

# Management of carcinoid tumours: Surgery

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# Disclosures

- Consultancy / Advisory Board
  - Strategen, Abbott Molecular, Glaxo Smith Klein, Pfizer
- Educational presentations / speaker
  - Roche, Imedex, Glaxo Smith Klein, Medela
- Travel, accommodation and course fees
  - Covidien
- Research funding
  - ScreenCell®
- Patent pending
  - Clearbridge Biomedics

# Background

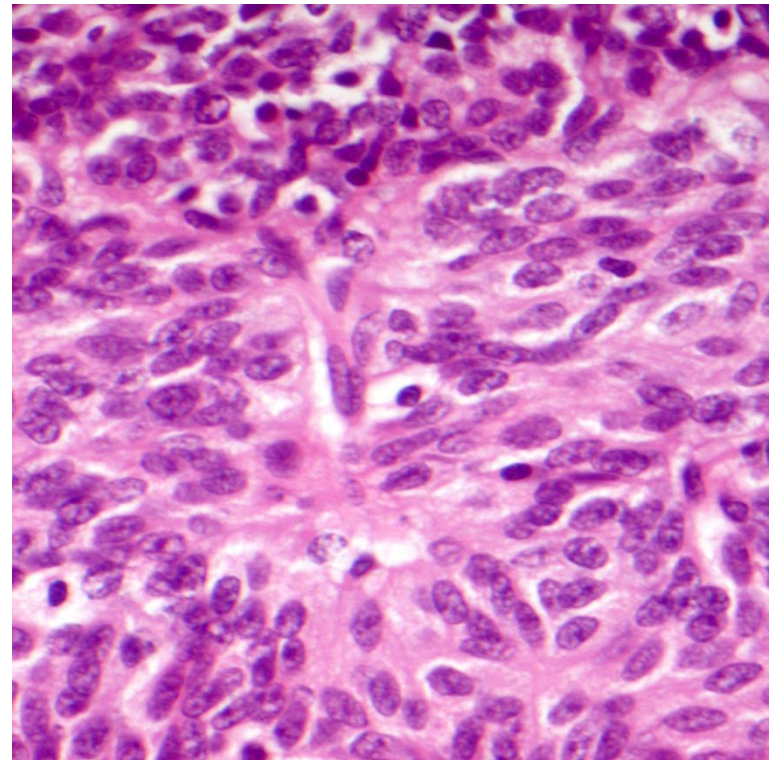
- Broncho-pulmonary neuroendocrine tumours are rare
- As the cohort of interest is very small, there is very little evidence based practice
- Therefore the basis of my talk is largely observational studies and consensus opinion (forthcoming ENETS guidelines)

# Classification

- Usually divide lung cancers into non-small cell and small cell lung cancer
  - Based on surgery as a possible initial treatment modality
- Bronchopulmonary neuroendocrine tumours are both non-small cell and small cell “lung cancers”
  - Typical carcinoid
  - Atypical carcinoid 1% lung cancers
  - Large cell neuroendocrine
  - Small cell lung cancer 10% lung cancers

# Pathology

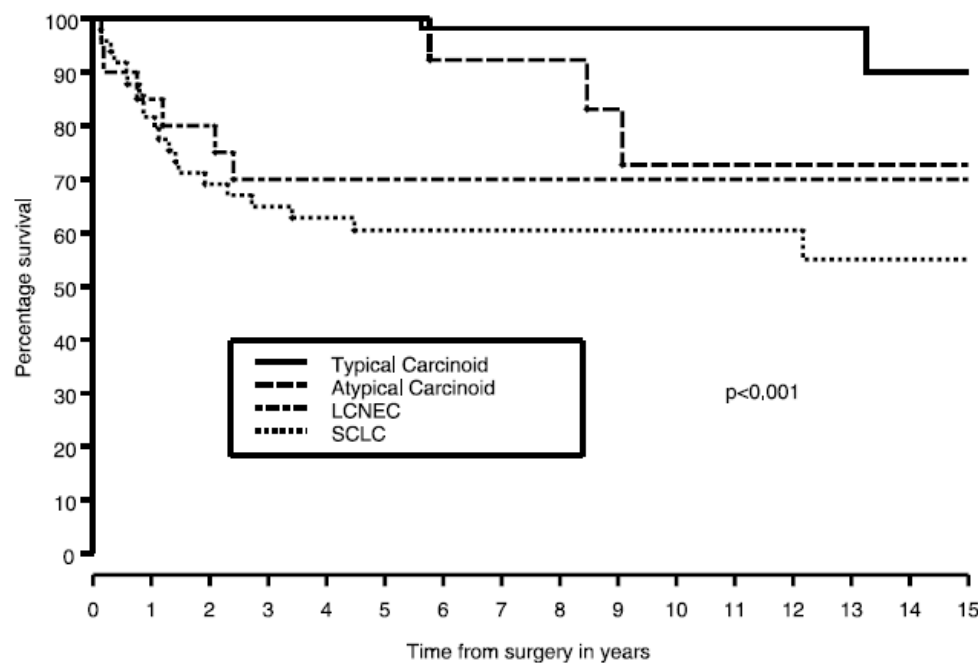
- Typical carcinoid
  - Mitoses are less than 2 per 2mm<sup>2</sup> and there is no necrosis
- Atypical carcinoid
  - 2-10 mitoses per 2mm<sup>2</sup> and necrosis
- Large cell neuroendocrine
  - 11 or more mitoses per 2mm<sup>2</sup>
- Small cell lung cancer
  - 60 or more mitoses per 2mm<sup>2</sup>



# The impact of stage and cell type on the prognosis of pulmonary neuroendocrine tumors

Eric Lim, MRCS,<sup>a</sup> Yoong K. Yap, MRCS,<sup>a</sup> Bianca L. De Stavola, PhD,<sup>b</sup> Andrew G. Nicholson, MRCPATH,<sup>a</sup> and Peter Goldstraw, FRCS<sup>a</sup>

	Typical carcinoid	Atypical carcinoid	LCNEC	SCLC
N	89	15	22	51
Mean age, y (SD)	48 (15)	58 (10)	63 (10)	61 (11)
Men, n (%)	41 (46)	6 (40)	17 (77)	27 (53)
T category				
N/A*	0 (0)	0 (0)	3 (14)	2 (4)
T1	45 (51)	10 (67)	5 (23)	16 (31)
T2	42 (47)	5 (33)	12 (55)	31 (61)
T3	1 (1)	0 (0)	2 (9)	1 (2)
T4	1 (1)	0 (0)	0 (0)	1 (2)
N category				
N/A*	1 (1)	0 (0)	3 (14)	2 (4)
N0	75 (84)	8 (53)	9 (41)	18 (35)
N1	11 (12)	3 (20)	6 (27)	21 (41)
N2	2 (2)	4 (27)	4 (18)	10 (20)
Stage				
N/A*	1 (1)	0 (0)	3 (13)	2 (4)
I	70 (79)	7 (47)	9 (41)	21 (41)
II	15 (17)	3 (20)	5 (23)	17 (33)
III	2 (2)	4 (27)	4 (18)	11 (22)
IV	1 (1)	1 (7)	1 (5)	0 (0)



J Thorac Cardiovasc Surg 2005;130:969-72

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# Presentation

- Varies with location and malignant potential
  - Typical carcinoid
    - Airway symptoms or incidental finding
  - Atypical carcinoid / large cell neuroendocrine tumours
    - Present similarly to other non-small cell lung cancers
  - Small cell lung cancer
    - Present with extensive local and distant disease

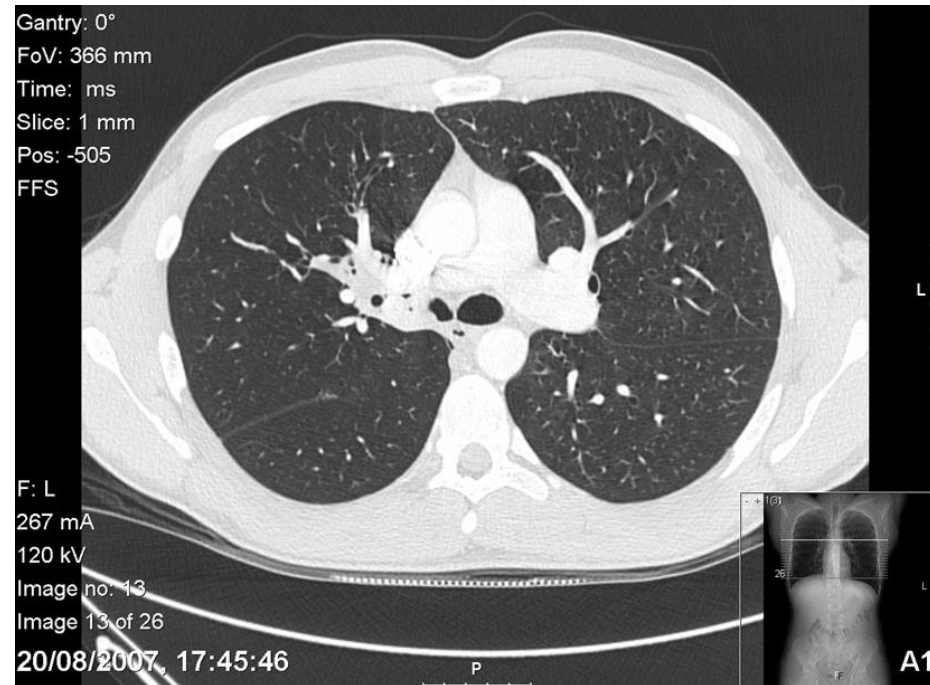


# Selection of patients for surgery



# Imaging

- CT chest / abdomen
  - Anatomic localisation
  - Staging
  - Diagnosis via percutaneous biopsy of peripheral lesions



# Imaging

- PET scanning
  - FDG-PET limited use
  - $^{68}\text{Ga}$  DOTATATE PET tracer
- Octreotide scan
  - Functional imaging
  - Receptor based with potential therapeutic information



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## Guidelines on the Radical Management of Patients with Lung Cancer

British Thoracic Society and the Society  
for Cardiothoracic Surgery in Great Britain  
and Ireland

thorax.bmj.com



BMJ Journals

## Guidelines on the Radical Management of Patients with Lung Cancer

Eric Lim, David Baldwin, Michael Beckles,  
John Duffy, James Entwisle, Corinne Faivre-Finn,  
Keith Kerr, Alistair Macfie, Jim McGuigan, Simon Padley,  
Sanjay Popat, Nicholas Screatton, Michael Snee,  
David Waller, Chris Warburton, Thida Win

On behalf of the British Thoracic Society and  
Society for Cardiothoracic Surgery in Great Britain  
and Ireland Lung Cancer Guideline Group: a sub-group  
of the British Thoracic Society Standards of Care Committee



Imperial College  
London

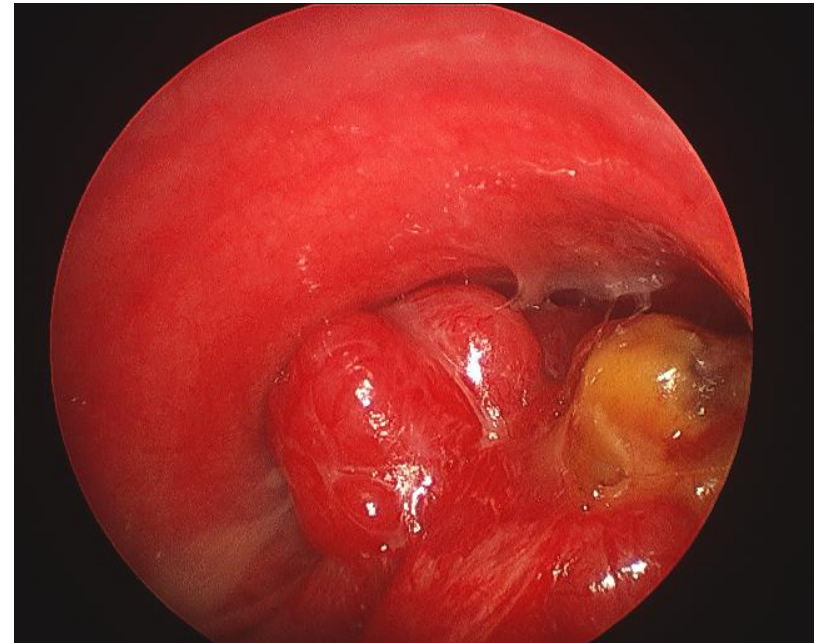
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# Typical carcinoids

# Bronchoscopy

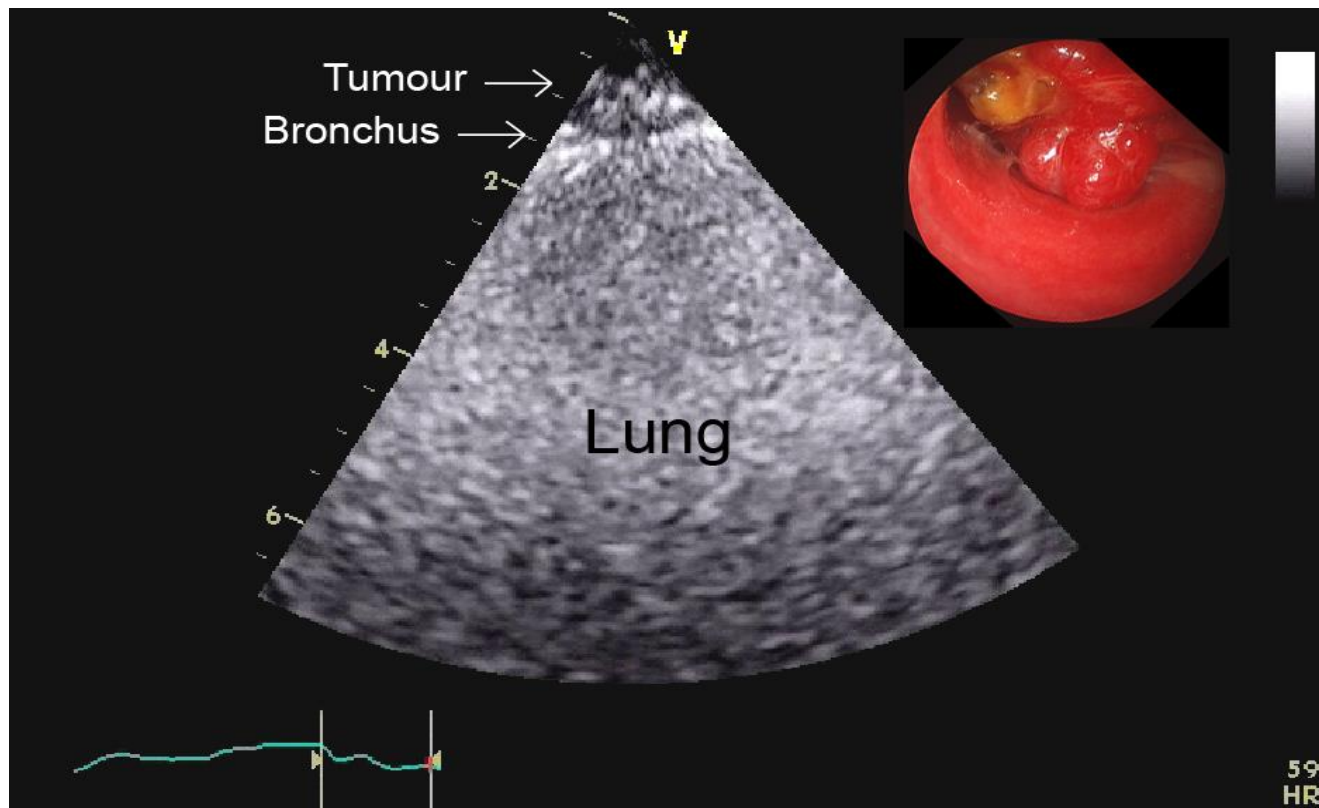
- For central tumours
  - Anatomic localisation
  - Staging
  - Diagnosis via direct biopsy



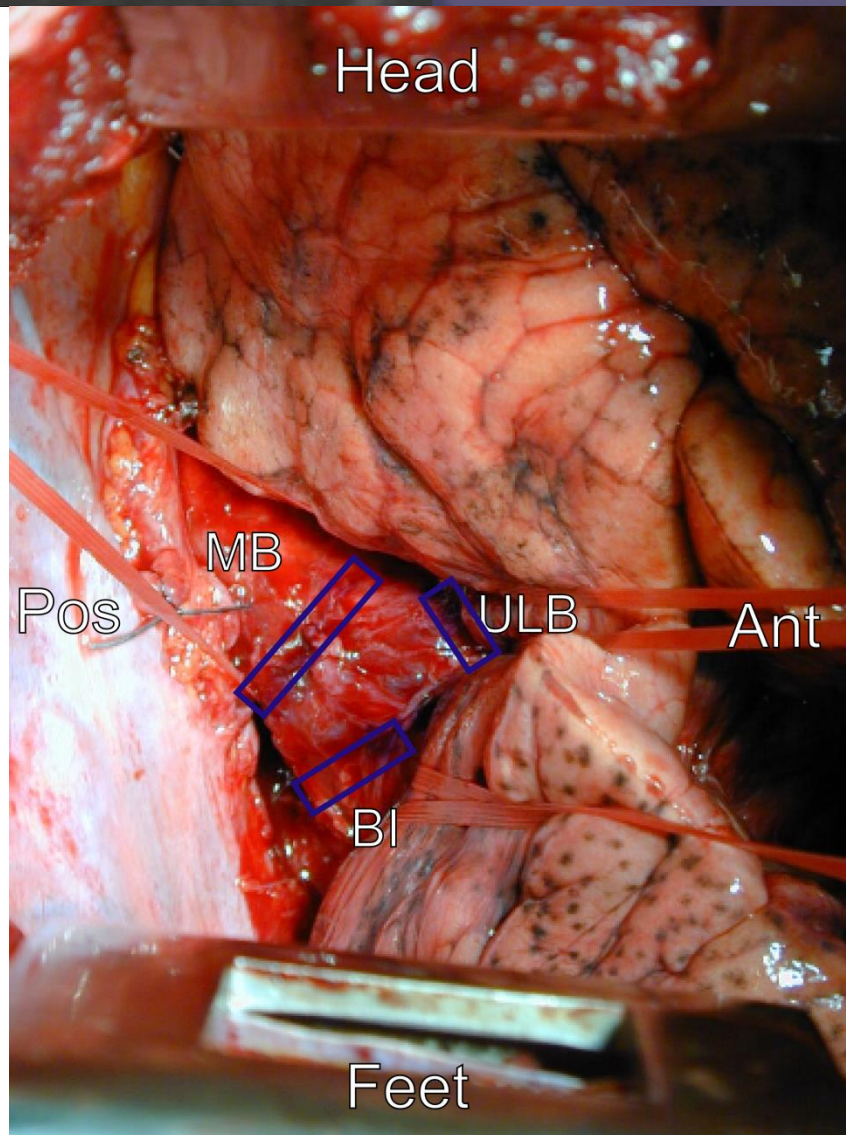
# Surgical management

- Typical carcinoid
  - Low malignant potential, rarely metastasise, central airway predominance
  - Early disease
    - Complete anatomic resection (segmentectomy, lobectomy, sleeve)
    - Systematic nodal dissection
- Important that these patients are seen in specialist thoracic surgical centres for consideration of lung parenchyma sparing surgery and systematic nodal dissection

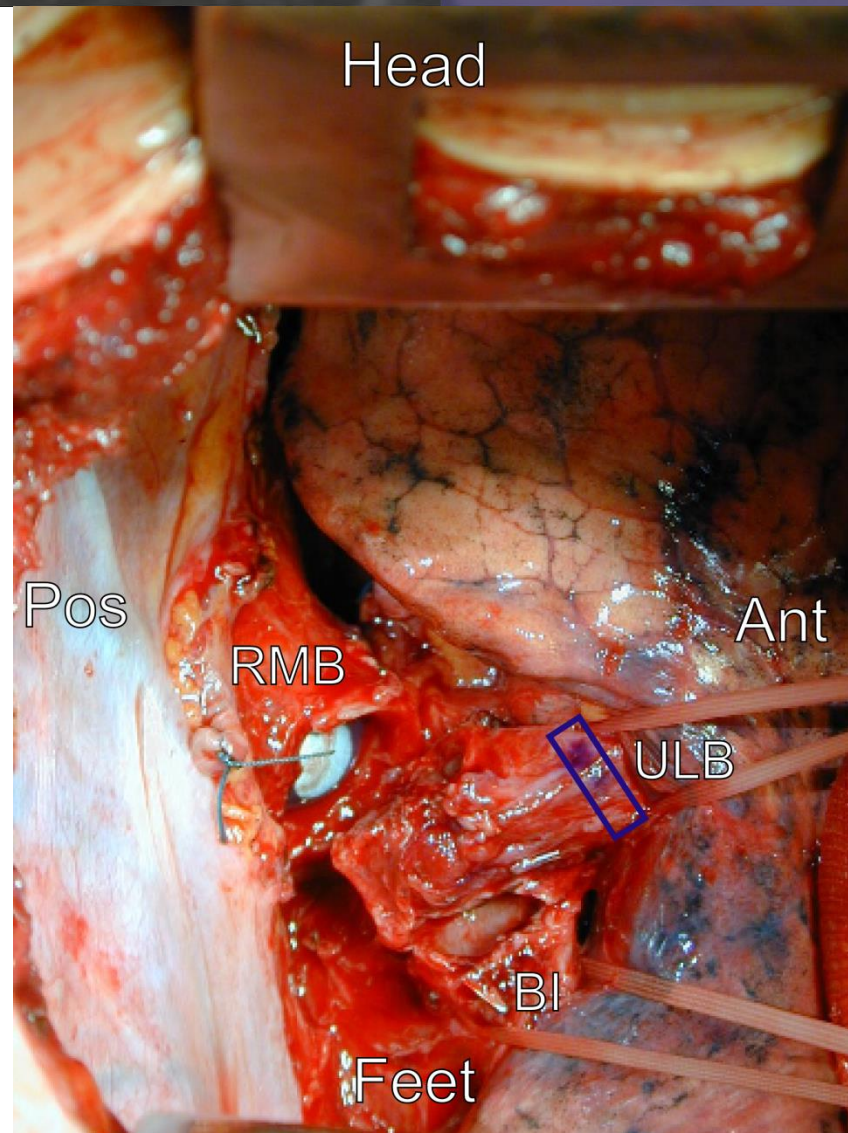
## Epi-bronchial ultrasound imaging

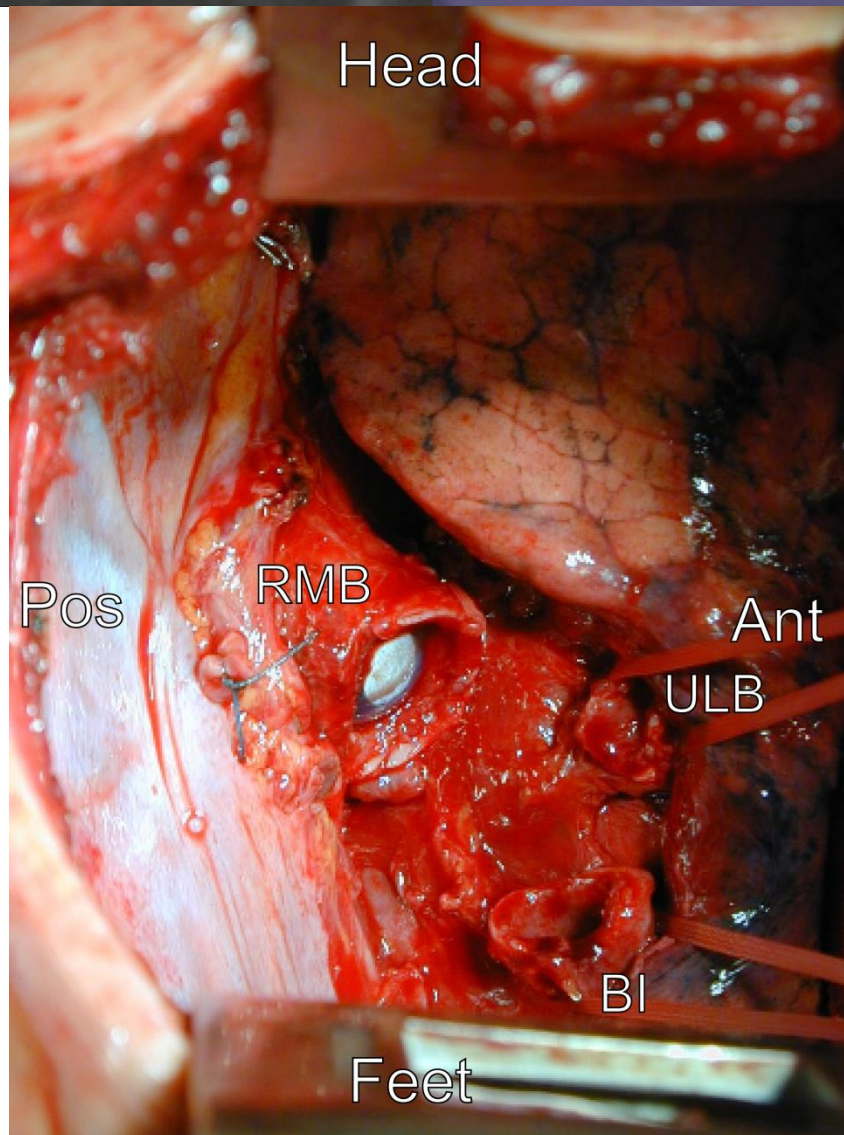




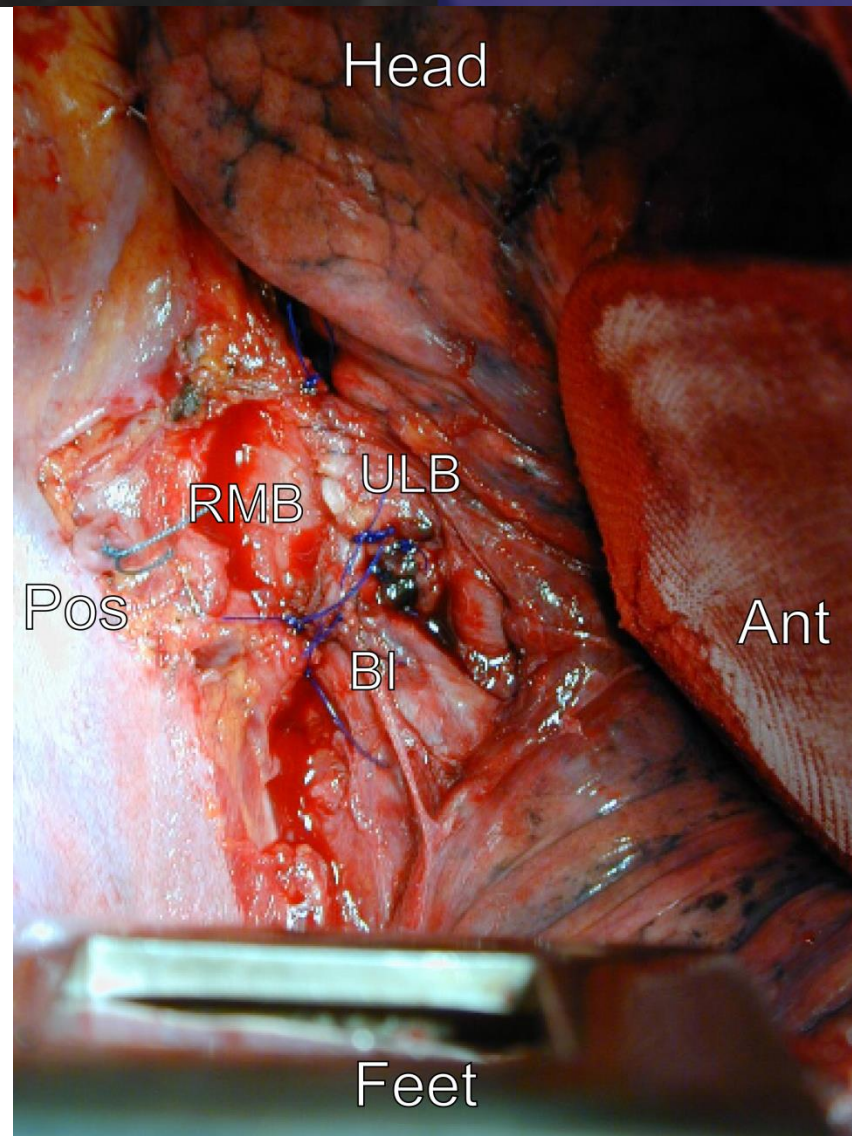












# Advanced disease

- N2 disease
- Multifocal disease / distant metastases
- Recurrent disease

# Test performance of PET-CT for mediastinal lymph node staging of pulmonary carcinoid tumours

Holly A. Pattenden<sup>1</sup>, Emma Beddow<sup>1</sup>, Michael Dusmet<sup>1</sup>, Andrew G. Nicholson<sup>1</sup>, Iyer Swetha<sup>2</sup>, Adrian Marchbank<sup>2</sup>, Amy Greenwood<sup>3</sup>, Doug West<sup>3</sup>, Priyadharshanan Ariyaratnam<sup>4</sup>, Mahmoud Loubani<sup>4</sup>, Felice Granato<sup>5</sup>, Alan Kirk<sup>5</sup> and Eric Lim<sup>1</sup> on behalf of the UK Thoracic Surgery Collaborative

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<sup>2</sup>Department of Cardiothoracic Surgery, Derriford Hospital, Plymouth

<sup>3</sup>Department of Cardiothoracic Surgery, Bristol Royal Infirmary, University Hospitals Bristol NHS Trust, Bristol

<sup>4</sup>Department of Cardiothoracic Surgery, Castle Hill Hospital, Hull

<sup>5</sup>West of Scotland Regional Heart & Lung Centre, Golden Jubilee National Hospital, Glasgow

# Results

- From November 1999 to May 2012
  - 153 patients
  - 5 institutions
  - underwent surgery for a carcinoid tumour with a corresponding preoperative PET-CT scan.
- The mean SUV in the primary tumour was 4.9 (SD 5).

**Table 1. Baseline Characteristics**

Sample size (n)	153
Mean age, years (SD)	60 (16)
Males, n (%)	67 (44)
Mean tumour max size, mm (SD)	25 (13)
Stage, n (%)	
Ia	82 (59)
Ib	24 (17)
IIa	19 (14)
IIb	5 (4)
IIIa	9 (6)
IIIb	0
IV	0
Histology	
Typical, n (%)	138 (90)
Atypical, n (%)	15 (10)

# Results

Pathology result	PET result		
	Positive	Negative	Total
Abnormal	2	3	5
Normal	8	112	120
Total	10	115	125

- Results from lymph node dissection obtained in 125 patients
- Sensitivity was 40% (95% CI 5-85%)
- Specificity was 93% (87-97%)

## Clinical utility of PET/CT in staging

- PET-CT has a poor sensitivity (to rule out) but good specificity (to rule in) for mediastinal lymph node metastases for pulmonary carcinoid tumours.
- Lymph node metastases cannot accurately be ruled out in patients with a negative PET-CT
- If treatment decisions are based on the N2 status, invasive mediastinal staging should be undertaken as part of the work up for radical management



# Advanced disease

- N2 disease
  - Anatomic resection and systematic nodal dissection
- Multifocal disease / distant metastases
  - Radical management with surgery as part of multimodality treatment if
    - All sites can be treated radically
    - Patients accepts risk / willing to accepts risks of treatment
- Recurrent disease
  - Stage - treat along the same principal as a new lesion
  - Fitness - particular attention to lung function and operative risk



## High risk patient

- Endobronchial control
  - Endobronchial ablation
  - Stenting
- Local control
  - Radiotherapy
  - Radiofrequency ablation



# Atypical carcinoids

# Atypical carcinoid

- Behaviour is more like routine non-small cell lung cancer
- Acceptable risk for surgery
  - Anatomic resection
    - Lobectomy, segmentectomy, pneumonectomy
- Unacceptable risk for surgery
  - Local treatment
    - Radiotherapy (e.g. SABR)
    - Radiofrequency ablation

## ATYPICAL CARCINOID TUMORS OF THE LUNG: PROGNOSTIC FACTORS AND PATTERNS OF RECURRENCE

MA Cañizares<sup>1</sup>, JM Matilla<sup>2</sup>, A Cueto<sup>3</sup>, J Algar<sup>4</sup>, I Muguruza<sup>5</sup>, N Moreno-Mata<sup>6</sup>, R Moreno-Balsalobre<sup>7</sup>, R Guijarro<sup>8</sup>, R Arrabal<sup>9</sup>, E Garcia-Fontán<sup>1</sup>, A Gonzalez-Piñeiro<sup>1</sup>, M Garcia-Yuste<sup>2</sup>, and EMETNE-SEPAR Members<sup>10</sup>.

From the 1082 patients affected by a neuroendocrine lung tumor registered in our database in December 2009, 127 corresponded to an AC.

Finally, prognostic effect of adjuvant ChT was analyzed. Patients who underwent adjuvant ChT did not present any statistical differences regarding to survival and recurrence ( $p=0,327$  and  $p=0,294$ , respectively) (Table 4). When entered into a multivariate analysis, ChT was not considered into the model for survival ( $p=0.632$ ; HR=0.740; 95% CI for HR: 0.215, 2.540) nor loco-regional recurrence ( $p=0.450$ ; HR=2.027; 95% CI for HR: 0.324, 12.682).

Unpublished data courtesy of Canizares et al

# Advanced disease

- N2 disease
  - ?
- Multifocal disease / distant metastases
  - ?
- Recurrent disease
  - Stage - treat along the same principal as a new lesion
  - Fitness - particular attention to lung function and operative risk

# ENET guidelines for surgery - recommendations

## Typical carcinoid (T1-4 N0-2 M0)

- Acceptable risk for surgery
  - Central disease
    - Lung sparing surgery
  - Peripheral disease
    - Anatomic resection (lobectomy, segmentectomy, pneumonectomy)
- Unacceptable risk for surgery
  - Local treatment
    - Central disease
      - Endobronchial resection
    - Peripheral disease
      - Radiotherapy (e.g. SABR)
      - Radiofrequency ablation
  - Systemic treatment
    - Chemotherapy



## Atypical carcinoid (T1-4 N0-2 M0)

- Acceptable risk for surgery
  - Anatomic resection
    - Lobectomy, segmentectomy, pneumonectomy
  - Adjuvant treatment
    - Consider adjuvant chemotherapy for node positive patients
- Unacceptable risk for surgery
  - Local treatment
    - Radiotherapy (e.g. SABR)
    - Radiofrequency ablation
  - Systemic treatment
    - Chemotherapy



Thank you!