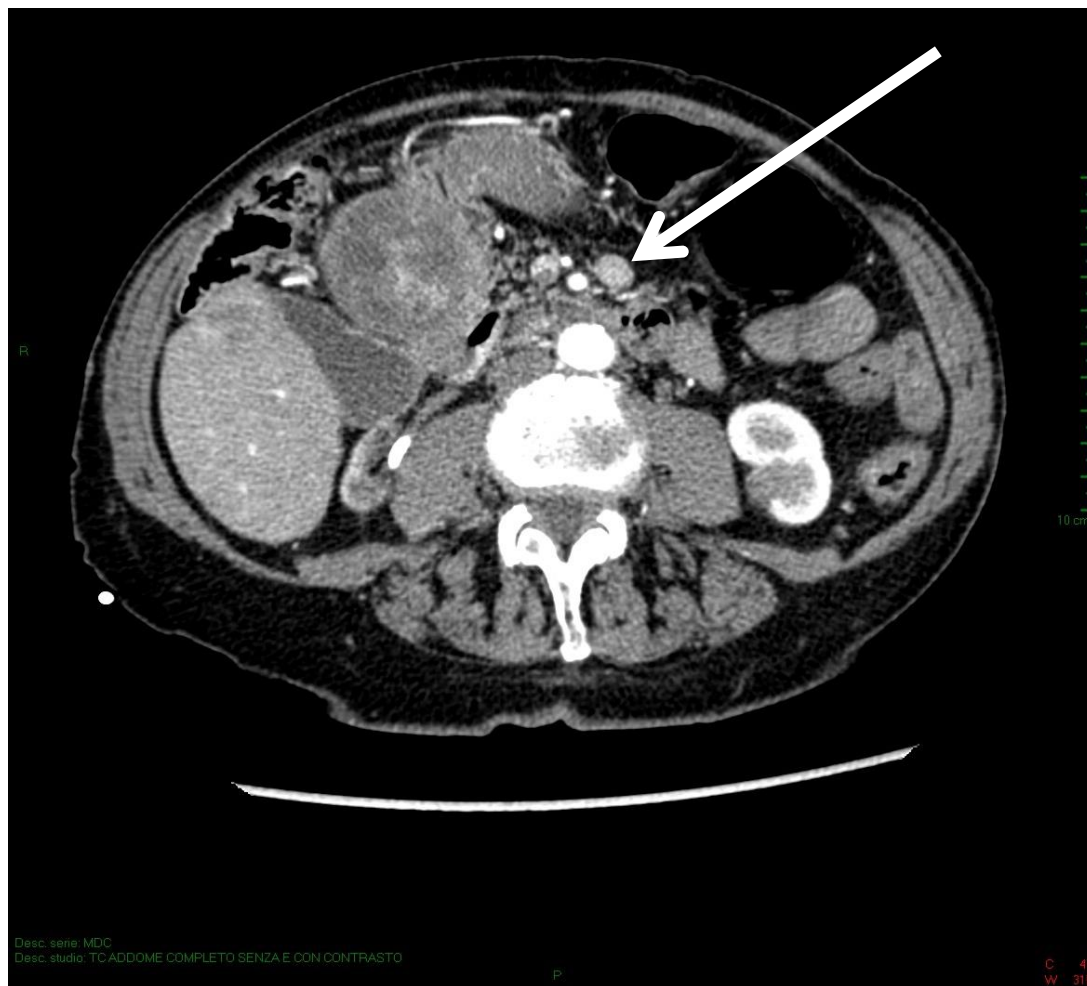
Male 61 yrs - Liver Mets



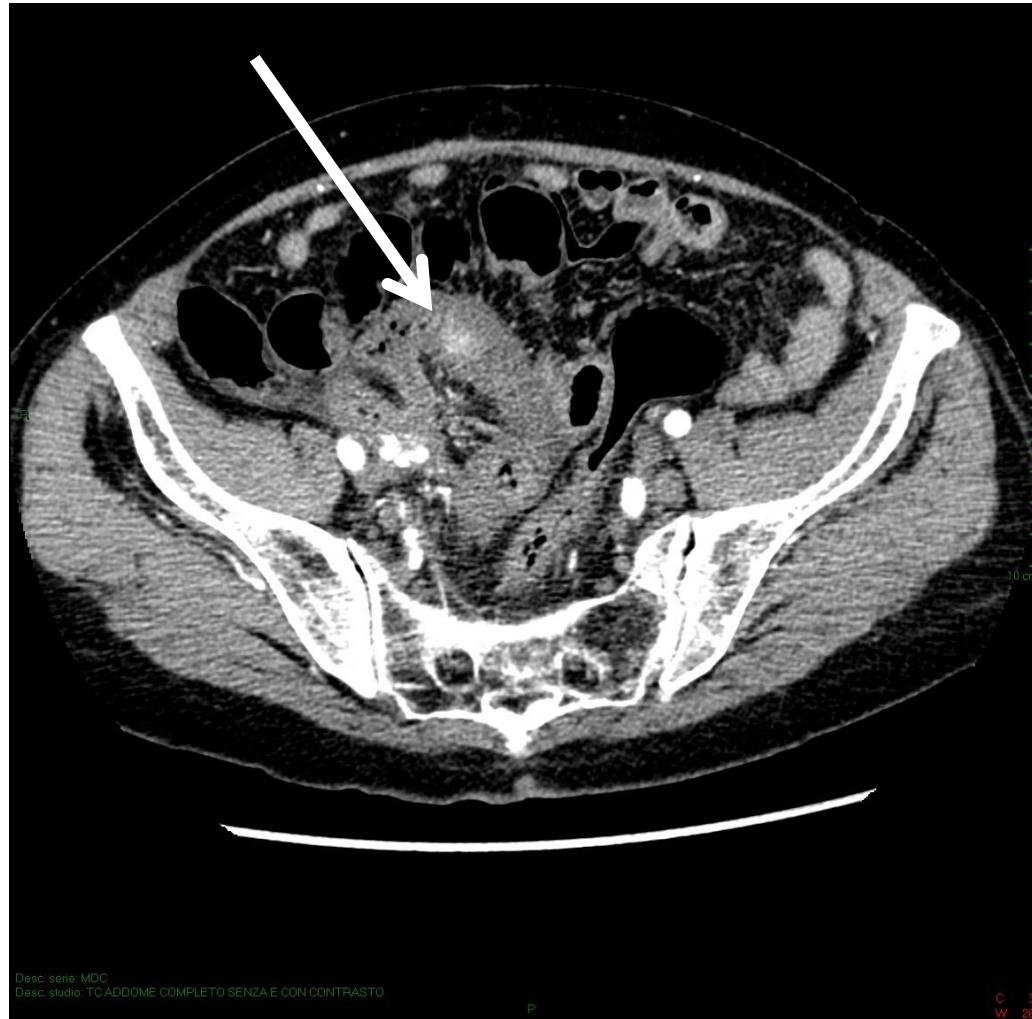


# Carcinoid of Unknown primary site

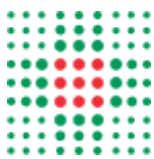
**N +**



# Primary tumour was located in the small bowel



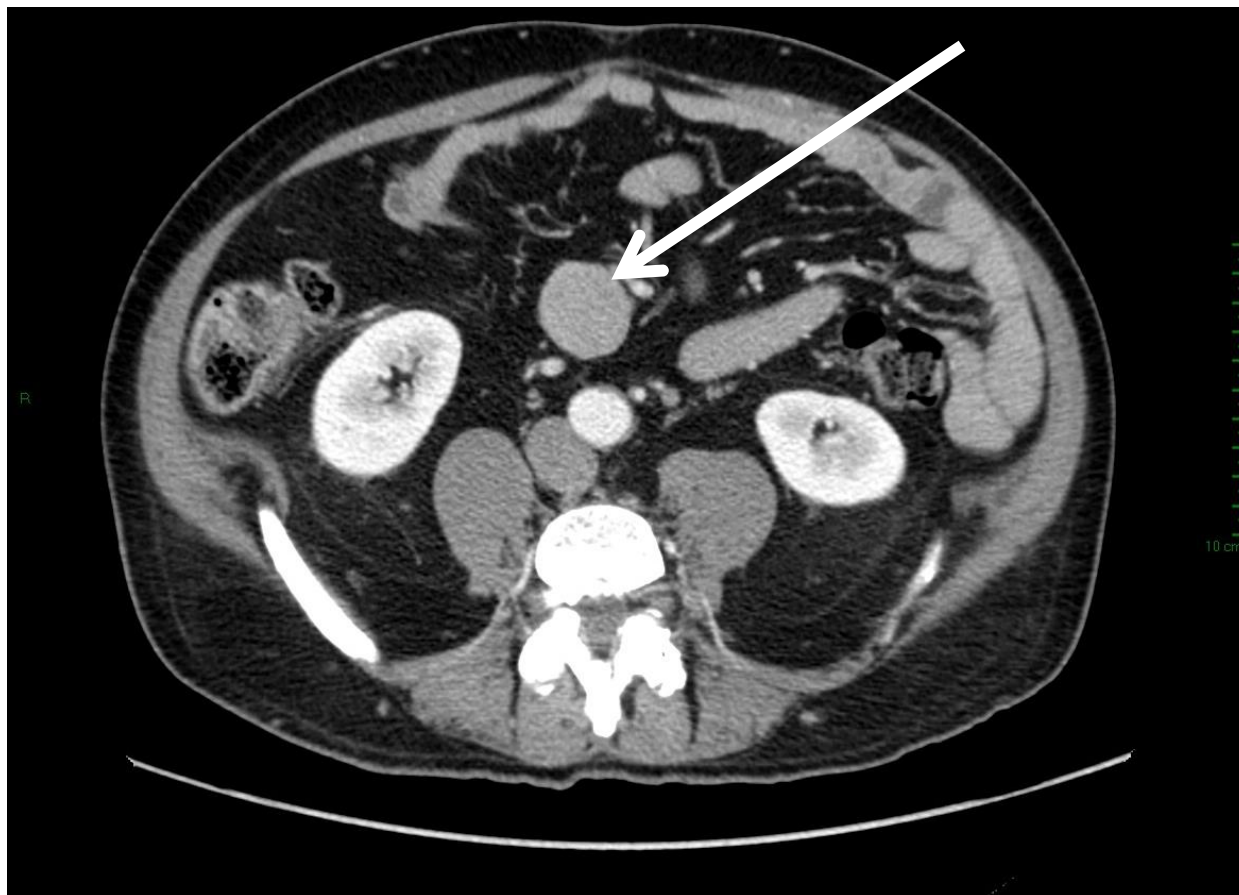




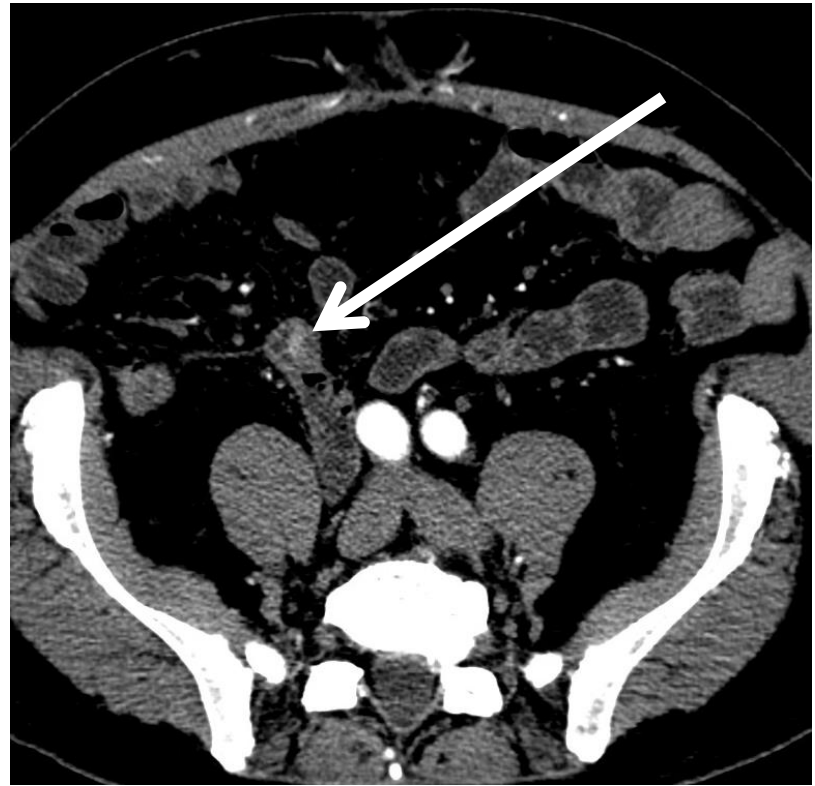
# Carcinoid of Unknown primary site

Male, 42 Yrs

*N* +

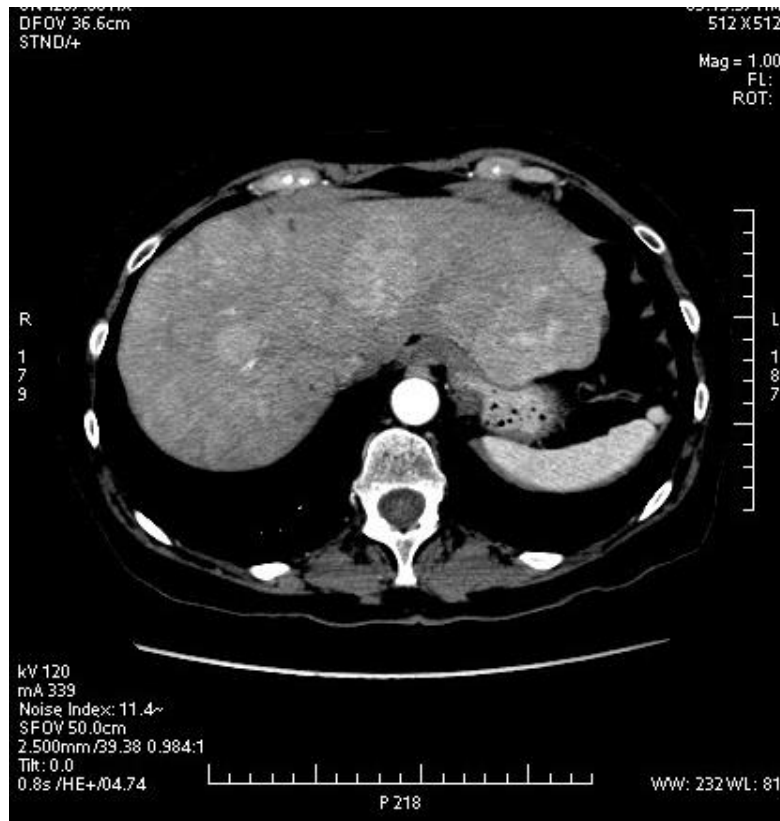


# Primary tumour was located in the small bowel

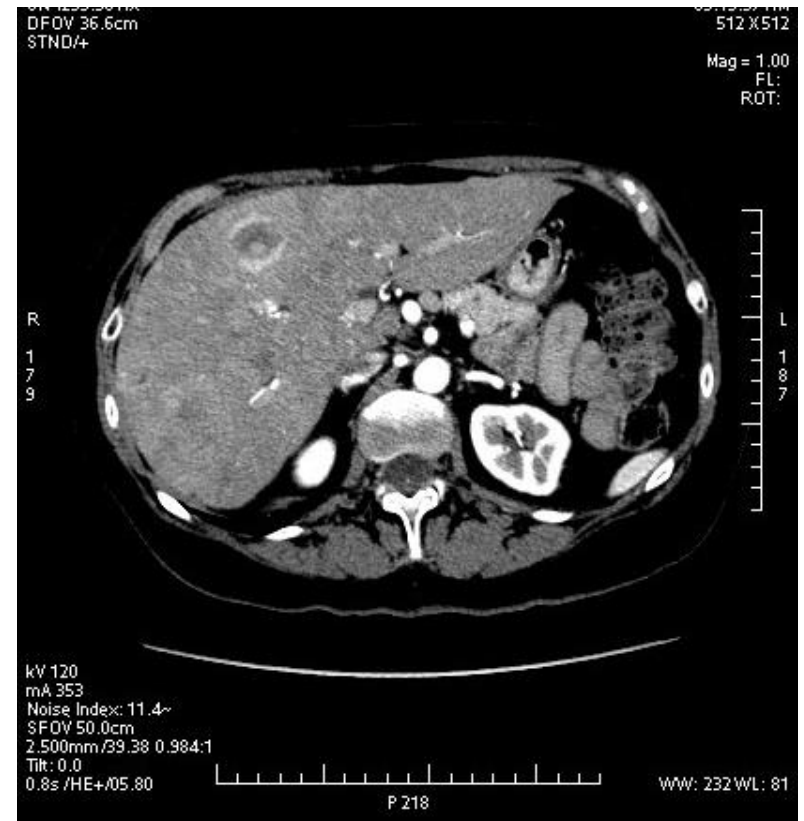


# Carcinoid of Unknown primary site

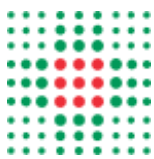
Male, 58 Yrs



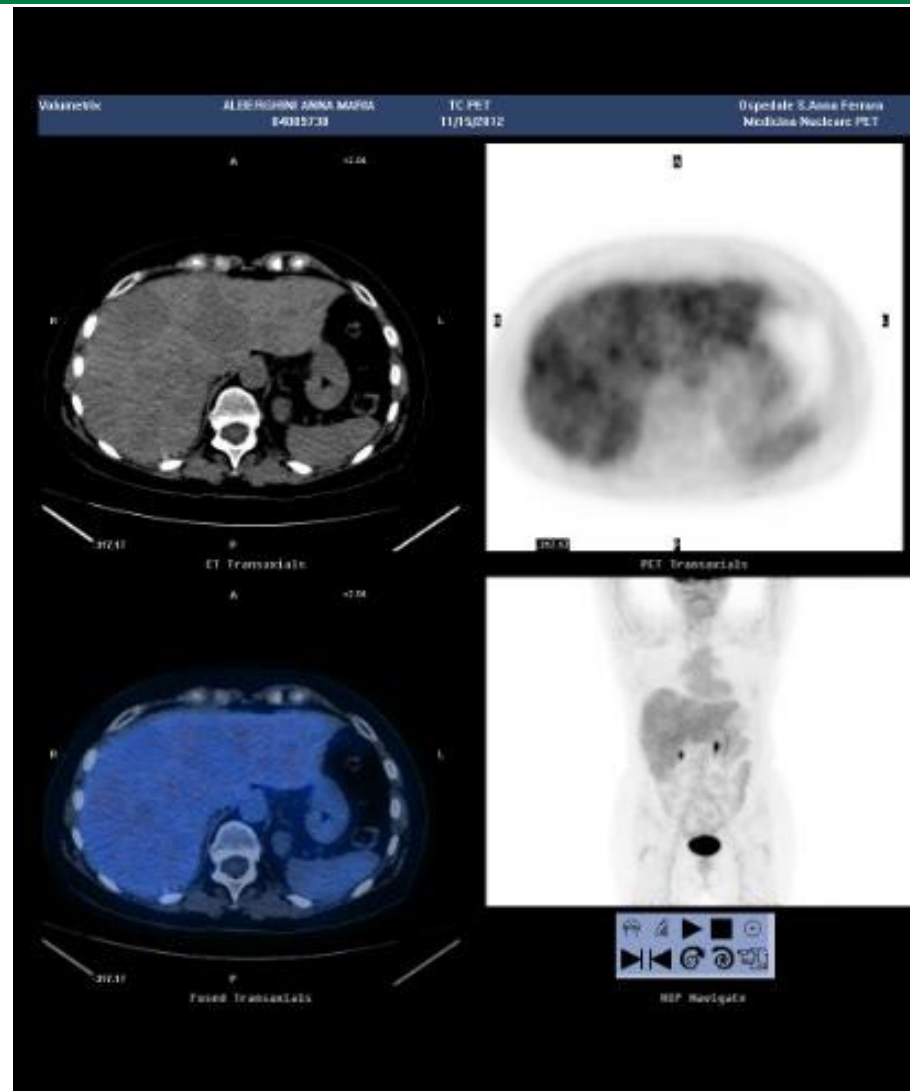
*Arterial phase*



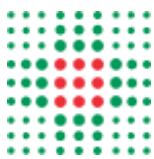
*Portal Venous phase*



# Carcinoid of Unknown primary site



Octreoscan: Negative result



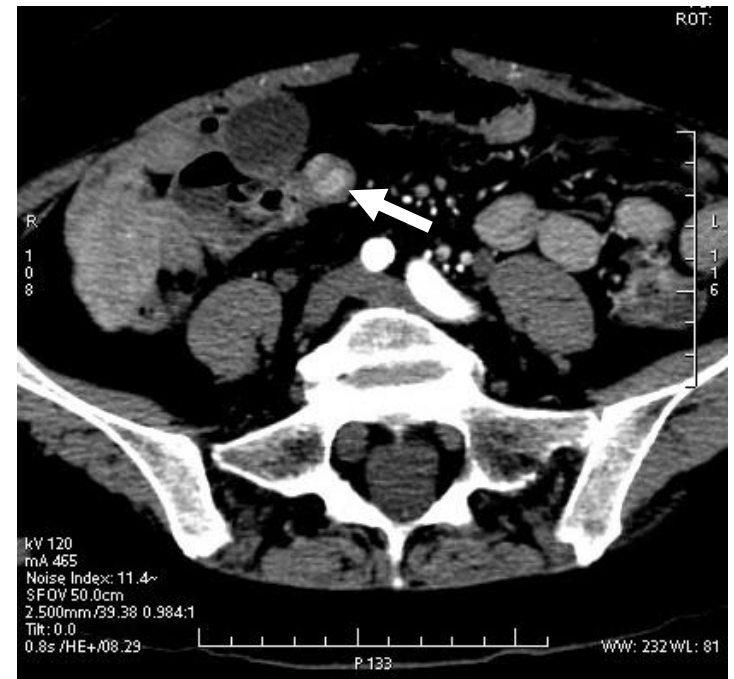
# Carcinoid of Unknown primary site



Gallium-68 DOTA PET scan



# Primary tumour was located in the small bowel

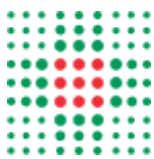


# Primary tumour was located in the small bowel

## CT Arterial Phase - MPR



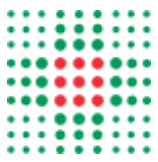




# Carcinoid

## Take Home Messages

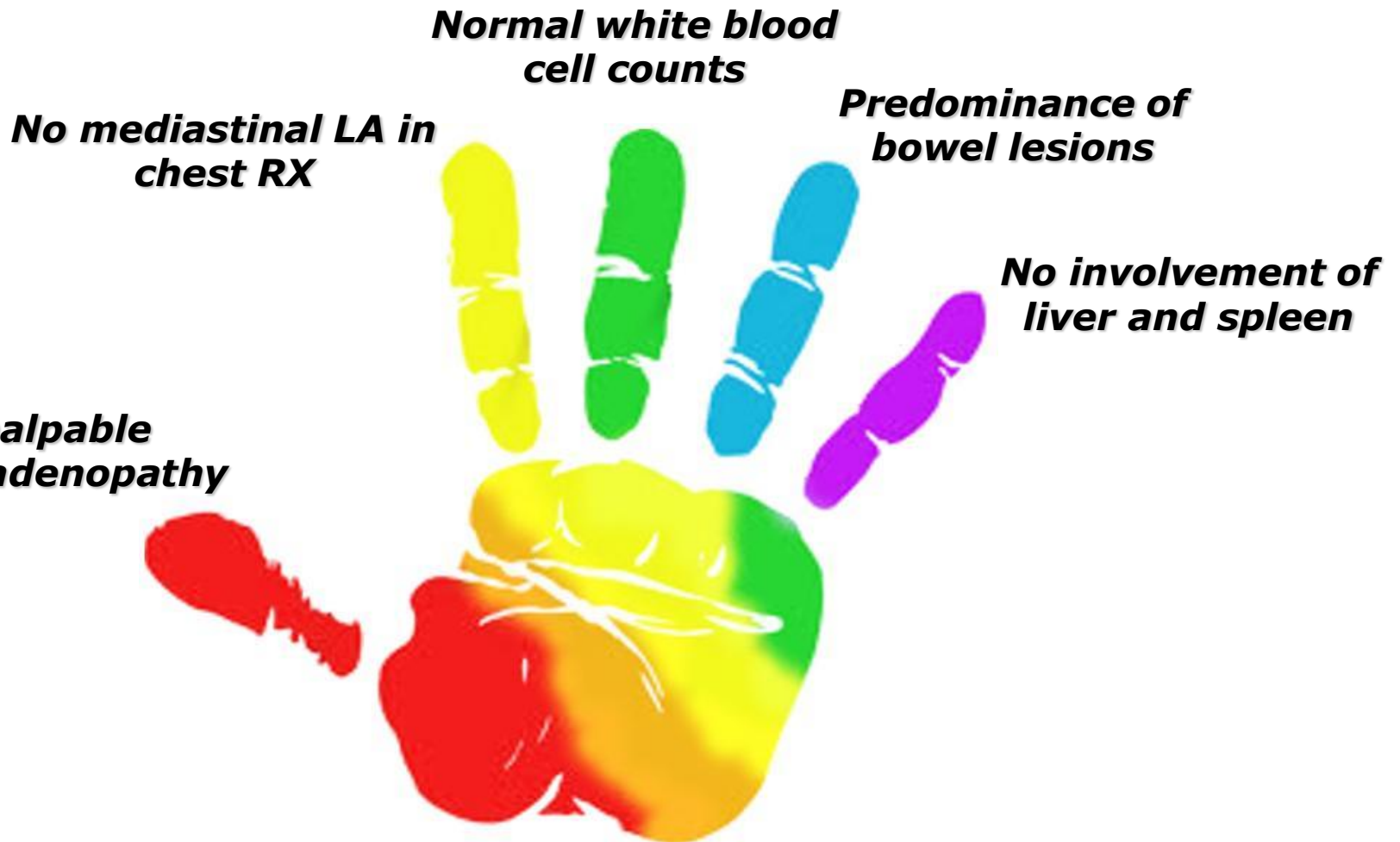
- Imaging may identify the location of primary neuroendocrine neoplasm and associated metastases
- In case of Metastatic Carcinoid of Unknown Primary Site LOOK the Small Bowel
- Diffuse metastatic disease often makes identification of the primary difficult



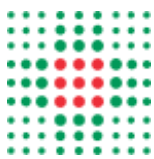
# Lymphoma



# Lymphoma



***Primary GI lymphoma: five criteria by Dawson***



# Lymphoma

## ***Epidemiology:***

- ***Primary GI 10-15% of all Non Hodgkin Lymphoma***
- ***GI involvement by generalized lymphoma up to 50%***
- ***Age 50-60***
- ***Male:Female ratio 3:1***

## ***Risk factors:***

- ***AIDS***
- ***Celiac disease***
- ***Inflammatory bowel disease***
- ***Autoimmune disorders***

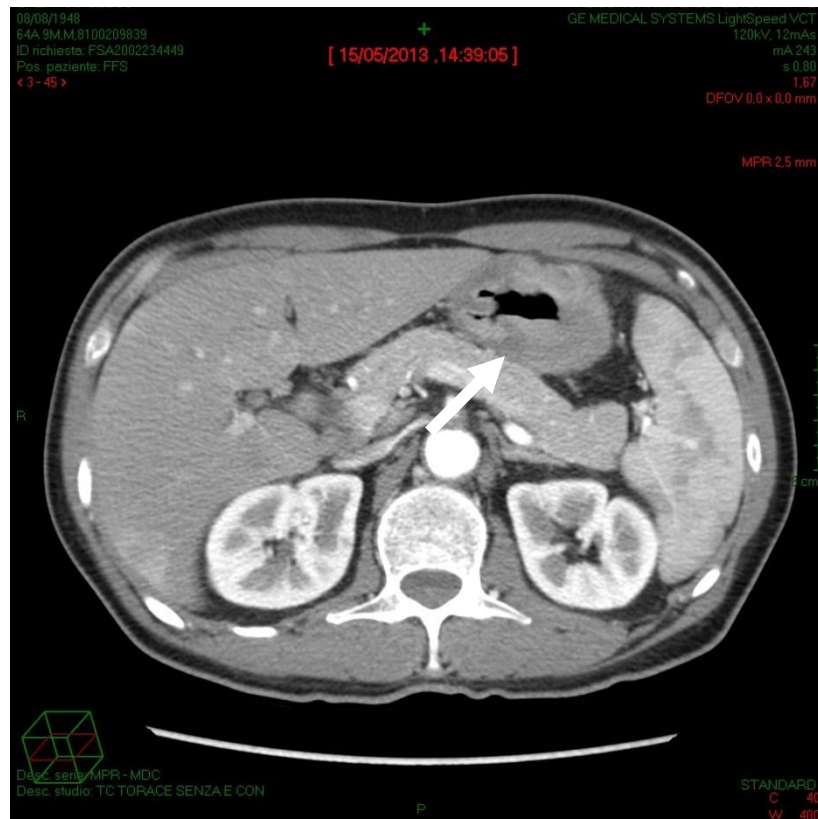
# Lymphoma: CT features

- Diffuse bowel wall thickening
- Dilatation > 4 cm (infiltration of muscularis propria and destruction of plexus)
- Bulky soft tissue mass
- Preservation of fat planes – No obstruction
- Ulceration – Cavitation - Perforation



# Gastric Lymphoma

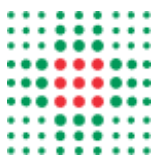
Female, 67 Yrs



## Diagnosi Istologica

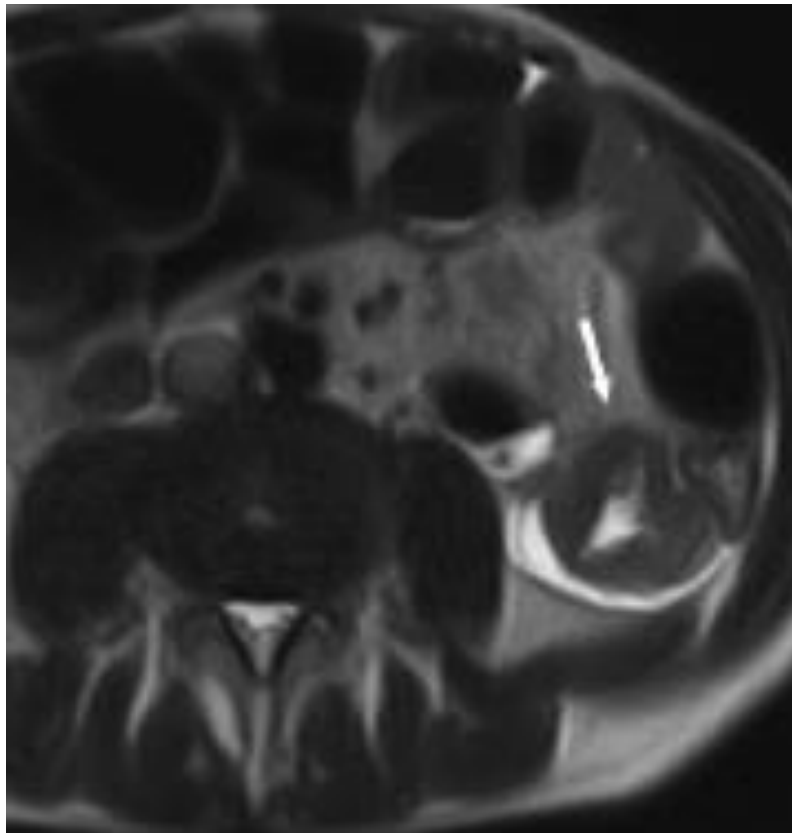
1-2) **Linfoma B linfocitario extranodale mucosa associato della zona marginale, (MALT linfoma)**, infiltrante la parete a tutto spessore ed il tessuto adiposo perigastrico; localizzazione di malattia in alcuni linfonodi periviscerali. Coesiste gastrite cronica follicolare con metaplasia intestinale. Indenni i margini di resezione, l'omento e l'anello esofageo inviato in (2).

Caratterizzazione fenotipica: /CD3 -/CD20 +/Bcl2 +, follicoli negativi/Bcl6 -, follicoli positivi.



# Lymphoma: MRI features

- Isointense on T1-W
- Homogenous contrast enhancement

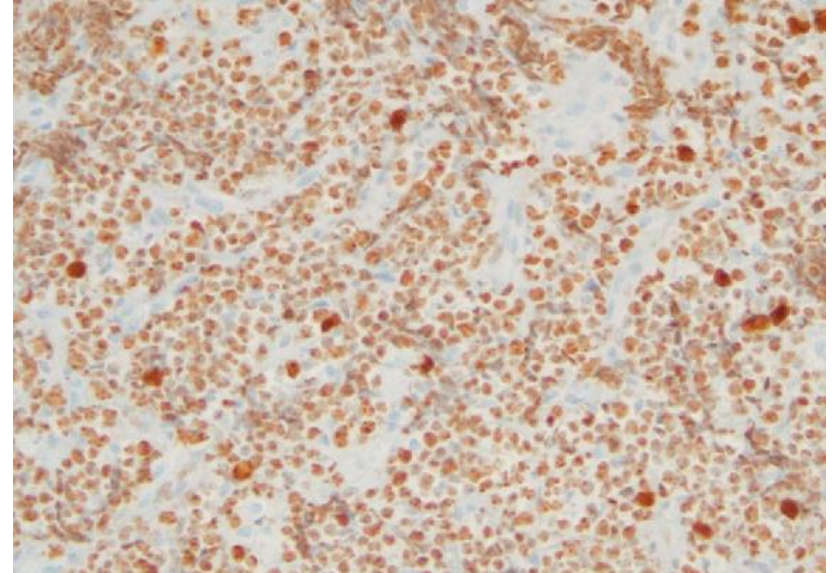
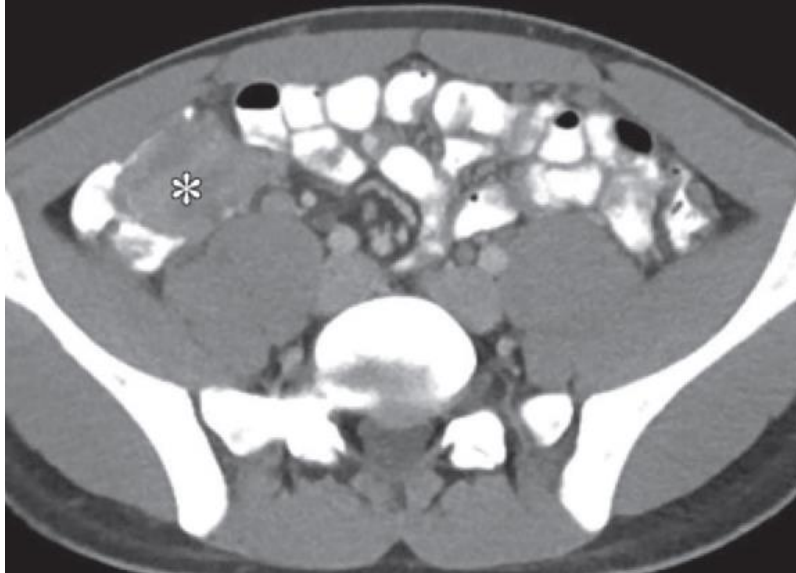


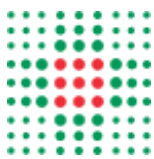


# Burkitt Lymphoma

## Most frequent subtype of NHL in children

- 5-year survival rates >90% in localized disease
- Ileocecal mass or distal ileum thickening
- Malignant ascites - intraperitoneal seeding
- Lymphadenopathy with large abdominal masses





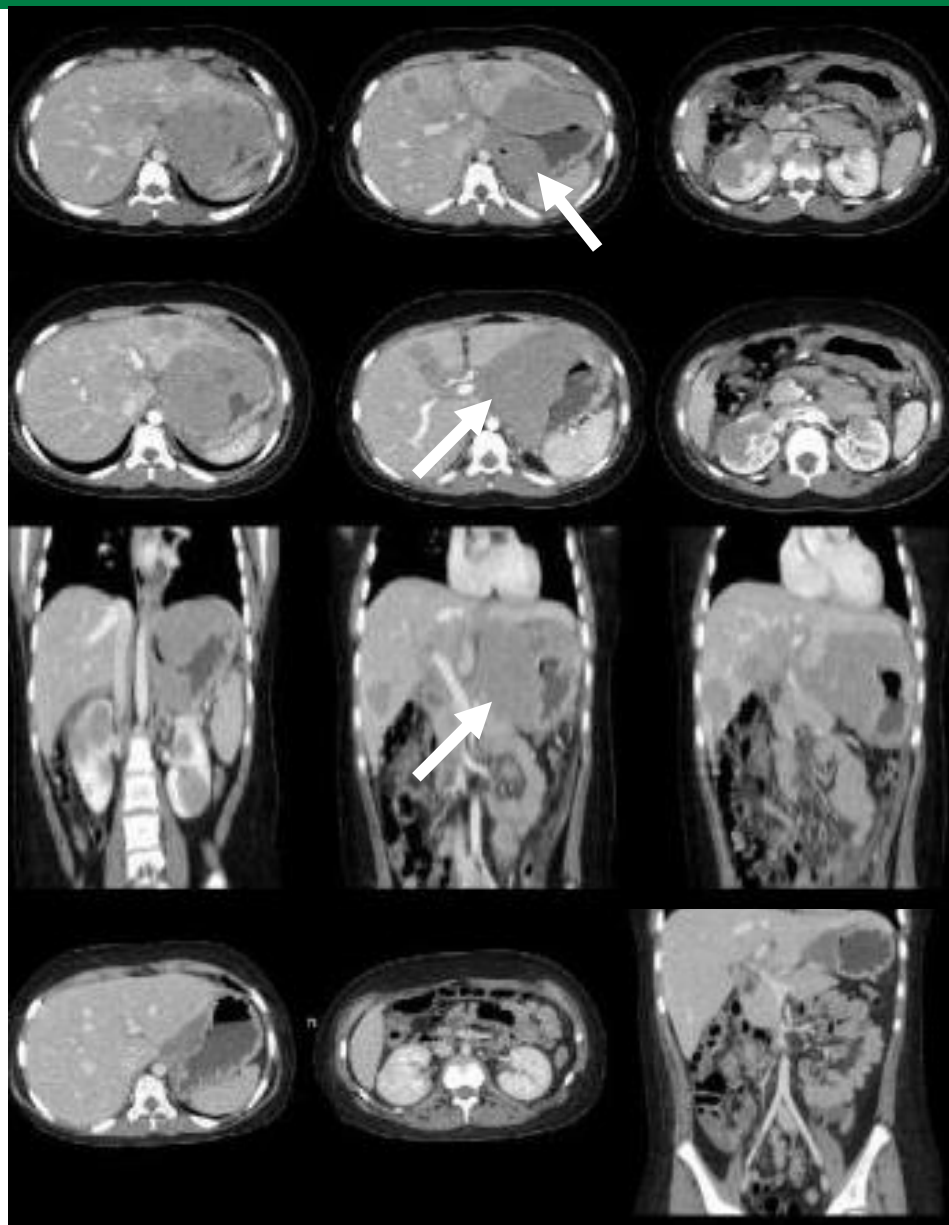
# Burkitt Lymphoma



Gagliano M, Cinotti AM, Liguori TL, Romagnoli E, Tugnoli Peron S, Mannella P  
Az. Ospedaliero-Universitaria Sant'Anna - Ferrara

A 15 year old male presented with a history of abdominal pain and a palpable abdominal mass. The patient underwent US scan and it confirmed an hypoechoic and lobulated abdominal lesion. Multiple hypoechoic nodules were present in liver and kidneys. A biopsy was performed at abdominal mass and it indicated a Burkitt non-Hodgkin's lymphoma. Contrast enhanced CT of the neck, thorax and abdomen was performed due to the biopsy findings. It showed enlarged lymph nodes in mesenteric and retroperitoneal region. Parts of enlarged lymph nodes were fused together and formed a huge mass. CT images demonstrated also the involvement of liver and kidneys showing multiple hypodense deposits. Also MR was performed to evaluate the central nervous system. The patient was treated with chemotherapy with excellent results as we verified in follow-up examinations.

After chemotherapy, CT shows the volumetric reduction of lymph node mass and the disappearance of extra-nodal deposits





# Lymphoma

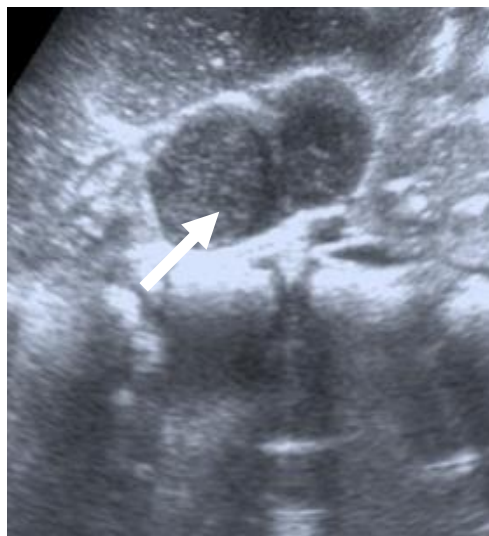
## Emergency Settings



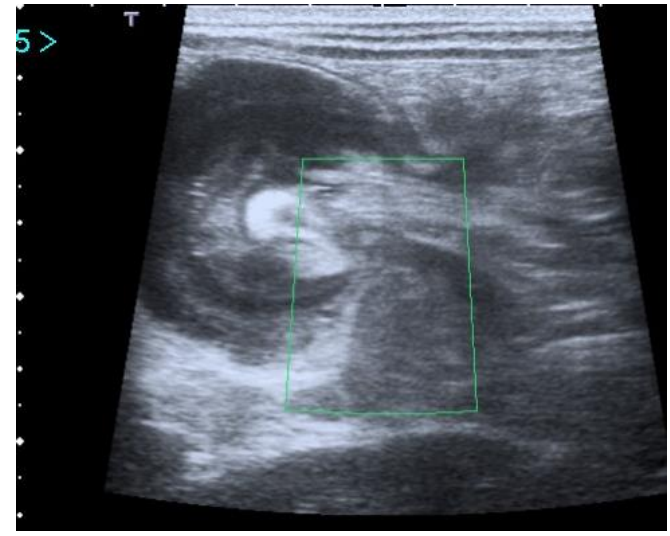
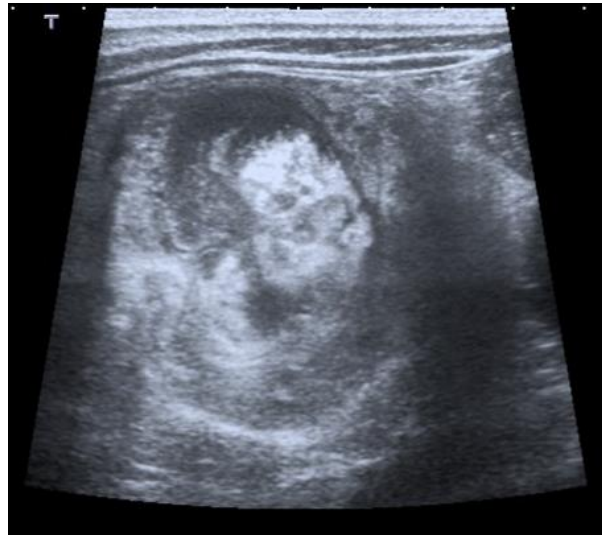


# Lymphoma: Emergency Settings

Male Child, 7 Yrs



Abdominal Lymph Nodes

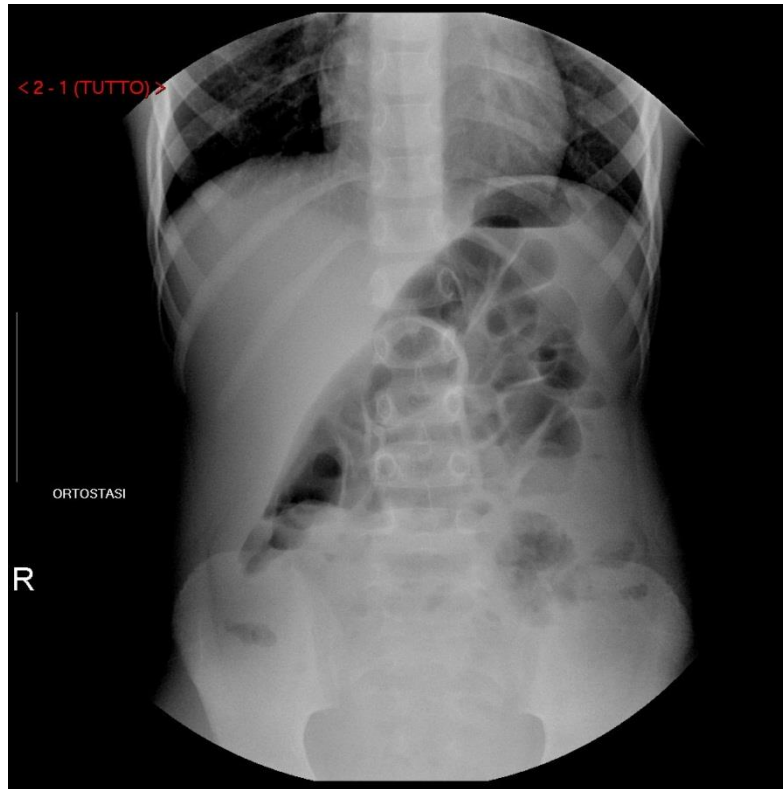


## Intussusception



# Lymphoma: Emergency Settings

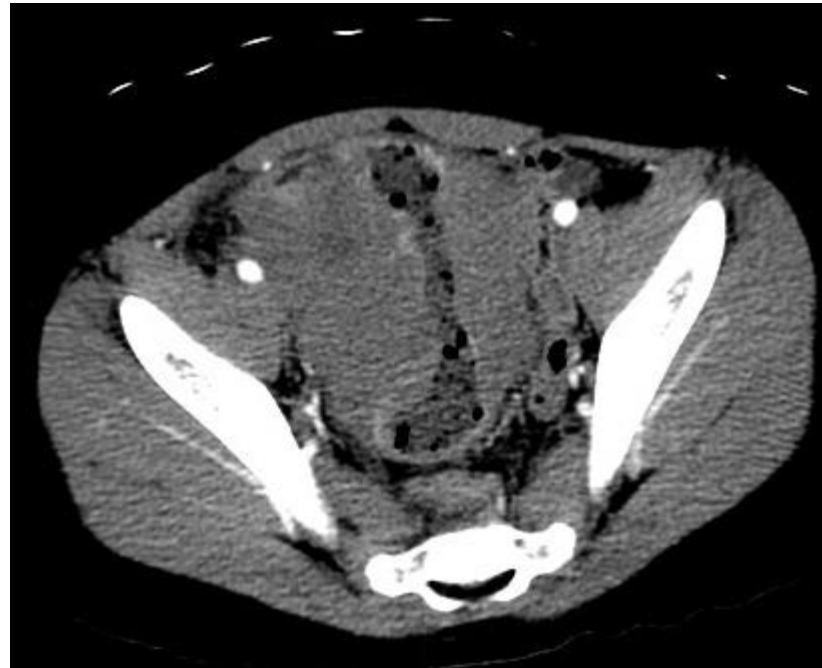
Male Child, 2 Yrs



Bowel Occlusion

# Lymphoma: Emergency Settings

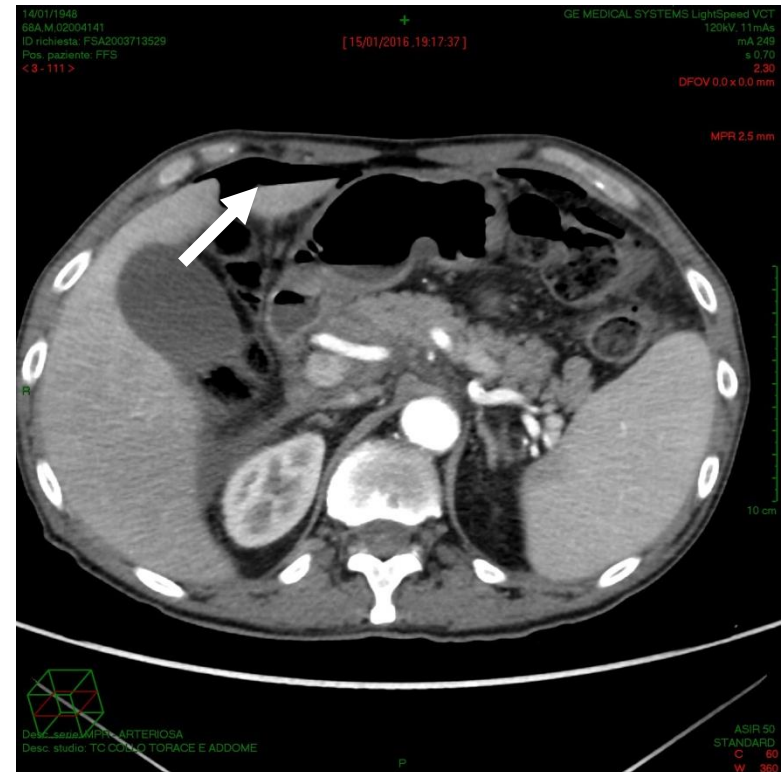
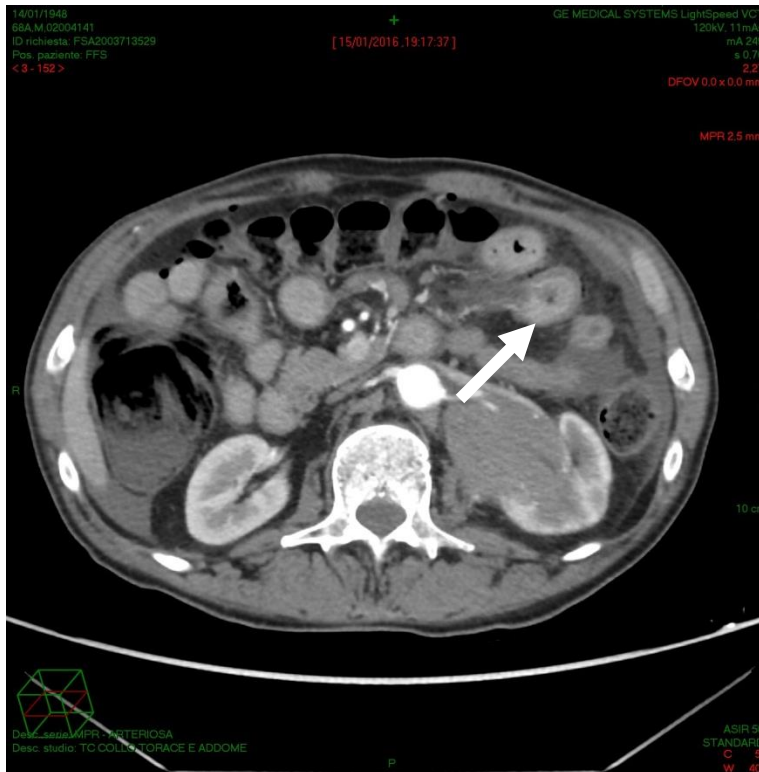
Male Child, 2 Yrs



Bowel Occlusion

# Lymphoma: Emergency Settings

## Male, 70 yrs - Small Bowel Perforation

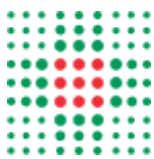


### Diagnosi Istologica

Linfoma maligno B linfocitario della zona marginale nodale, variante polimorfa con ricca componente plasmacellulare immunosecemente monotipica per catene pesanti IgG e monoclonale per catene leggere kappa alla ibridazione in situ (cfr B2013-007027).

Caratterizzazione fenotipica: /CD3 -/CD5 -/CD20 +/CD23 -/CD79a +/CD138 + (nella componente plasmacellulare) /KAPPA +/LAMBDA -/IgA -/IgG +/IgM -

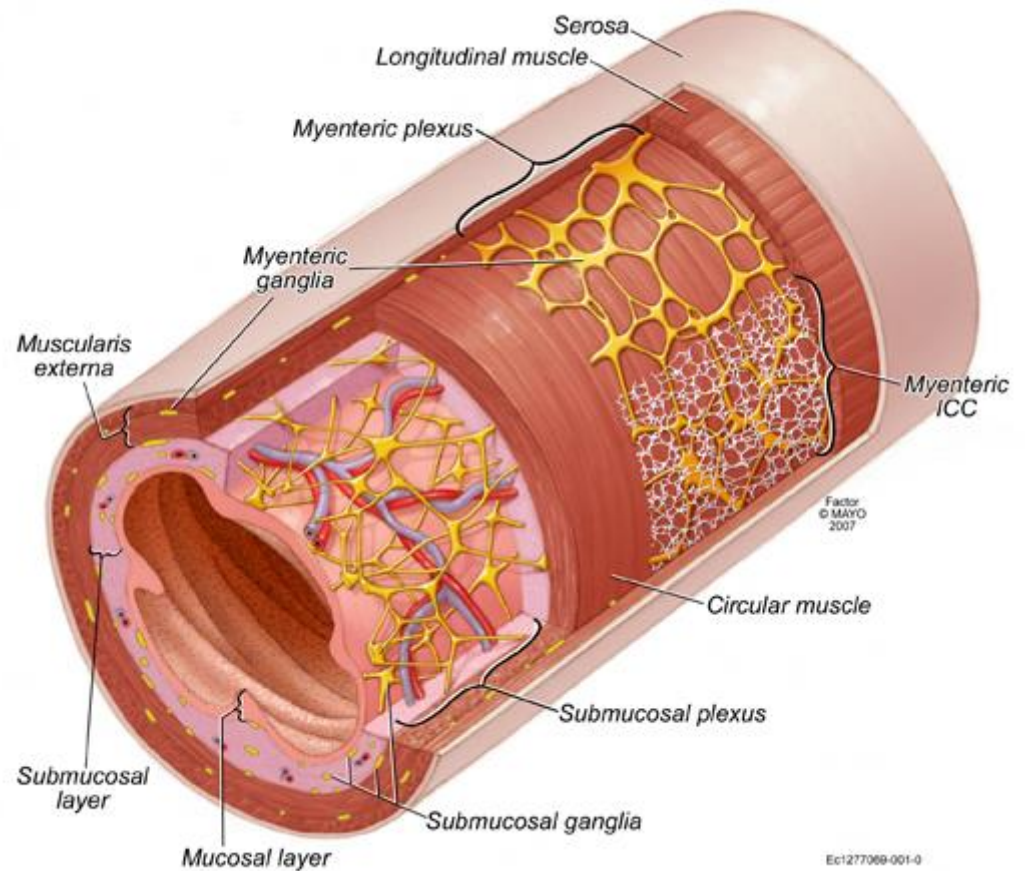




# GIST

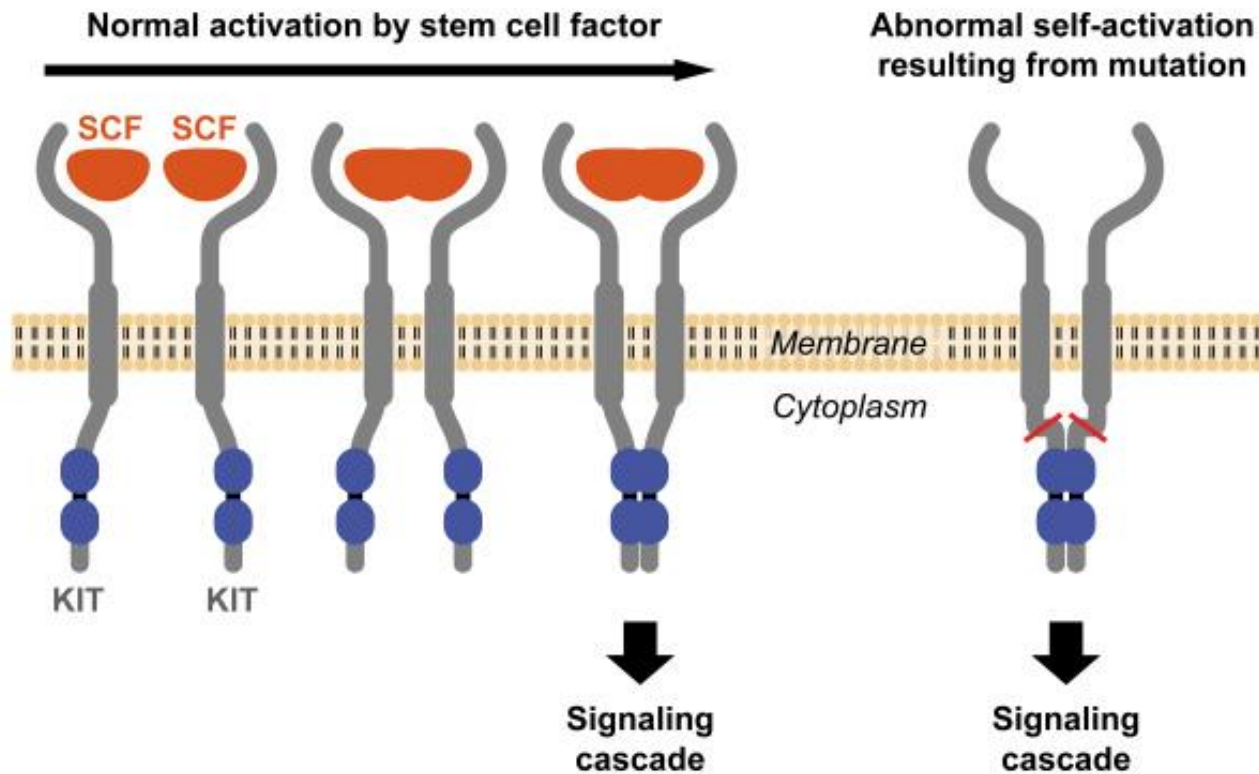
# GIST

- Mesenchymal neoplasms
- From intestinal cell of Cajal
- Stomach (70%)
- Small bowel (20-30%)
- Anorectum (7%)



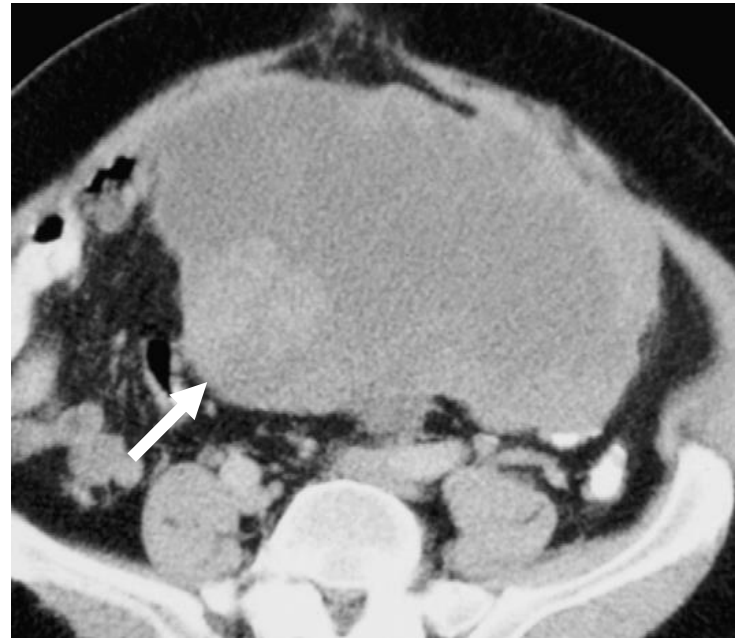
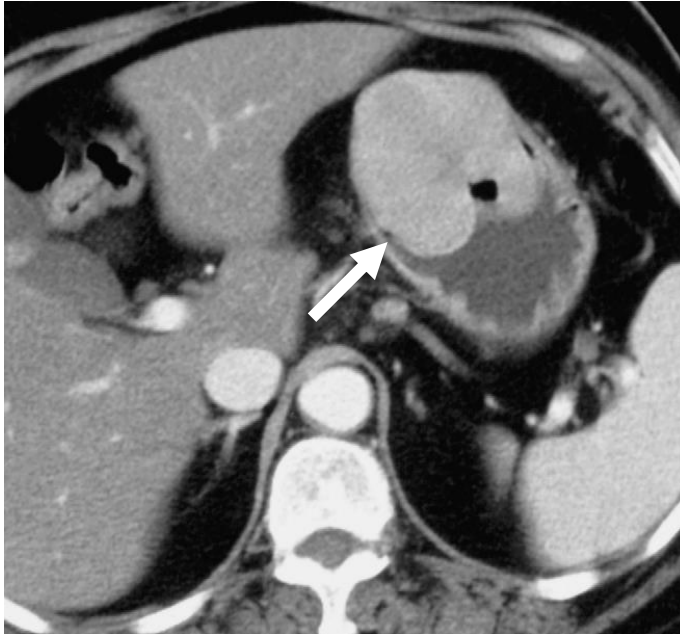
# GIST

***Defined by expression of cKIT (CD117)***  
***Tyrosine Kinase Growth Factor receptor***



# GIST – CT features

- Exophytic growth pushing rather than invading adjacent loops
- Greater than 5 cm in diameter
- Well-defined heterogenous masses
- Peripheral enhancing border
- Central low attenuation (necrosis, hemorrhage, cystic change)



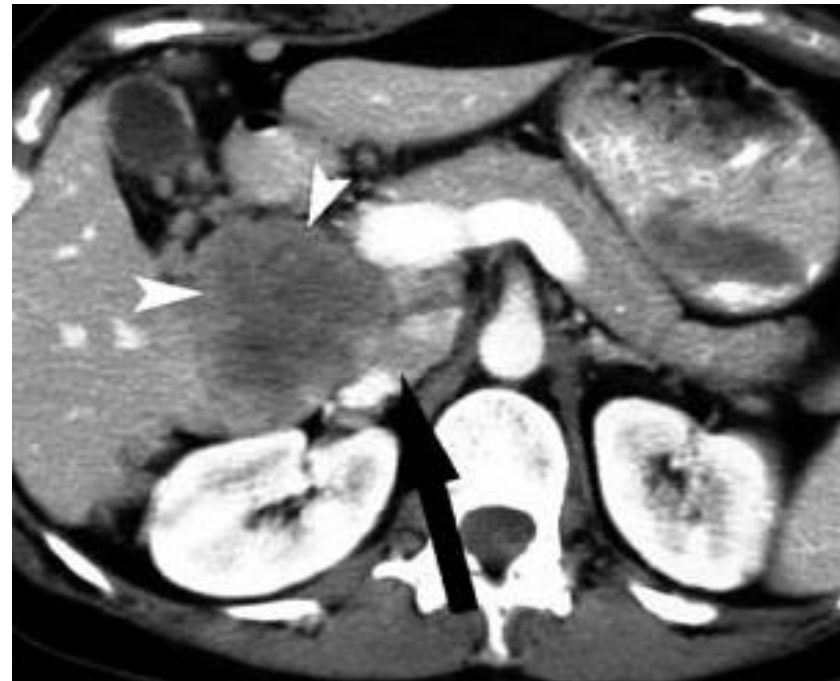
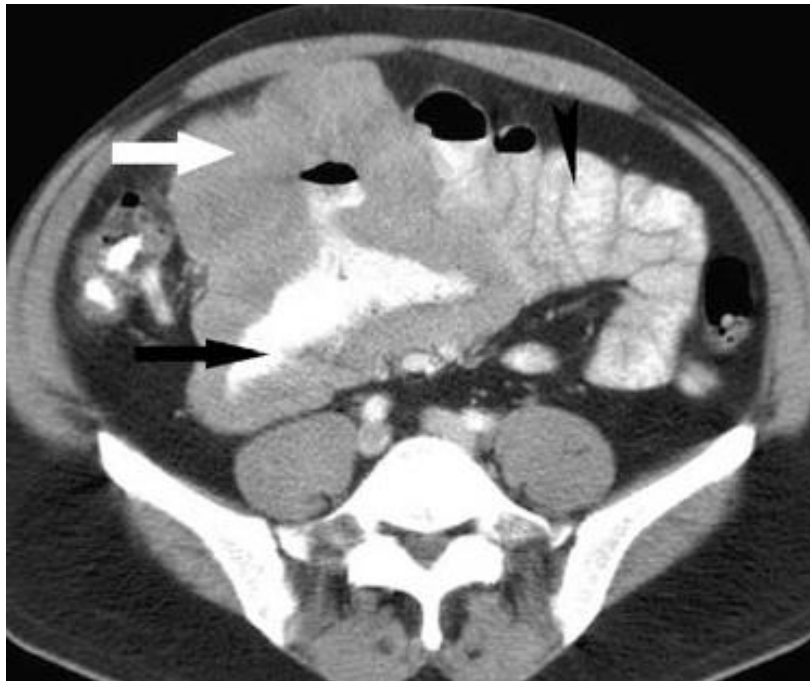
# GIST – Differential Diagnosis

Aneurysmal dilatation of small bowel is common

No Lymphadenopathy VS Lymphoma

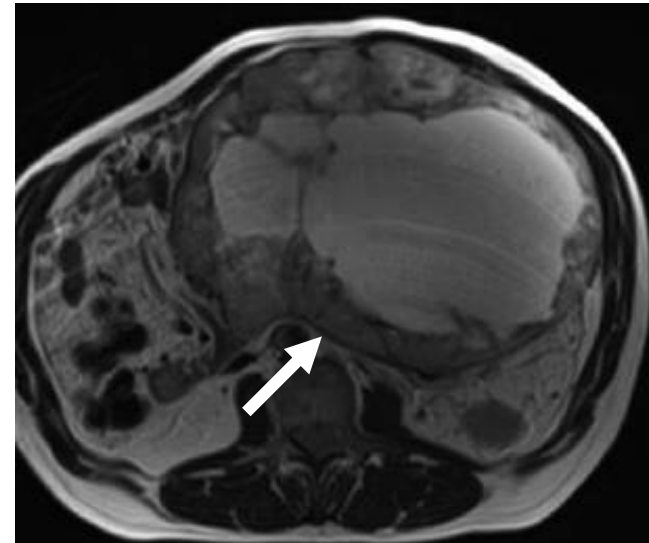
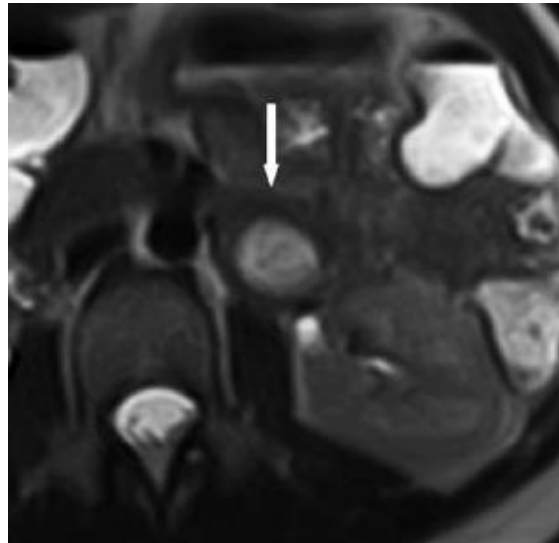
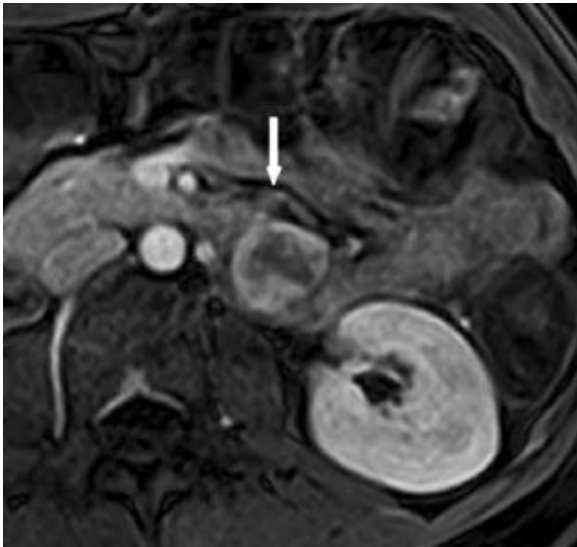
Mesenteric metastases

Smooth, multiple and not calcified VS Carcinoids



# GIST – MRI features

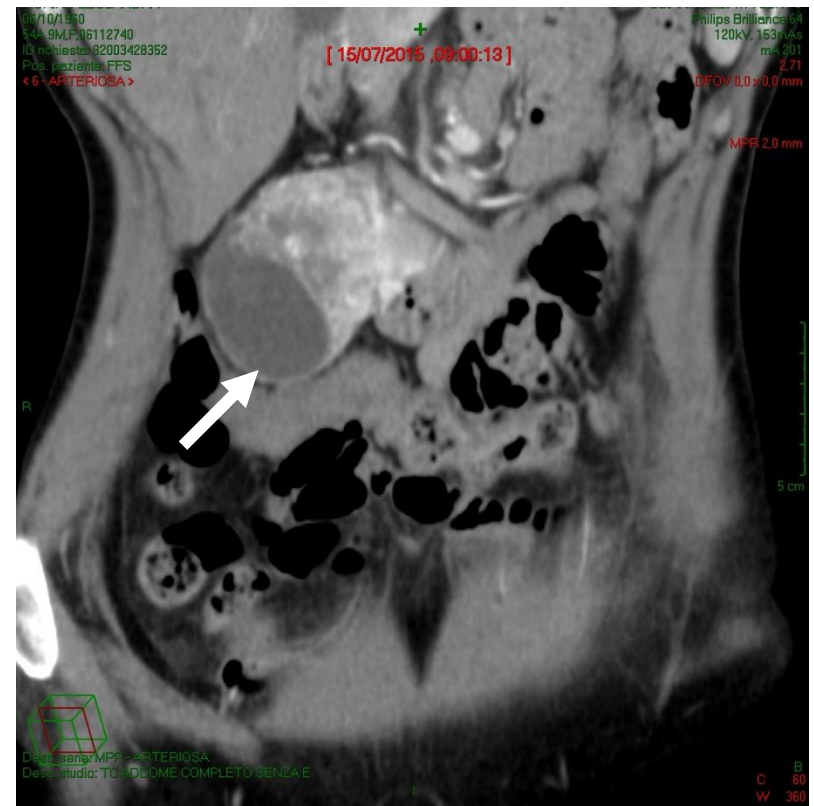
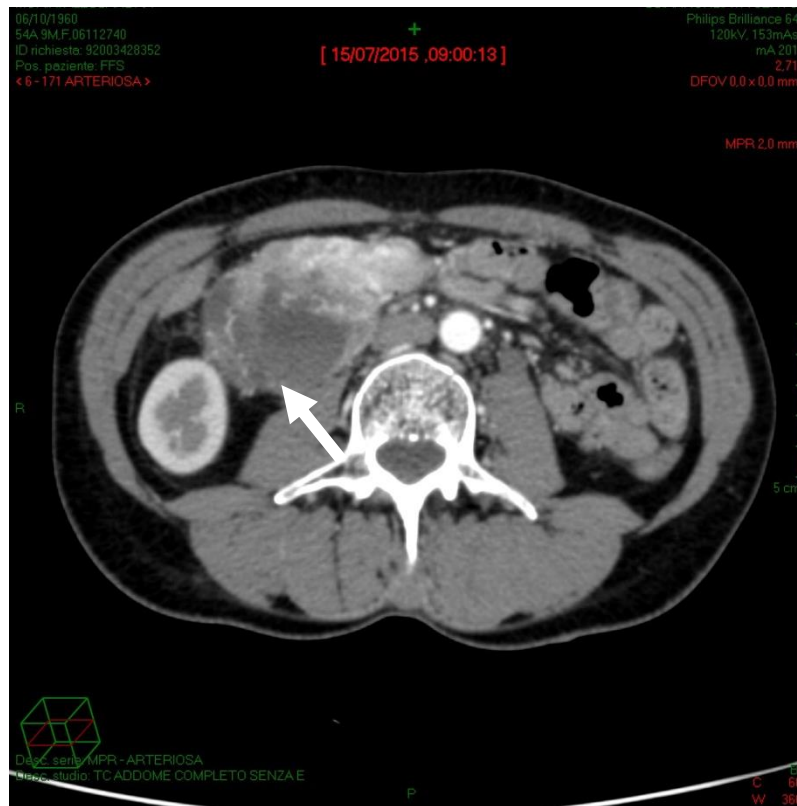
- Smooth, lobulated, intramural submucosal masses
- Extraintestinal extension
- Displacement of adjacent bowel loops
- Areas of necrosis low signal on T1-W and high signal on T2-W
- Areas of haemorrhage from high to low on T1 and T2-W
- Solid portions low on T1-W, high on T2-W – c.e. after Gd





# GIST

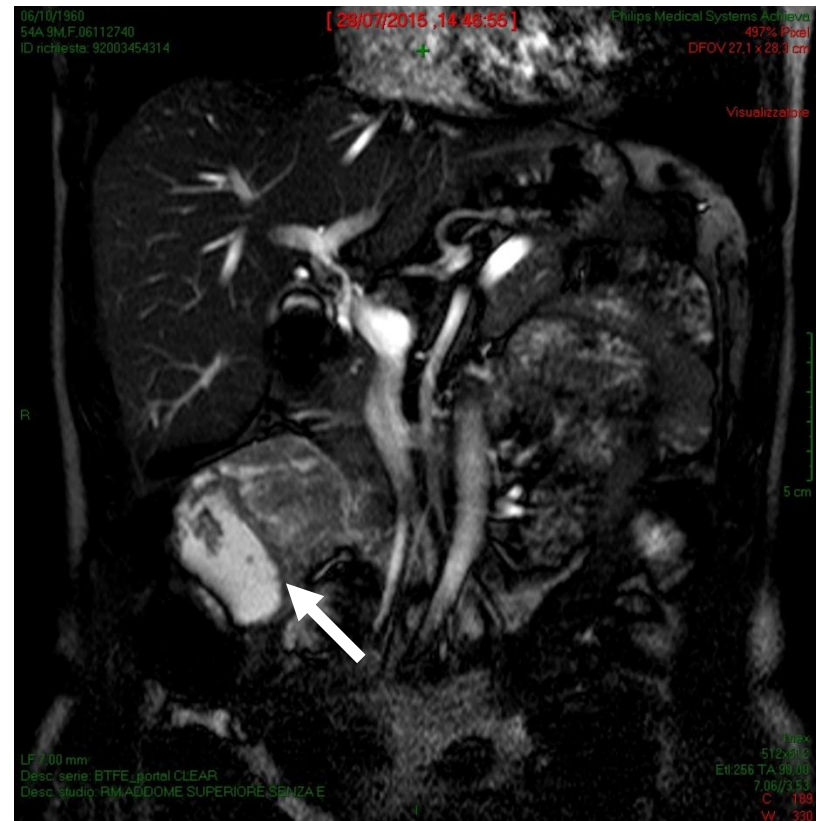
Female, 54 Yrs





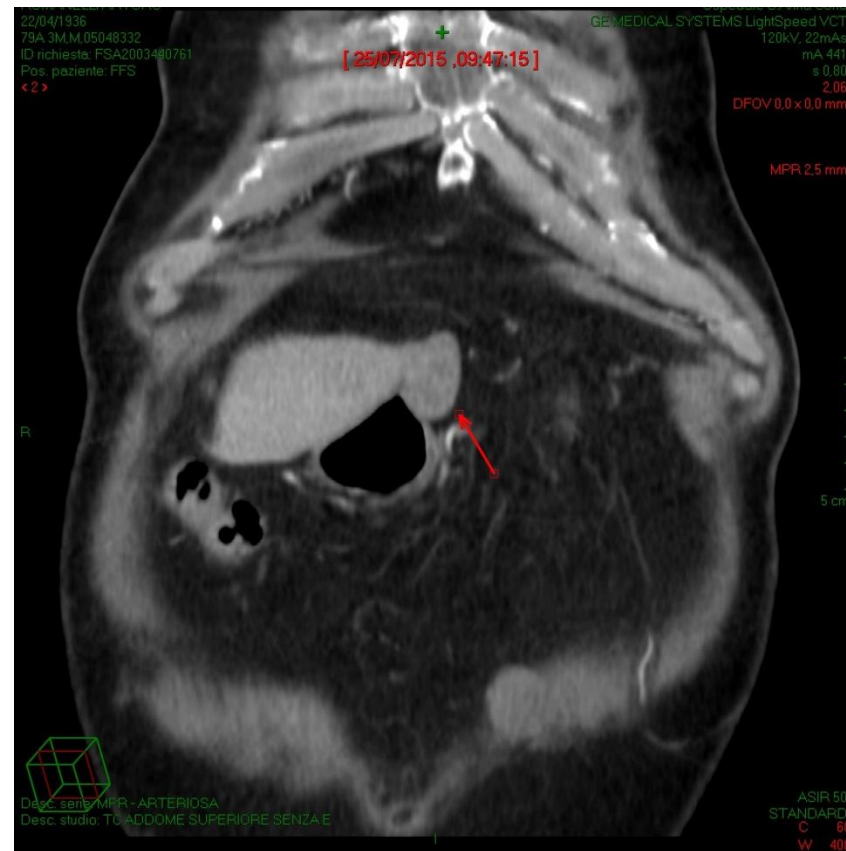
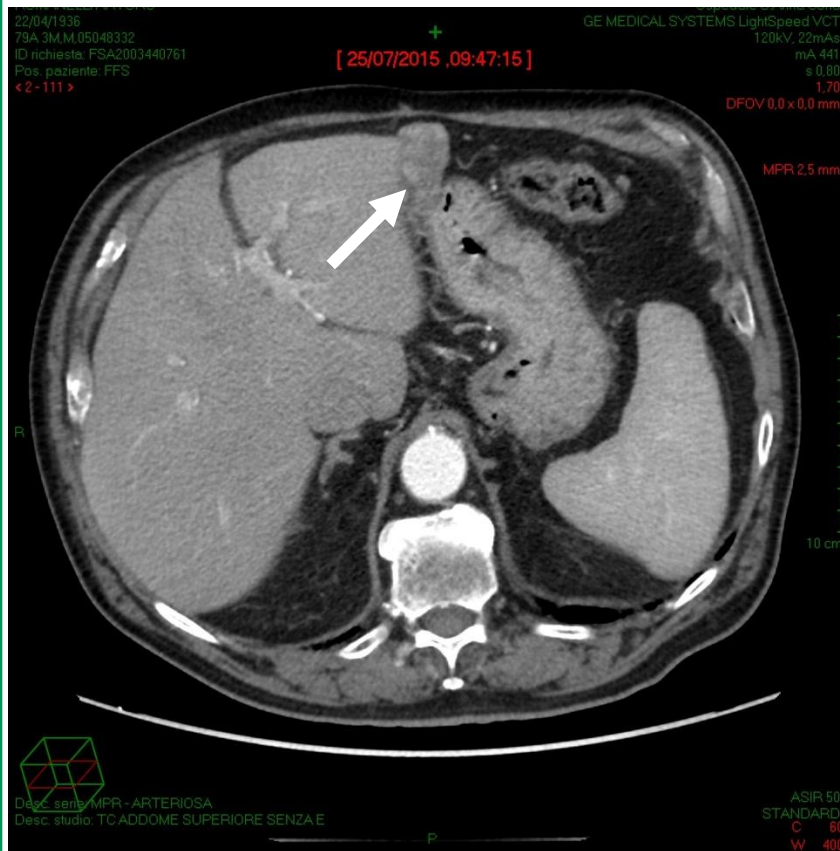
# GIST

Female, 54 Yrs



# GIST

Male, 79 Yrs



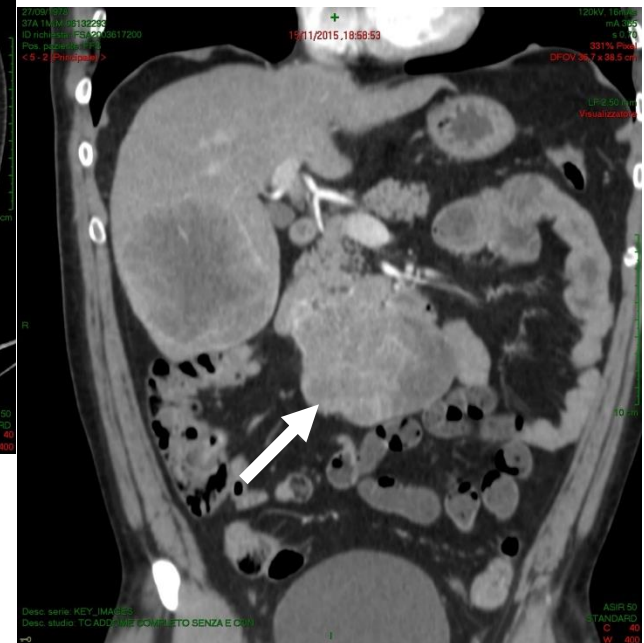
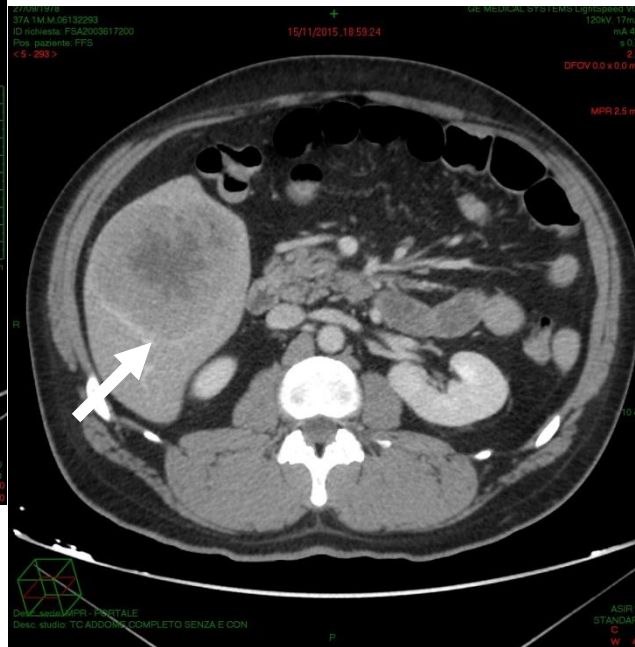
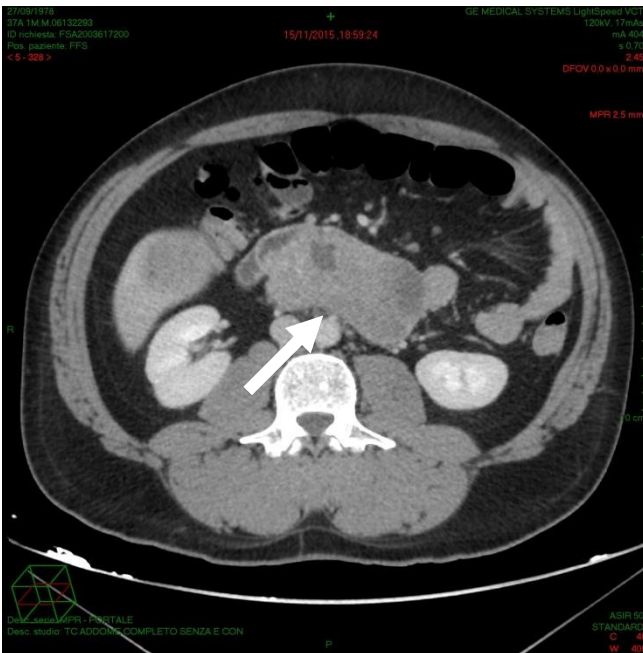
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Male, 79 Yrs



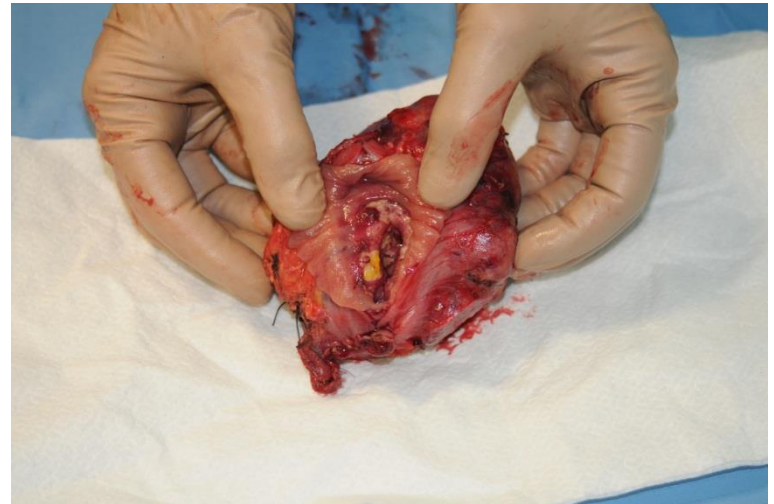
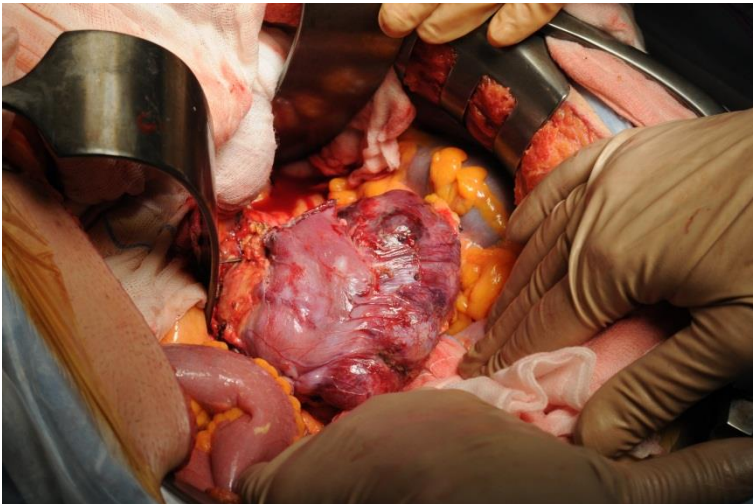
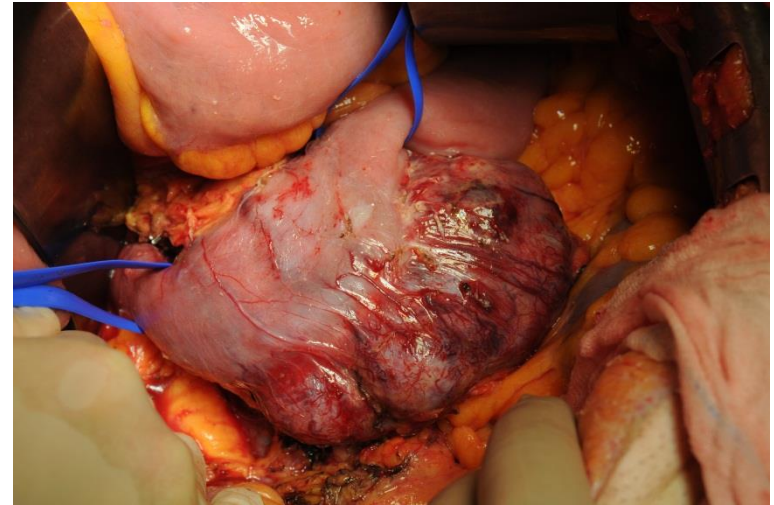
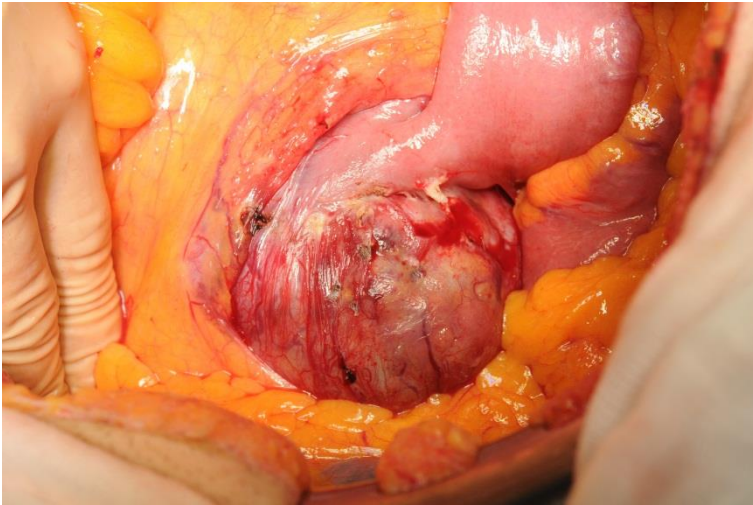
# GIST

Male, 37 Yrs

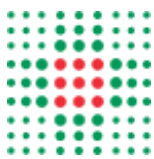




# GIST

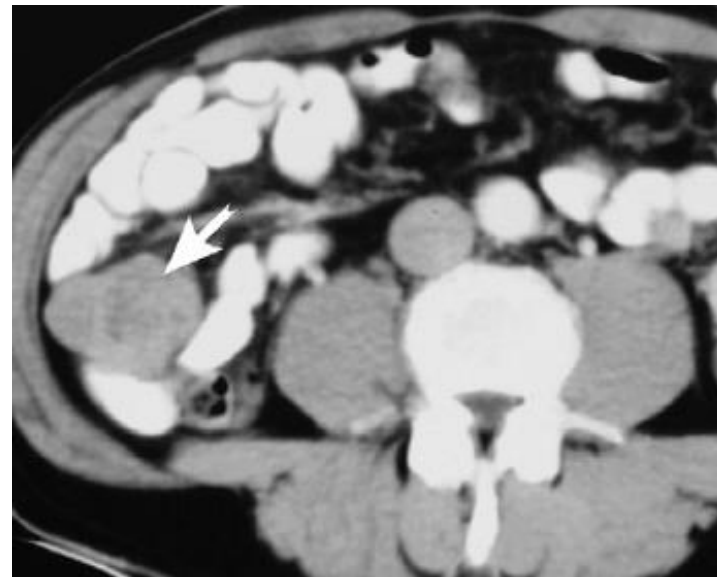


Courtesy of Prof. Giancarlo Pansini – U.O. Chirurgia Generale - Ferrara



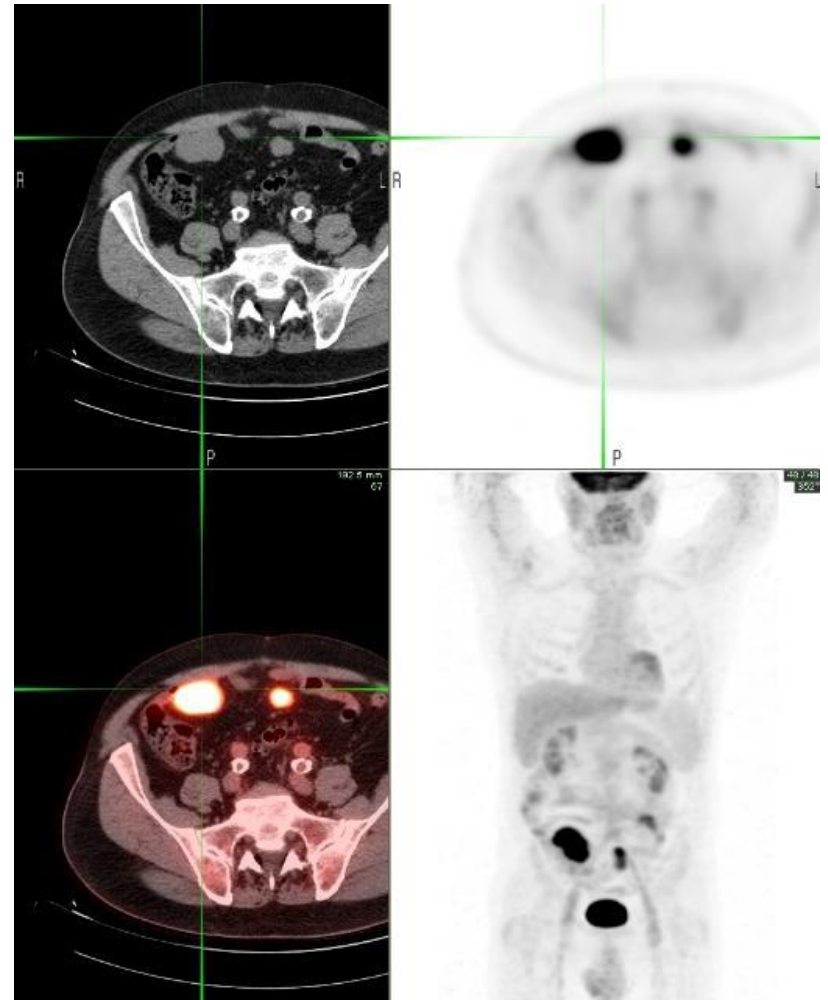
# GIST – Site of Metastases

- Liver
- Lung
- Bone
- Peritoneal surfaces
- No lymph nodes



# GIST – FDG PET/CT

- Imaging modality of choice
- Staging and Follow up after treatment
- Functional and anatomic informations
- SUV reflects cellular proliferation and tumor metabolic activity
- SUV correlates well with disease prognosis





# GIST - Treatment

## ***Surgery for organ-confined GISTS***

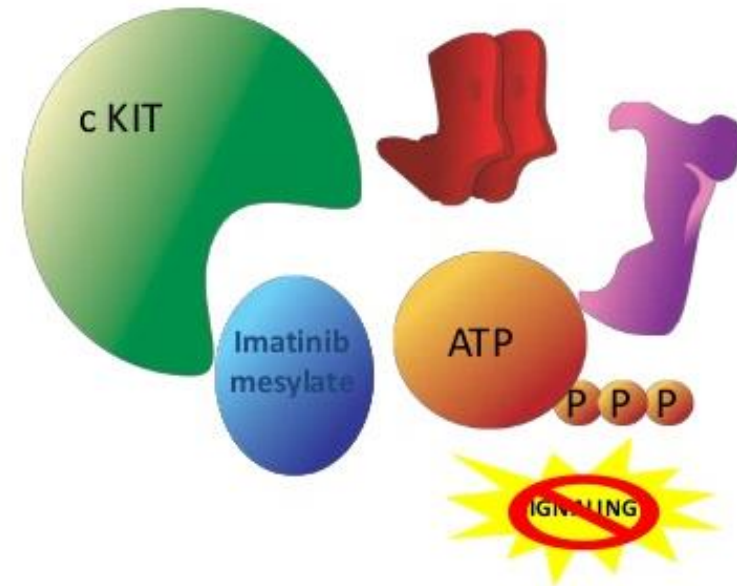
## ***Imatinib mesylate (**Gleevec®**) in KIT-positive, inoperable and metastatic GISTS***

**Selective  
Tyrosinase  
Inhibitor**



**APOPTOSIS**

- Imatinib mesylate occupies the ATP binding pocket of the c KIT kinase domain
- This prevents substrate phosphorylation and signaling
- A lack of signaling inhibits proliferation and survival



# GIST - Imaging after Imatinib

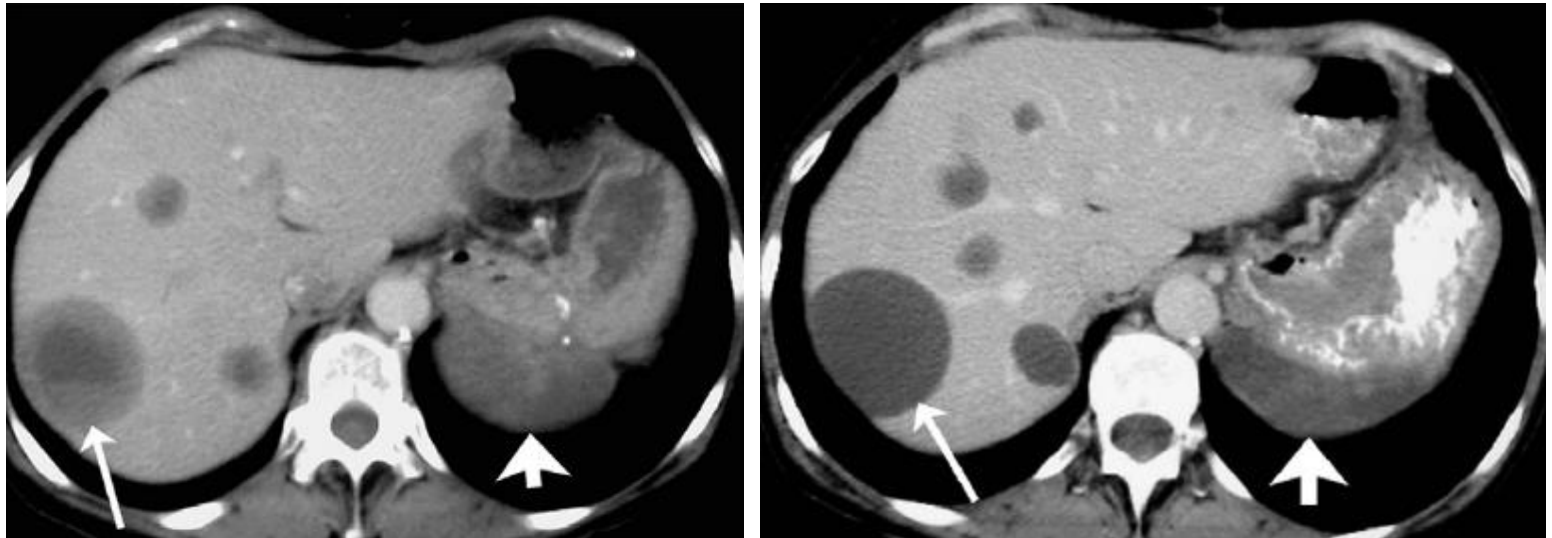
***Initial response → Cystic changes***

**NO RECIST criteria for GISTs !**

**Choi criteria**

Tumor density (>15% reduction)

Tumour size (>10% reduction)



# GIST - Imaging after Imatinib

## ***Pitfalls***

- ***Increase in size of lesions***
- ***Development of spurious new lesions***

***Lesions become hypodense and clearly visible***

***No new lesions !!!***

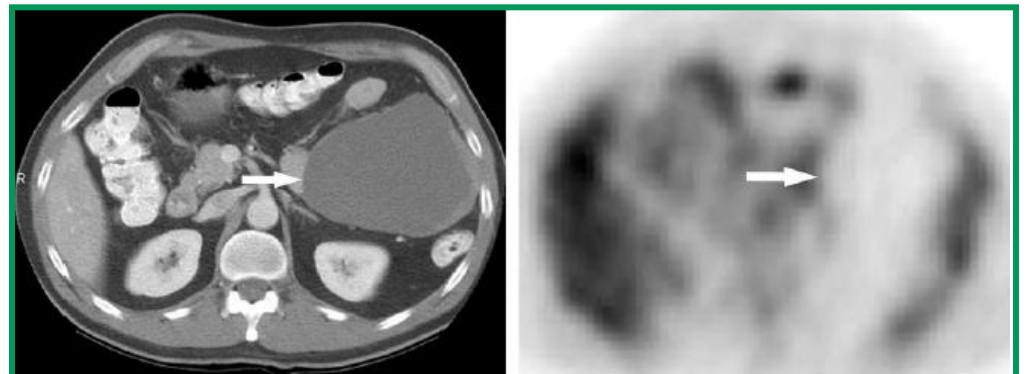
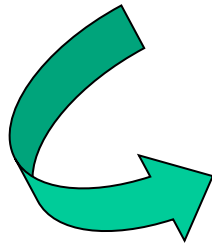
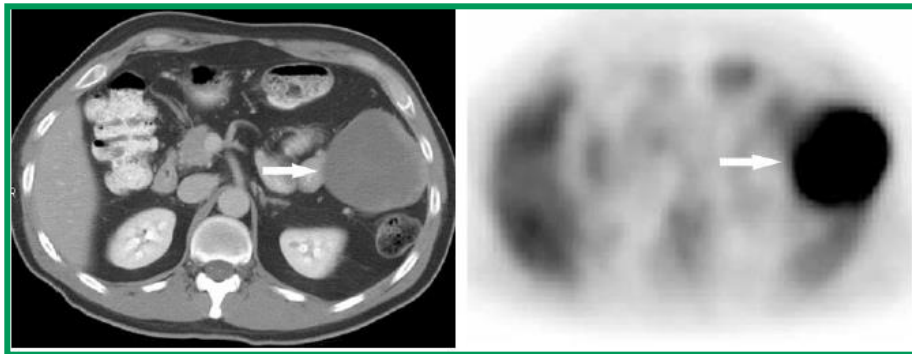


# GIST

Follow-up after treatment with Imatinib

***FDG-PET/CT precedes anatomic response (24h VS weeks)***

***SUV max reduction >25%***



# GIST

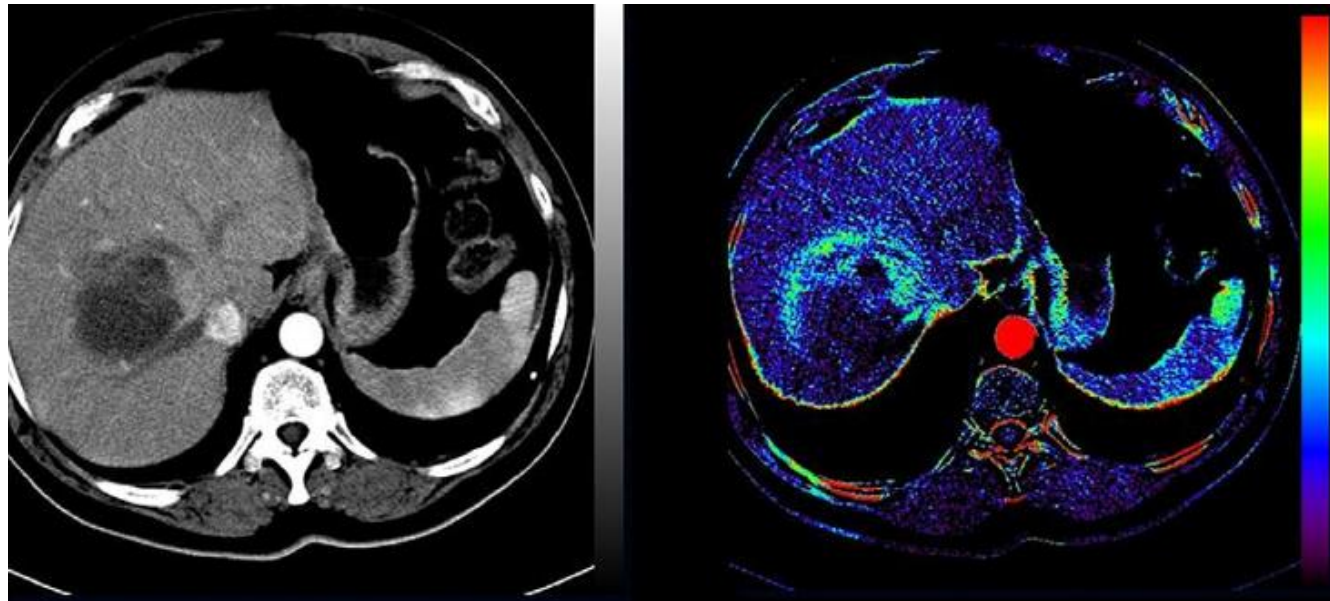
## Follow-up after treatment with Imatinib

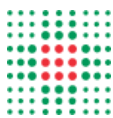
Perfusion patterns of metastatic gastrointestinal stromal tumor lesions under specific molecular therapy

Marcus Schlemmer<sup>b</sup>, Steven P. Sourbron<sup>a</sup>, Nicole Schinwald<sup>b</sup>, Konstantin Nikolaou<sup>a</sup>,  
Christoph R. Becker<sup>a</sup>, Maximilian F. Reiser<sup>a</sup>, Frank Berger<sup>a,\*</sup>

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<sup>b</sup> Department of Internal Medicine III, University Hospitals-Großhadern, Ludwig Maximilians University Munich, Marchioninistr. 15, 81377 Munich, Germany

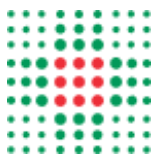




# Take Home Messages

<b>Tumour Type</b>	<b>Growth Pattern</b>	<b>Margins</b>	<b>Intestinal findings</b>	<b>Type of Spread</b>
<b>Adenocarcinoma</b>	<b>Short</b>	<b>Irregular</b>	<b>Stenotic Lesion</b>	<b>Locoregional Metastases</b>
<b>Lymphoma</b>	<b>Long</b>	<b>Smooth</b>	<b>Dilatation</b>	<b>Bulky Retroperitoneal</b>
<b>GISTs</b>	<b>Extraserosal</b>	<b>Smooth Lobulated</b>	<b>Dilatation</b>	<b>Peritoneal Metastases</b>
<b>Carcinoid</b>	<b>Focal</b>	<b>Irregular</b>	<b>Intermittent Obstruction</b>	<b>Hypervascular Metastases</b>





# Thank You



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