

What Nuclear Medicine is planning to offer the patient suffering NET

John Buscombe

Cambridge University Hospitals

Present situation

- Diagnostics
 - I-123 mIBG
 - In-111 pentetreotide
 - F-18 FDG
- Therapy
 - Y-90 Sirspheres (at least possible)

Areas of development

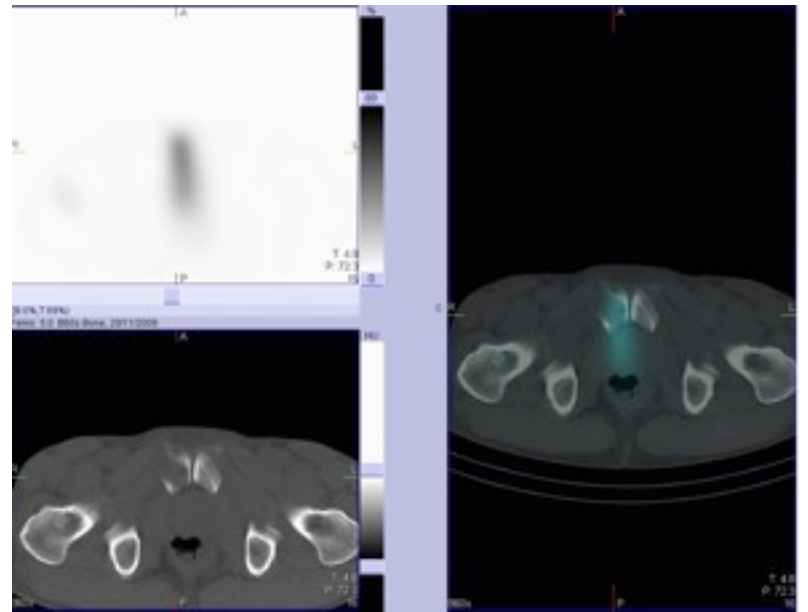
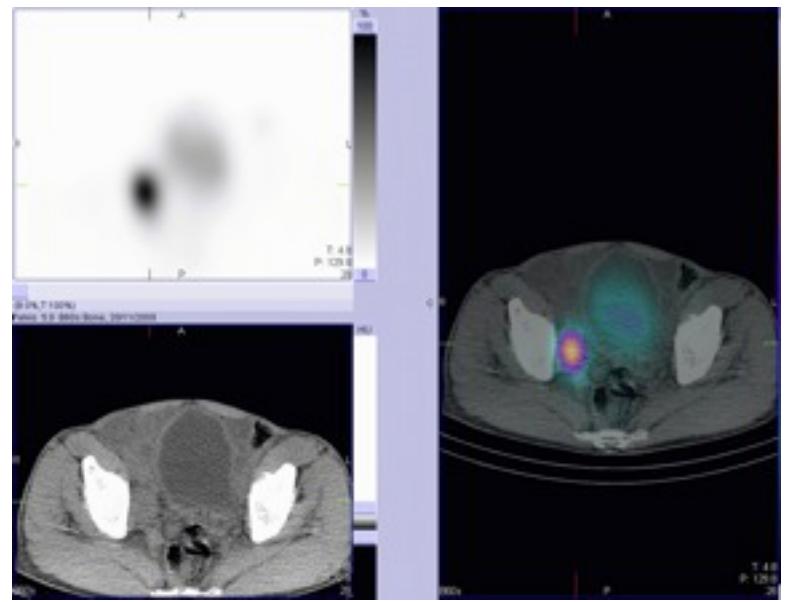
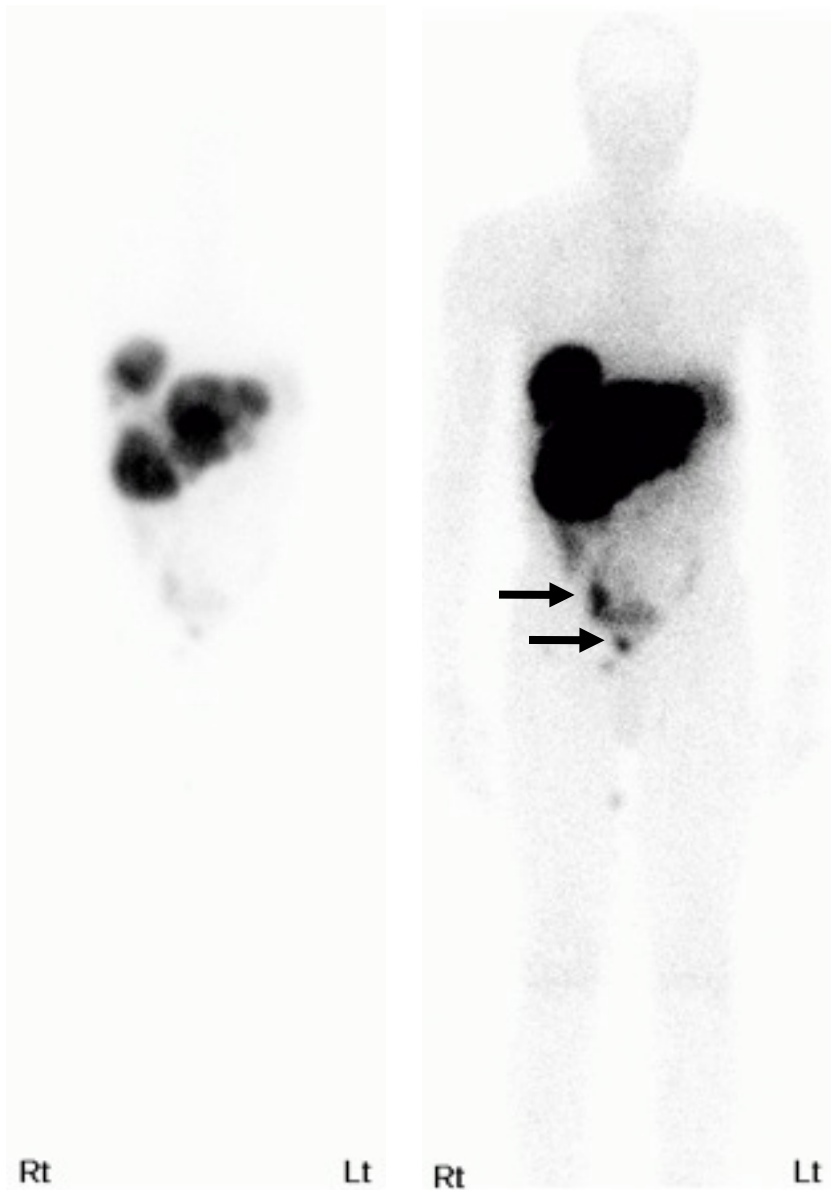
- Diagnostics
 - In-111 pentetretotide SPECT-CT
 - I-123 mIBG SPECT-CT
 - Ga-68 PET-CT
- Therapy
 - Y-90 DOTATATE

Who is Dr Buscombe

- Nuclear Medicine Physician since 1994
- In 1996 with Gastro Sen Reg Dr Martyn Caplin set up RFH NET clinic
- Over 1500 patients now seen in clinic
- Since 1996 developed radionuclide therapy
 - High activity In-111 pentetreotide
 - Y-90 Lanreotide
 - Y-90 Octreotide
 - Y-90 DOTATATE

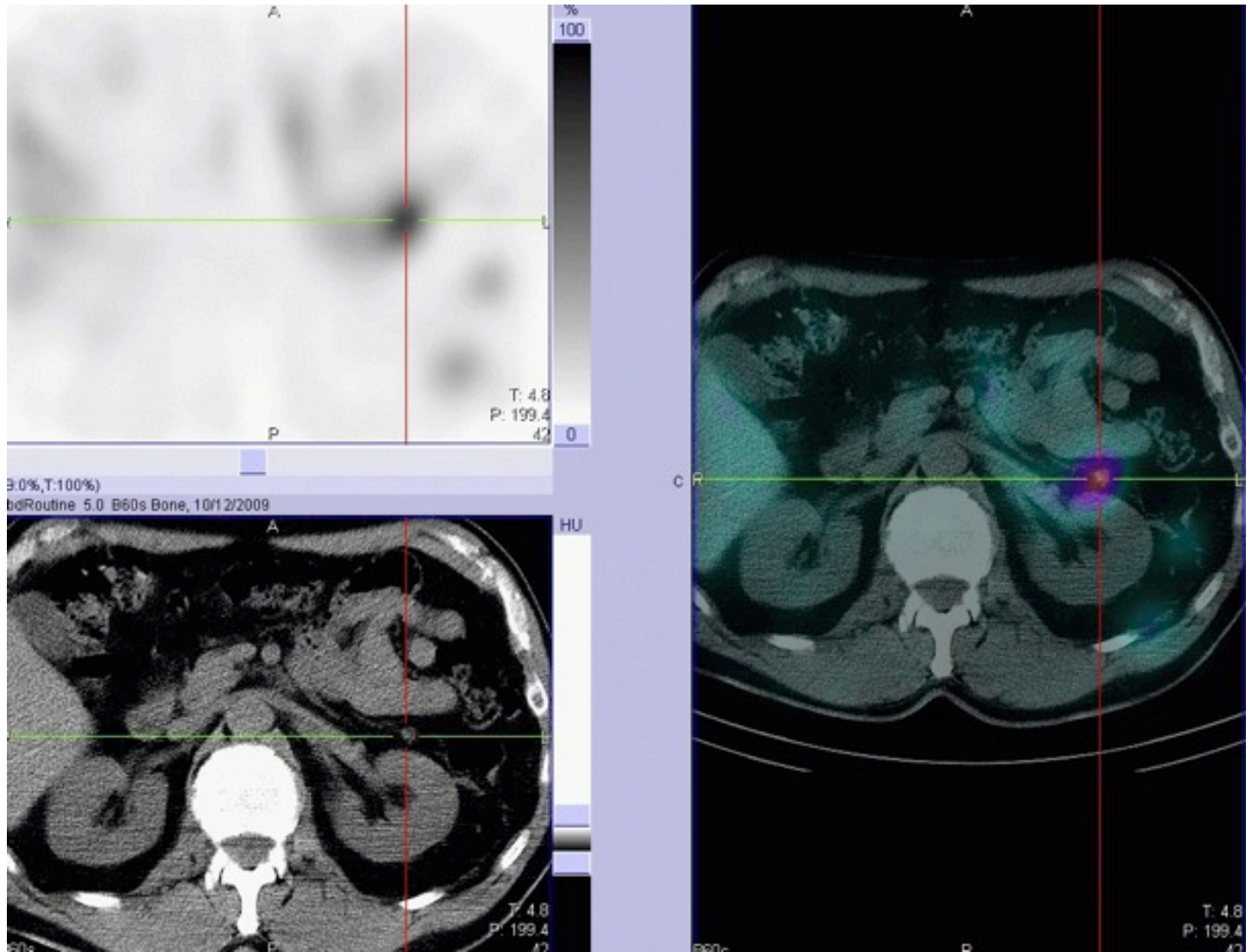
Who is Dr Buscombe contd

- Introduced radionuclide therapies
 - Intra-arterial Y-90 peptides
 - I-131 mIBG
 - I-131 Lipidol
 - Y-90 Sirspheres
 - Sm-153 EDTMP
- Over 14 years over 750 radionuclide treatments in over 300 patients
- 34 publications

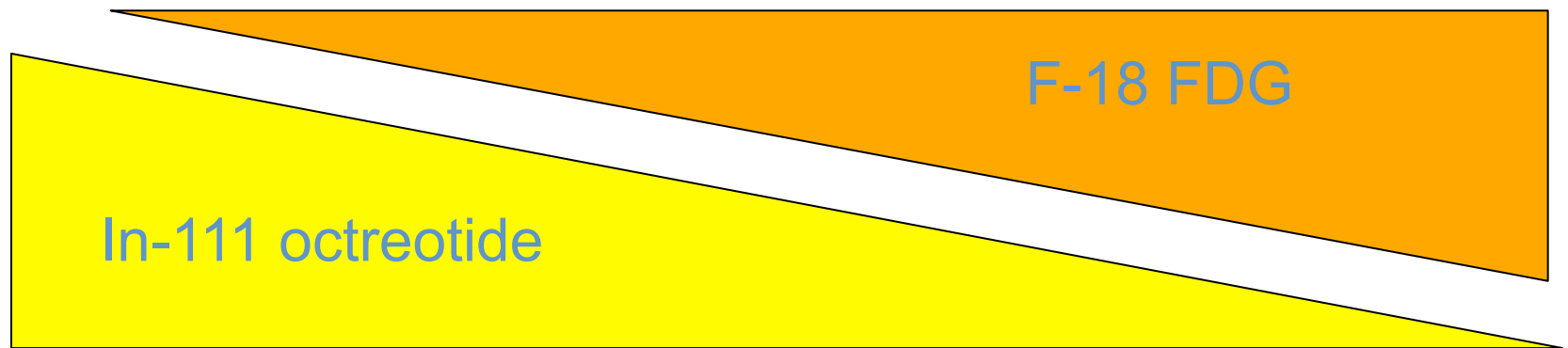


SPECT/CT: improved localisation with hybrid imaging
Courtesy of Dr Navalkissoor

Malignant Pheochromocytoma



In-111 octreotide v F-18 FDG



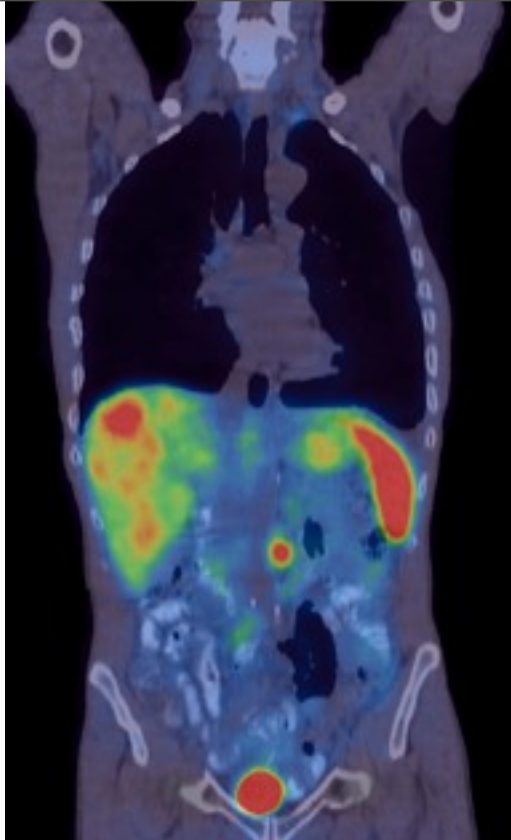
More benign



More malignant

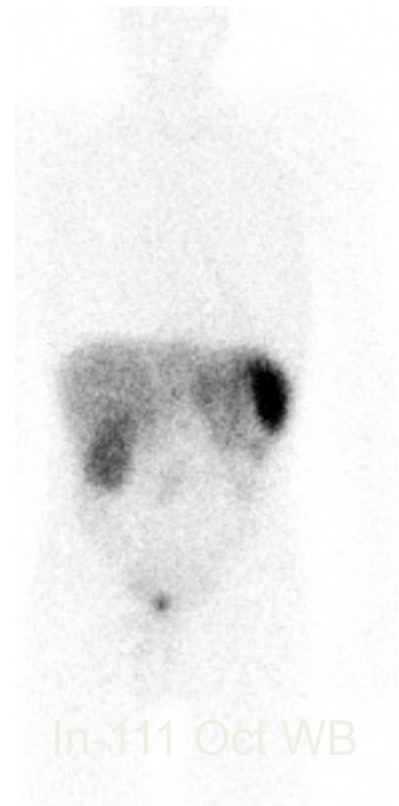
What is Ga-68 DOTATATE

- Ga-68
 - Short lived daughter of Ge-68
 - Therefore generator produced
 - Half life 68 minutes
 - Positron emitter
- DOTA
 - Linker molecule
- TATE
 - Alcoholised somatostatin analogue
 - Very high affinity for SSR2 (10x-100x octreotide)

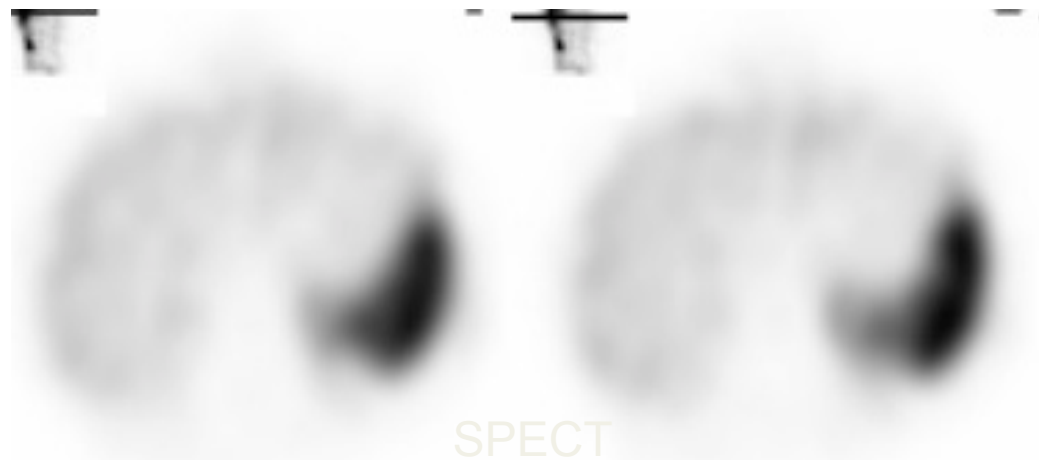
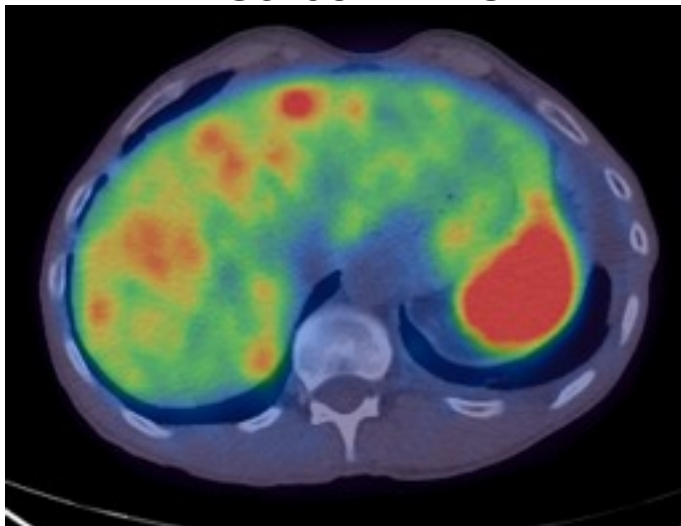


Ga-68 PET/CT

Ga-68 PET/CT more lesions than In-111 Oct
In fact 11% of patients negative of In-111 octreotide are positive on Ga-68 DOTATATE

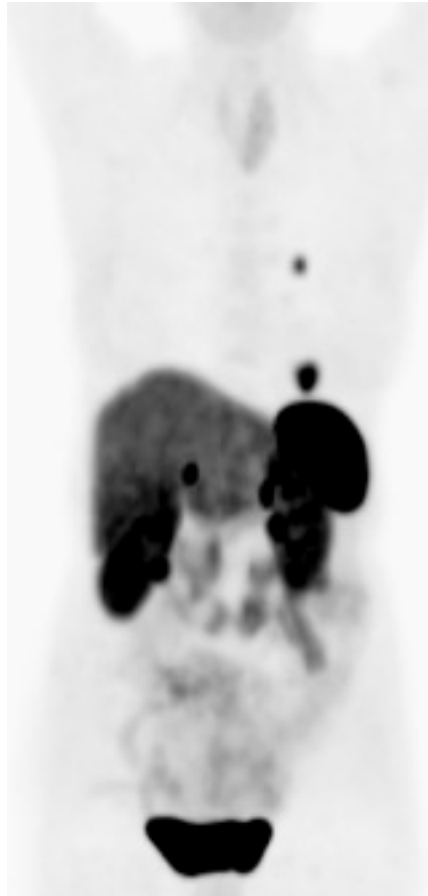


In-111 Oct WB



SPECT

Ga-68 PET/CT pos In-111 Oct neg

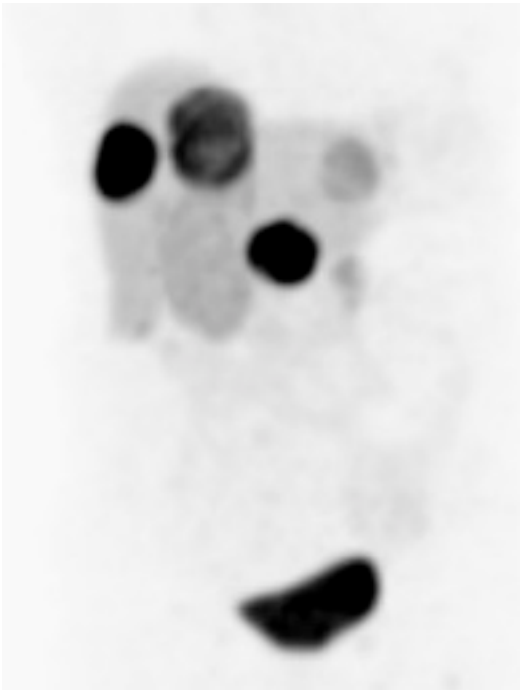


Ga-68 PET MIP



In-111 Oct WB

Similar Lesions



Ga-68 PET



In-111 Oct



Ga-68 PET/CT more lesions than In-111 Oct

In-111 Oct



Ga-68 PET

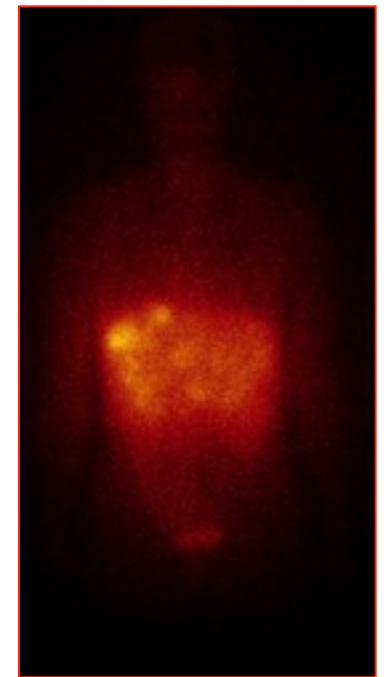


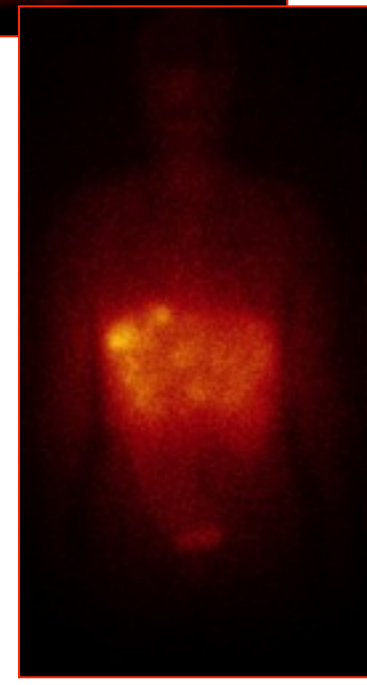
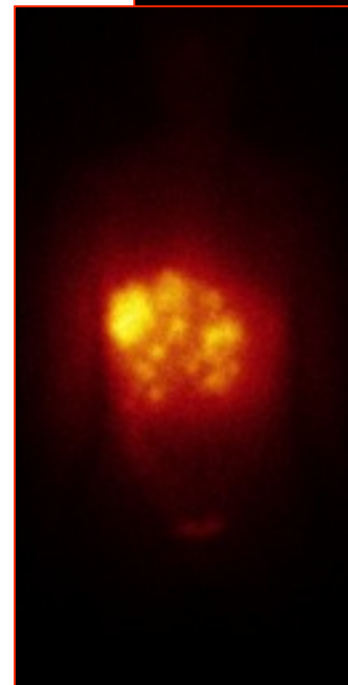
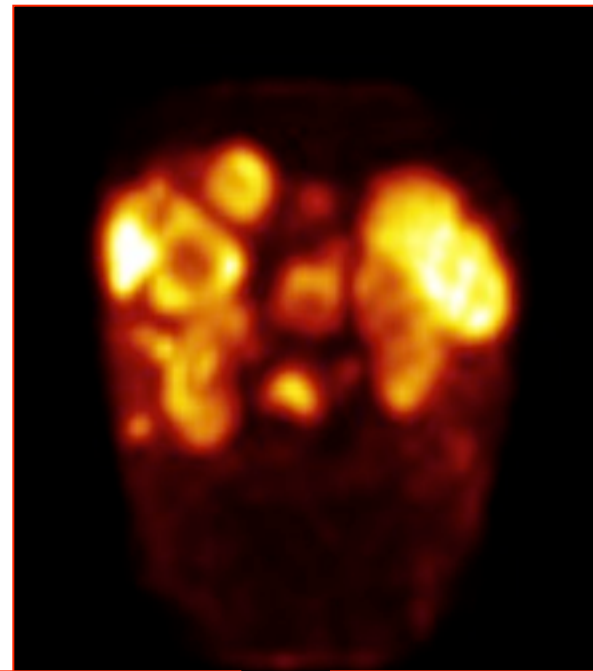
Y-90 octreotate

- Newer peptide
- Higher affinity for SSR2
- Minimal side effects as renal and bone marrow uptake low
- Patients treated in Poland, UK and Germany



Foregut, pancreas – secretor (gastrinoma)
NECLM (WHO 2)





Foregut, pancreas – secretor (gastrinoma)
NECLM (WHO 2)

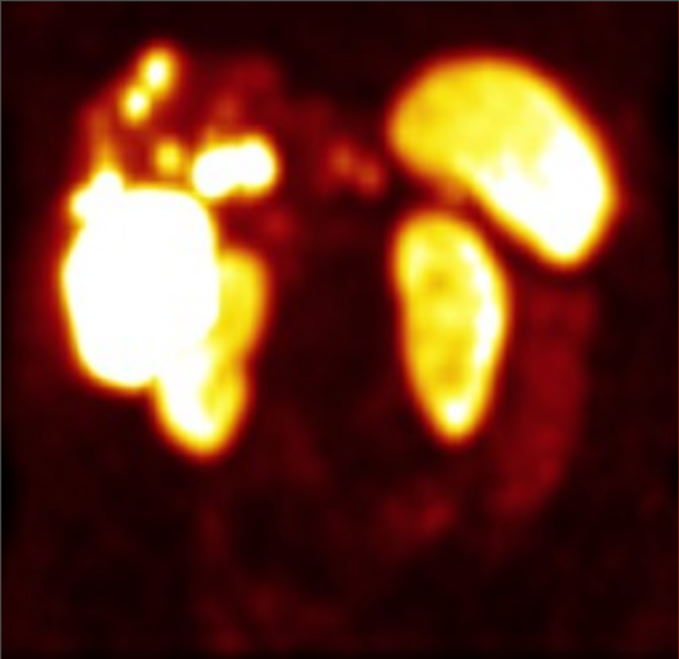
Treatment with Y-90 DOTATATE

Cwikla et al (Ann Oncol 2010)

- 35 patients with proven GEP-NET
- All treated patient had evidence of PD before therapy
- 4x3-4GBq Y-90 DOTATATE with amino-acid cover 12 weeks apart
- Response measure by CT and symptom relief

Results Cwikla et al

- At 6 months 12 patients PR, 1 only PD
 - 23 patients had good symptomatic response
- Median PFS was 20 months with Median OS of 22 months
- 6 patients mild renal toxicity (WHO grade 1,2)
- 1 patient reduced platelets grade3



61 yrs old female;
FPI, WHO 2, G2;
CS IV, nonsecretor



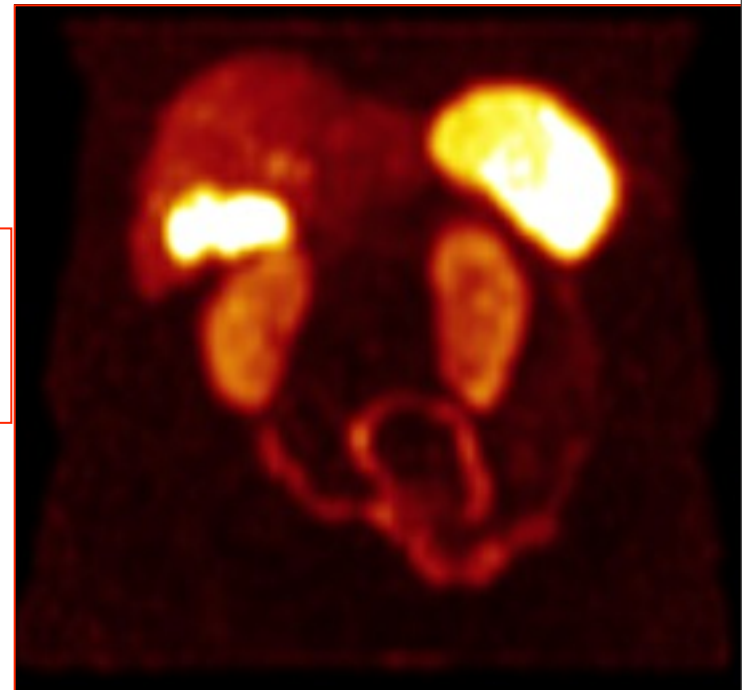
Initial SRS (^{99}Tc TOC)

Initial CT



CT 12 M
after PRRT

SRS 12 M
after PRRT,
(^{99}Tc TOC)



Y-90 DOTATATE

Y

Author	CR	PR	SD	DP	Sympto
Baum (75)	0	28	39	8	64
Cwikla (57)	0	14	44	0	51
Toupanakis	0	11	66	11	62
TOTAL (217)	0	49	14	19	167

When?

- Well as soon as possible
- Trying to work round how Cambridge works
- Y-90 SIRT now
- I-131 mIBG now
- Working through chemistry
- Ready for Ga-68 DOTATATE in next 1 month
- Ready for Y-90 DOTATATE in next 6

Possible next steps

- Lu-177 DOTATATE
 - Issues on cost and efficacy
- F-18 DOPA for small pancreatic tumours
- Will need staffing and equipment