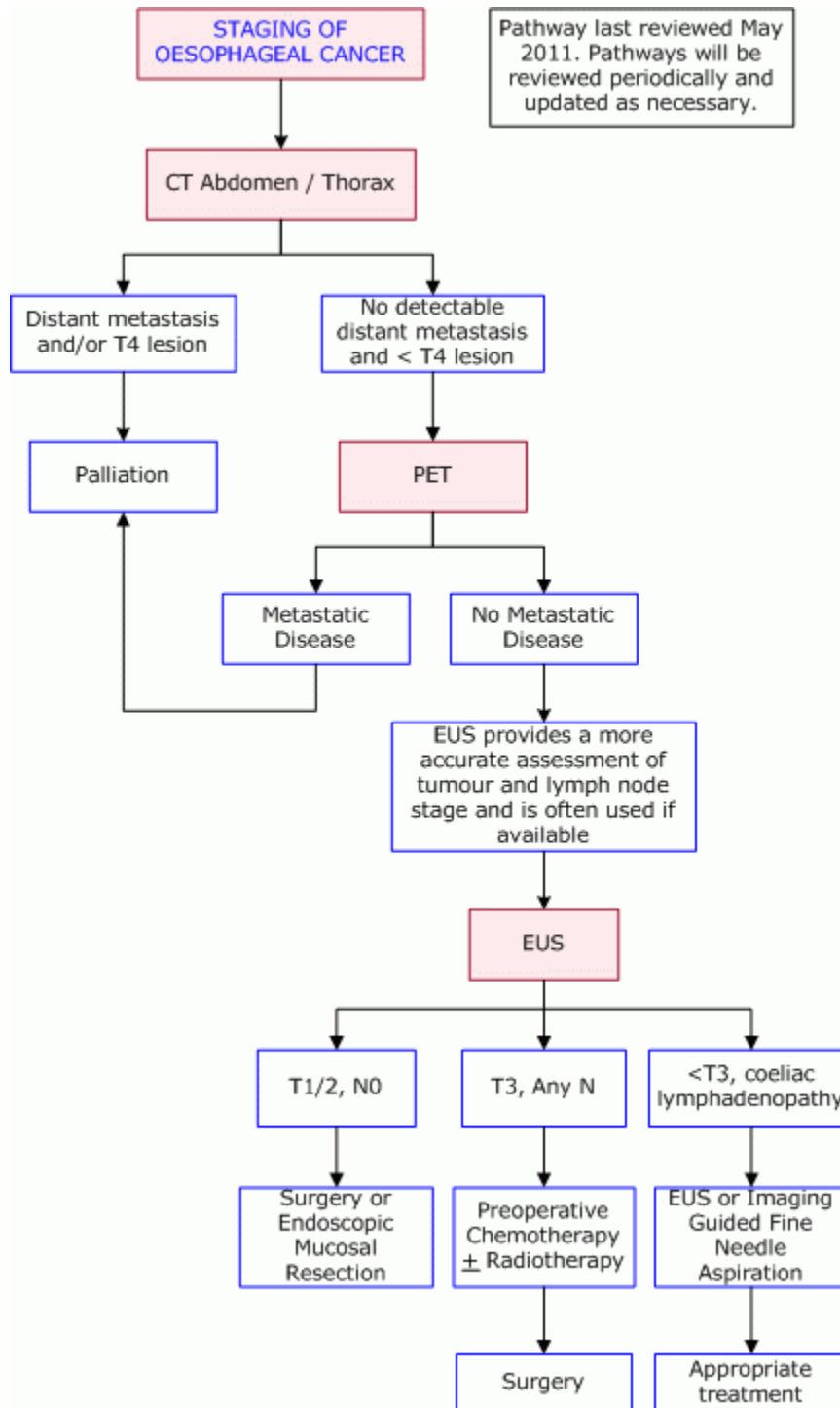




## DIAGNOSTIC IMAGING PATHWAYS

[www.imagingpathways.health.wa.gov.au](http://www.imagingpathways.health.wa.gov.au)



## OESOPHAGEAL CANCER STAGING

- Accurate staging of cancer is important for prognostication and directing further therapy. The most common staging system used for oesophageal malignancy is the American Joint Committee on Cancer tumour-node-metastases (AJCC TNM) score. [1](#)
- Primary Tumour (T) stages:
  - T0 - No evidence of primary tumour
  - Tis - High grade dysplasia
  - T1 - Tumour invades lamina propria or submucosa
  - T2 - Tumour invades muscularis propria
  - T3 - Tumour invades adventitia
  - T4a - Resectable tumour invades adjacent structures (eg. Pleura, pericardium, diaphragm)
  - T4b - Unresectable tumour invades adjacent structures (eg. Aorta, vertebral body, trachea)
- Regional Lymph Node (N) stages:
  - A regional lymph node is defined as any perioesophageal lymph node from the cervical nodes to the celiac node.
  - N0 - No regional lymph node metastases
  - N1 - 1-2 positive regional lymph nodes
  - N2 - 3-6 positive regional lymph nodes
  - N3 -  $\geq 7$  positive regional lymph nodes
- Metastases stages:
  - M0 - No distant metastases
  - M1 - Distant metastases

Stage	Tumour	Nodes	Metastases	Grade	Location
IA	1	0	0	1	Any
IB	1	0	0	2-3	Any
	2-3	0	0	1	Lower
IIA	2-3	0	0	1	Upper/middle
	2-3	0	0	2-3	Lower
IIB	2-3	0	0	2-3	Upper/middle
	1-2	1	0	Any	Any
IIIA	1-2	2	0	Any	Any
	3	1	0	Any	Any
	4a	0	0	Any	Any
IIIB	3	2	0	Any	Any
IIIC	4a	1-2	0	Any	Any
	4b	Any	0	Any	Any
	Any	3	0	Any	Any
IV	Any	Any	1	Any	Any

- Plain chest radiographs can be used to screen for pulmonary or mediastinal disease. [2](#)

## COMPUTED TOMOGRAPHY

- Initial staging test of choice for oesophageal cancer. [2,3](#)
- Useful for exclusion of T4 oesophageal cancers, as demonstrated by the preservation of fat planes between the oesophageal cancer and adjacent structures. [4](#)
- If CT shows advanced local disease or distant metastases, no further staging is required, as palliative treatment is the only option. [5](#)
- Limitations: less sensitive in differentiating the layer of the oesophageal wall (T status) or accurately assessing regional lymph node disease (N status). Therefore, if there is no

evidence of metastatic disease on CT, endoscopic ultrasound should be performed to achieve the most accurate regional staging. [2,6,7](#)

## ENDOSCOPIC ULTRASOUND (EUS)

- Most accurate non-invasive method for locoregional staging of oesophageal cancer. [8](#)
- Indicated in patients with oesophageal cancer in whom a CT scan has ruled out T4 and M1 disease. [4](#)
- Limitations: [8](#)
  - Incomplete examinations due to impassable stenosing tumours (which may be overcome by the use of recently available "miniproboscopes"). [9](#)
  - Difficulties with specificity for nodal involvement (reactive versus malignant). However, it can be overcome by the ability to combine fine-needle aspiration with EUS, allowing histological verification of identified lymph nodes (eg. coeliac lymph nodes). [10](#)
  - Note: suspicion of tracheo-bronchial involvement may require bronchoscopy or bronchoscopic ultrasonography. [11](#)

## POSITRON EMISSION TOMOGRAPHY (PET)

- Useful for detecting radiographically occult distant metastatic disease. [12-15](#)
- Sensitivity for diagnosing distant metastatic disease is 67%, with a specificity of 97%. [20](#) It is more accurate compared to the combination of CT and EUS. [12-19](#)
- Improves diagnostic specificity for lymph node staging. [16,17,19,20](#)
- Findings on PET have been shown to be of prognostic value independent of TNM stage. [21,22](#)
- Co-registration of PET and CT images using PET/CT systems may be more accurate than PET alone. [23](#)
- Limitations: [12-17](#)
  - Inability to determine T stage of the oesophageal tumour.
  - Inaccurate in the detection of local lymph node metastases.
  - Lack of anatomical detail.
  - Expensive and limited availability.

## TEACHING POINTS

- Staging of oesophageal malignancy is aimed at assessing the extent of local invasion of the primary tumour and the for the presence or absence of nodal/distal metastatic disease
- CT of the abdomen and chest are suitable initial staging modalities
- If these initial investigations demonstrate a lesion that is amenable to potential curative resection further staging should include a PET scan.
- If a PET scan shows no distal metastatic disease, Endoscopic US (EUS) is indicated for local staging.

## REFERENCES

1. The New TNM classification in gastroenterology (1997). Endoscopy 1998;30(7):643-9.
2. Lightdale CJ. American College of Gastroenterology: Practice guidelines. Esophageal Cancer. Am J Gastroenterology 1999;94:20-9.

3. Hadzijahic N, Wallace MB, Hawes RH, et al. **CT or EUS for the initial staging of oesophageal cancer? A cost minimisation analysis.** *Gastrointestinal Endoscopy* 2000;52:715-20.
4. Rice TW. **Clinical staging of esophageal carcinoma: CT, EUS, and PET.** *Chest Surg Clin of North America* 2000;10(3):471-85.
5. Fockens P, Kisman K, Merksu MP, et al. **The prognosis of oesophageal carcinoma staged irresectable (T4) by endosonography.** *J Am Coll Surg* 1998;186:17-23.
6. Botet JF, Lightdale CJ, Zauber AG, et al. **Preoperative staging of oesophageal cancer: comparison of endoscopic US and dynamic CT.** *Radiology* 1991;181:419-25. (Level II/III evidence)
7. Vilgrain V, Mompoin D, Palazzo L, et al. **Staging of Esophageal carcinoma: comparison of results with endoscopic sonography and CT.** *AJR* 1990;155:277-81. (Level II evidence). [Click here to view reference](#)
8. Kelly S, Harris KM, Berry E, et al. **A systematic review of the staging performance of endoscopic ultrasound in gastro-oesophageal carcinoma.** *Gut* 2001;49:534-9. (Level II evidence). [Click here to view reference](#)
9. Bowrey DJ, Clark GWB, Roberts SA, et al. **Endosonographic staging of 100 consecutive patients with esophageal carcinoma: introduction of the 8-mm esophagoprobe.** *Diseases of the Esophagus* 1999;12:258-63. (Level II evidence). [Click here to view reference](#)
10. Vazquez-Sequeiros E, Norton ID, Clain JE, et al. **Impact of EUS-guided fine needle aspiration on lymph node staging in patients with oesophageal carcinoma.** *Gastrointestinal Endoscopy* 2001;53:751-7. (Level III evidence)
11. Nishimura Y, Osugi H, Inoue K, et al. **Bronchoscopic ultrasonography in the diagnosis of tracheobronchial invasion of esophageal cancer.** *J Ultrasound Med* 2002;21:49-58. (Level II/III evidence)
12. Block MI, Patterson GA, Sundaresan RS, et al. **Improvement in staging of oesophageal cancer with the addition of positron emission tomography.** *Ann Thorac Surg* 1997;64:770-7. (Level II/III evidence)
13. Luketich JD, Schauer PR, Meltzer CC, et al. **Role of positron emission tomography in staging oesophageal cancer.** *Ann Thorac Surg* 1997;64:765-9. (Level III evidence)
14. Kole AC, Plukker JT, Nieweg OE, et al. **Positron emission tomography for staging of oesophageal and gastroesophageal malignancy.** *Br J Cancer* 1998;78:521-7.
15. Luketich JD, Friedman DM, Weigel TL, et al. **Evaluation of distant metastases in esophageal cancer: 100 consecutive positron emission tomography scans.** *Ann Thorac Surg* 1999;68:1133-7.
16. Flamen P, Lerut A, van Custem E, et al. **Utility of positron emission tomography for the staging of patients with potentially operable esophageal carcinoma.** *J Clin Oncology* 2000;18(18):3202-10. (Level II/III evidence)
17. Meltzer CC, Luketich JD, Friedman D, et al. **Whole-body FDG positron emission tomographic imaging for staging esophageal cancer: comparison with computed tomography.** *Clinical Nuclear Medicine* 2000;25(11):882-7. (Level III evidence)
18. Lerut T, Flamen P, Ectors N, et al. **Histopathologic validation of lymph node staging with FDG-PET scan in cancer of the esophagus and gastroesophageal junction: A prospective study based on primary surgery with extensive lymphadenectomy** *Ann Surg* 2000;232:743-52. (Level II evidence). [Click here to view reference](#)
19. Kato H, Miyazaki T, Nakajima M et al. **The incremental effect of positron emission tomography on diagnostic accuracy in the initial staging of esophageal carcinoma.** *Cancer* 2005; 103:148-156. (Level II evidence)
20. Van Westreenen HL, Westerterp M, Bossuyt PM et al. **Systematic review of the staging performance of 18F-fluorodeoxyglucose positron emission tomography in esophageal cancer.** *J Clin Oncol* 2004; 22:3805-3812. (Level II evidence) [Click here to view reference](#)

21. Hong S, Lunagomez S, Kim EE et al. **Value of baseline positron emission tomography for predicting overall survival in patient with nonmetastatic esophageal or gastroesophageal junction carcinoma.** Cancer 2005; 104:1620-1626. (Level II evidence)
22. Choi JY, Jang HJ, Shim YM et al. **18F-FDG PET in patients with esophageal squamous cell carcinoma undergoing curative surgery: prognostic implications.** J Nucl Med 2004; 45:1843-1850. (Level II evidence)
23. Bar-Shalom R, Guralnik L, Tsalic M et al. **The additional value of PET/CT over PET in FDG imaging of oesophageal cancer.** Eur J Nucl Med Mol Imaging 2005; 32:918-924. (Level III evidence)

#### Website

For more information go to [www.imagingpathways.health.wa.gov.au](http://www.imagingpathways.health.wa.gov.au)

#### Copyright

© Copyright 2007, Department of Health Western Australia. All Rights Reserved.

This web site and its content has been prepared by The Department of Health, Western Australia. The information contained on this web site is protected by copyright.

#### Legal Notice

Please remember that this leaflet is intended as general information only. It is not definitive and The Department of Health, Western Australia can not accept any legal liability arising from its use. The information is kept as up to date and accurate as possible, but please be warned that it is always subject to change.

