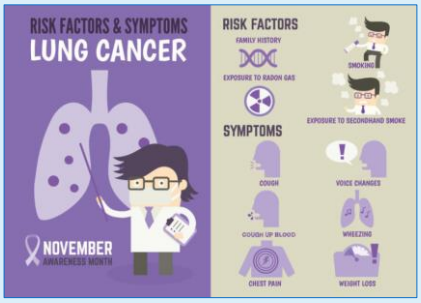
2018 Updates - Neoplasms of the Lung

2018-2019 FCDS Educational Webcast Series

Steven Peace, CTR

September 20, 2018



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- Attendees must take and pass a 3-5 question CEU Quiz to get CEUs
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- The CEU Quiz will be posted to FLccSC 1-2 hours after the webcast ends

FLccSC
Fundamental Learning Collaborative for the Cancer Surveillance Community

- Only registered FLccSC Users will be given access to the CEU Quiz
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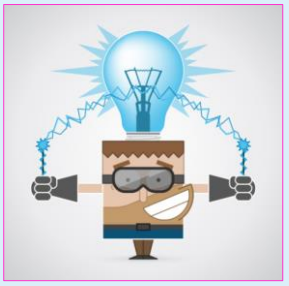

- Attendees can attend any of the live webcasts without receiving CEUs
- Recorded Sessions are also available for non-FLccSC Users – No CEUs

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Presentation Outline

- Overview of Neoplasms of the Lung
- Genetic, Clinical & Radiological Advances Since 2004
- 2015 WHO Classification of Lung Tumors
- 2018 ICD-O-3 Lung Histology Codes
- 2018 CAP Protocols for Lung
- Biomarkers and Genetics
- 2018 MP/H Lung Rules
- Anatomy of the Thorax – Lung & Pleura
- 2018 Anatomic Staging – SS2018 & AJCC TNM
- 2018 Non-Anatomic Site-Specific Data Items (SSDI)
- Lung Cancer Primary Treatment Options
- Importance of Text Documentation
- Practice Cases - *Pending*
- Questions

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Overview

Figure 3. Leading Sites of New Cancer Cases and Deaths – 2018 Estimates

Estimated New Cases

Male			Female		
Prostate	164,690	19%	Breast	266,120	30%
Lung & bronchus	121,680	14%	Lung & bronchus	112,350	13%
Colon & rectum	75,610	9%	Colon & rectum	64,640	7%
Urinary bladder	62,380	7%	Uterine corpus	63,230	7%
Melanoma of the skin	55,150	6%	Thyroid	40,900	5%
Kidney & renal pelvis	42,680	5%	Melanoma of the skin	36,120	4%
Non-Hodgkin lymphoma	41,730	5%	Non-Hodgkin lymphoma	32,950	4%
Oral cavity & pharynx	37,160	4%	Pancreas	26,240	3%
Leukemia	35,030	4%	Leukemia	25,270	3%
Liver & intrahepatic bile duct	30,610	4%	Kidney & renal pelvis	22,660	3%
All sites	856,370	100%	All sites	878,980	100%

Estimated Deaths

Male			Female		
Lung & bronchus	83,550	26%	Lung & bronchus	70,500	25%
Prostate	29,430	9%	Breast	40,920	14%
Colon & rectum	27,390	8%	Colon & rectum	23,240	8%
Pancreas	23,020	7%	Pancreas	21,310	7%
Liver & intrahepatic bile duct	20,540	6%	Ovary	14,070	5%
Leukemia	14,270	4%	Uterine corpus	11,350	4%
Esophagus	12,850	4%	Leukemia	10,100	4%
Urinary bladder	12,520	4%	Liver & intrahepatic bile duct	9,660	3%
Non-Hodgkin lymphoma	11,510	4%	Non-Hodgkin lymphoma	8,400	3%
Kidney & renal pelvis	10,010	3%	Brain & other nervous system	7,340	3%
All sites	323,630	100%	All sites	286,010	100%

Estimates are rounded to the nearest 10, and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Ranking is based on modeled projections and may differ from the most recent observed data.

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Overview

Table 1. Estimated Number* of New Cancer Cases and Deaths by Sex, US, 2018

	Estimated New Cases			Estimated Deaths		
	Both sexes	Male	Female	Both sexes	Male	Female
All sites	1,735,350	856,370	878,980	609,640	323,630	286,010
Oral cavity & pharynx	51,540	37,160	14,380	10,030	7,280	2,750
Tongue	17,110	12,490	4,620	2,510	1,750	760
Mouth	13,580	7,980	5,600	2,650	1,770	880
Pharynx	17,590	14,250	3,340	3,230	2,480	750
Other oral cavity	3,260	2,440	820	1,640	1,280	360
Digestive system	319,160	181,960	137,200	160,820	94,230	66,590
Esophagus	17,290	13,480	3,810	15,850	12,850	3,000
Stomach	26,240	16,520	9,720	10,800	6,510	4,290
Small intestine	10,470	5,430	5,040	1,450	810	640
Colon†	97,220	49,690	47,530	50,630	27,390	23,240
Rectum	43,030	25,920	17,110			
Anus, anal canal, & anorectum	8,580	2,960	5,620	1,160	480	680
Liver & intrahepatic bile duct	42,220	30,610	11,610	30,200	20,540	9,660
Gallbladder & other biliary	12,190	5,450	6,740	3,790	1,530	2,260
Pancreas	55,440	29,200	26,240	44,330	23,020	21,310
Other digestive organs	6,480	2,700	3,780	2,610	1,100	1,510
Respiratory system	253,290	136,400	116,890	158,770	87,200	71,570
Larynx	13,150	10,490	2,660	3,710	2,970	740
Lung & bronchus	234,030	121,680	112,350	154,050	83,550	70,500
Other respiratory organs	6,110	4,230	1,880	1,010	680	330

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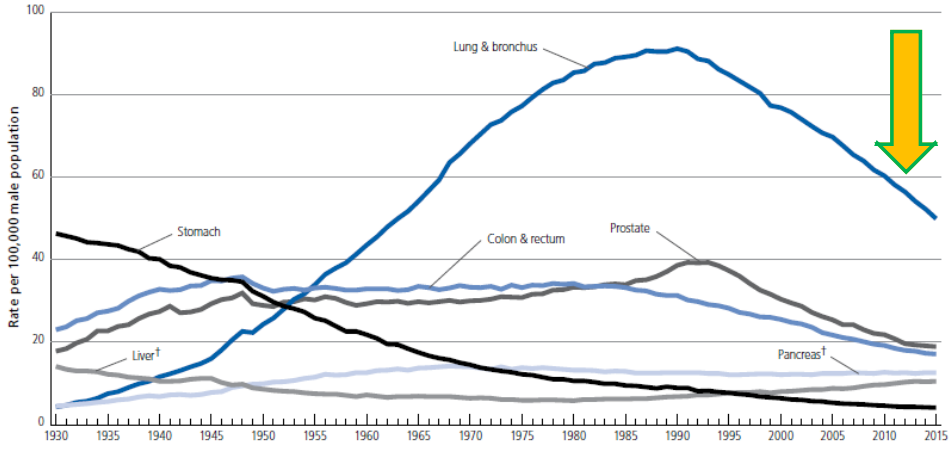
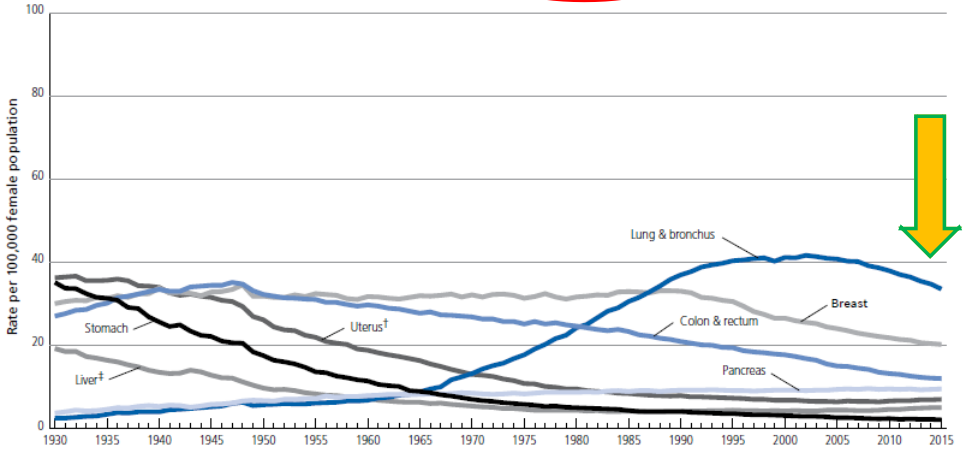
Figure 1. Trends in Age-adjusted Cancer Death Rates* by Site, Males, US, 1930-2015



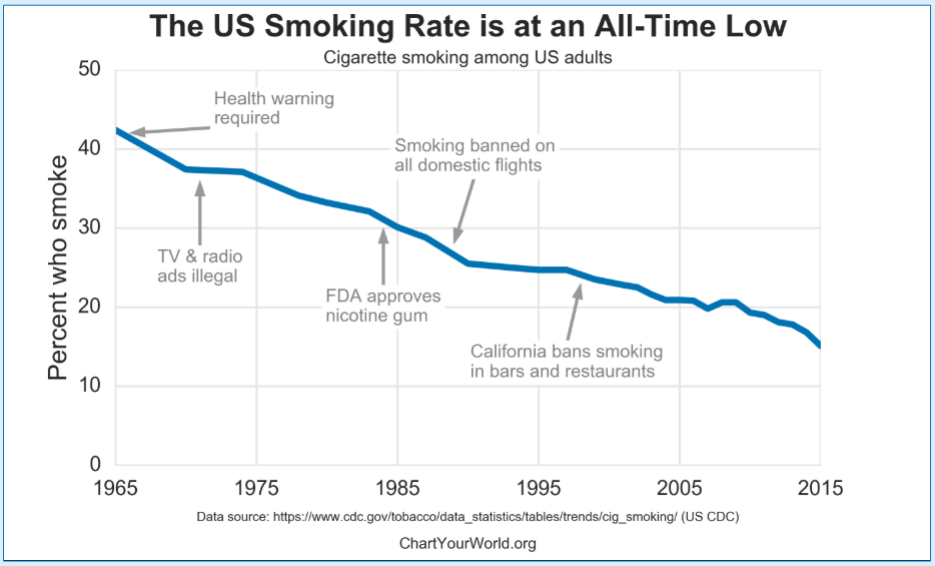
*Age adjusted to the 2000 US standard population. †Mortality rates for pancreatic and liver cancers are increasing.
Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver, lung and bronchus, colon and rectum, and uterus are affected by these coding changes.
Source: US Mortality Volumes 1930 to 1959, US Mortality Data 1960 to 2015, National Center for Health Statistics, Centers for Disease Control and Prevention.

Figure 2. Trends in Age-adjusted Cancer Death Rates* by Site, Females, US, 1930-2015

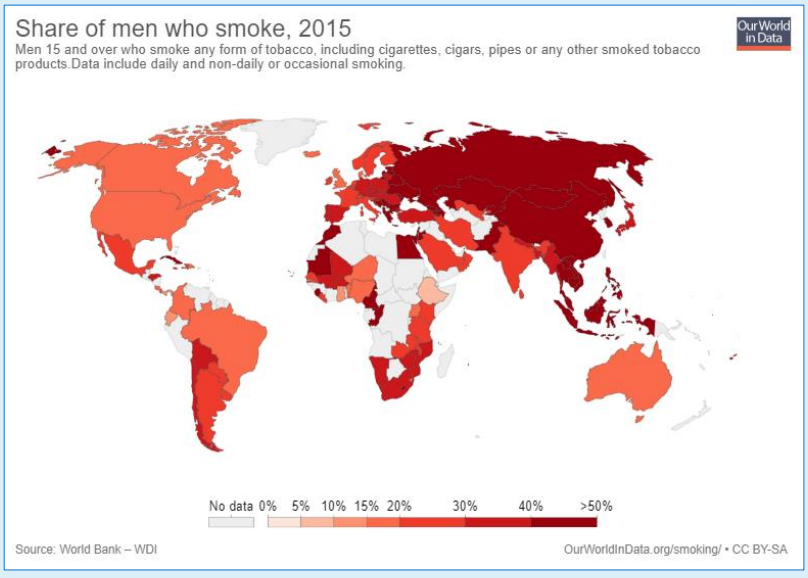


*Age adjusted to the 2000 US standard population. †Uterus refers to uterine cervix and uterine corpus combined. ‡The mortality rate for liver cancer is increasing.
Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver, lung and bronchus, colon and rectum, and uterus are affected by these coding changes.
Source: US Mortality Volumes 1930 to 1959, US Mortality Data 1960 to 2015, National Center for Health Statistics, Centers for Disease Control and Prevention.

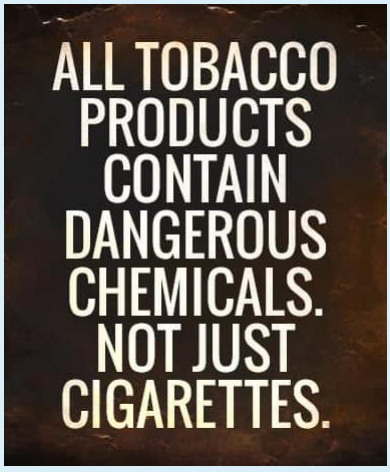
United States Smoking Rates



World Smoking Rates



Dangerous Chemicals in All Tobacco



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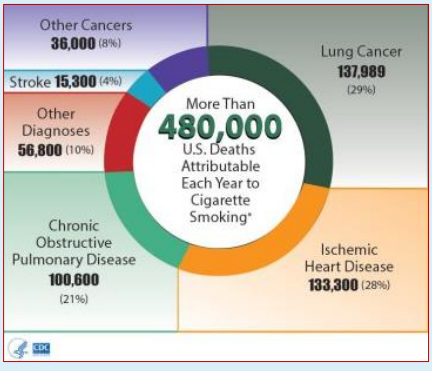
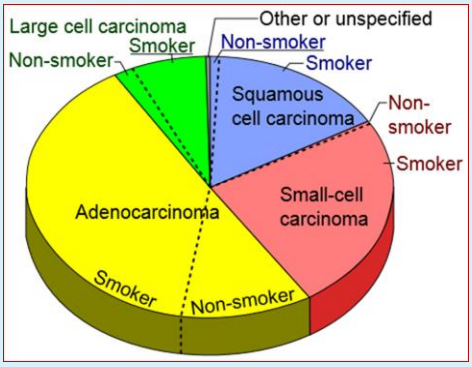
Association with Smoking





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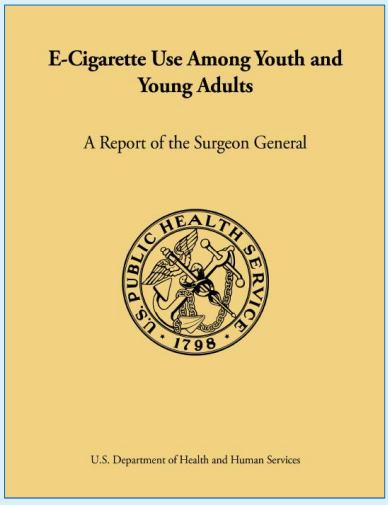
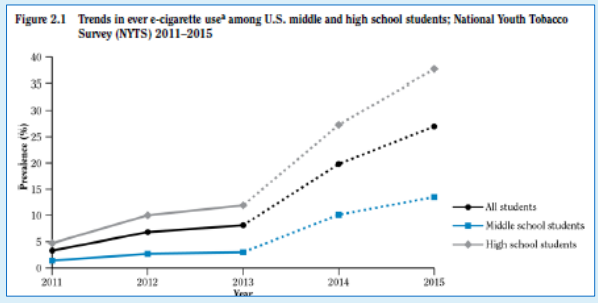
Kenfield SA, Wei EK, Stampfer MJ, Rosner BA, Colditz GA (2008), Tobacco Control 17 (3): 198-204

E-Cigarette Use



Florida Registrars
Code E-Cigarettes in Field
✓ Tobacco Use, NOS



U.S. Department of Health and Human Services. E-Cigarette Use Among Youth and Young Adults. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016.

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E-Cigarette Use

- E-cigarettes have only been readily available in the United States since 2006. As a result, there's limited research on their health risks.
- Question Remains: Are e-cigarettes safer than smoking?
- People who use e-cigarettes while still smoking do not reduce the levels of toxic chemicals they were exposed to. And, a large number of e-cigarette users do still smoke.
- "The full benefit of using e-cigarettes is from completely stopping smoking," says Shahab. "Any health benefits come from dramatic reductions in these chemicals, and we're not seeing this in people that use both e-cigarettes and combustible cigarettes."
- And although this study found significantly lower levels of these substances in vapers than smokers, the chemicals are still there.
- Does this study confirm that e-cigarettes are safer than smoking. Concerns remain…
- Why? E-cigarettes do not contain tobacco. Instead, they carry a nicotine-containing liquid which is heated into a vapour and breathed in. The nicotine satisfies the cravings associated with a smoking addiction, but doesn't cause cancer…or does it?

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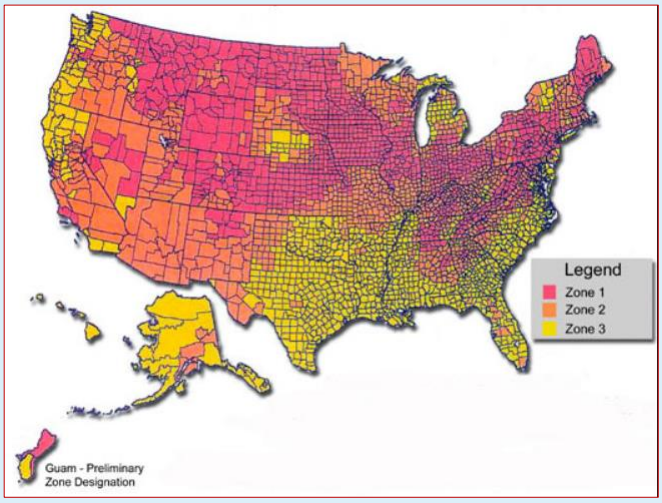
Radon Gas



Source: United States Environmental Protection Agency (EPA)

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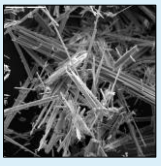
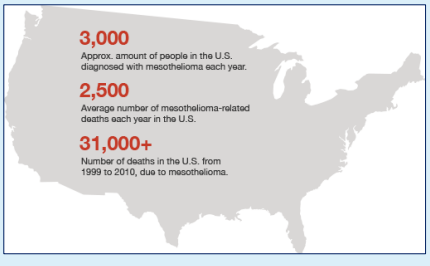
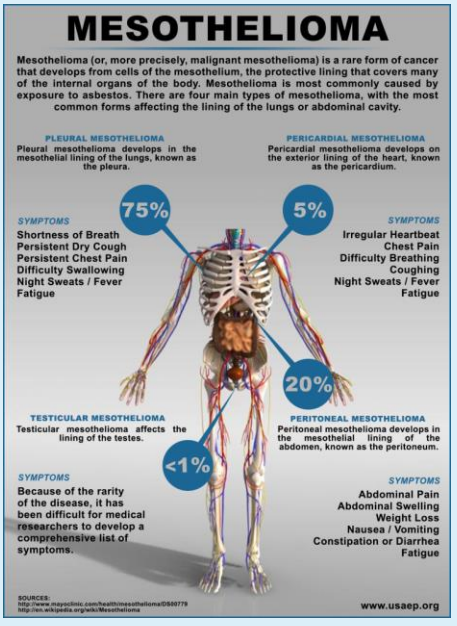
Mesothelioma (just a mention)







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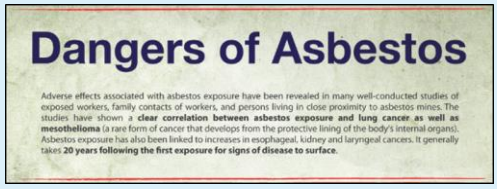
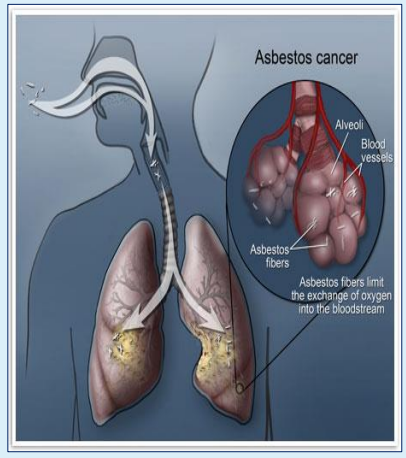
Sources: http://www.mesothelioma.com and http://www.usaep.org



Asbestos



http://www.mesothelioma.com/asbestos-cancer

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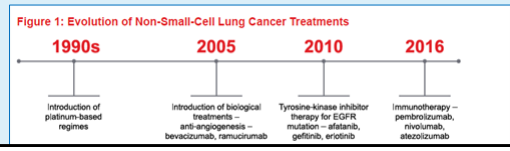
Genetic, Clinical & Radiological Advances
Since 2004

- Imaging Advances (CT, PET, PET/CT, MRI, Ultrasound) have led to improved staging
- Lung Cancer Screening – low dose CT scan (LDCT) for high risk patients
- Immunohistochemistry: sputum, FNA, Gene Expression Analysis, Next Generation Genetics
- Genetics: EGFR, KRAS, MET, LKB1, BRAF, PIK3CA, ALK, RET, and ROS1
- The seminal discovery that epidermal growth factor receptor (EGFR) activating mutations are putative drivers and predict response to EGFR tyrosine kinase inhibitors (TKIs) in patients with NSCLC paved the way for development of targeted therapeutics based on molecular testing.
- Immune checkpoint inhibition in lung cancer – PD-L1 Inhibitors (nivolumab)
- Treatment Advances – Chemotherapy, Biologicals, Gene Targets, Immunotherapy



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2015 WHO Classification of Lung Tumors

STATE OF THE ART: CONCISE REVIEW

The 2015 World Health Organization Classification of Lung Tumors

Impact of Genetic, Clinical and Radiologic Advances Since the 2004 Classification

William D. Travis, MD, Elisabeth Brambilla, MD,† Andrew G. Nicholson, MD,‡ Yasushi Yatabe, MD,§ John H. M. Austin, MD,‖ Mary Beth Beasley, MD,¶ Lucian. R. Chirieac, MD,# Sanja Dacic, MD,** Edwina Duhig, MD,†† Douglas B. Flieder, MD,‡‡ Kim Geisinger, MD,§§ Fred R. Hirsch, MD,‖‖ Yuichi Ishikawa, MD,¶¶ Keith M. Kerr, MD,## Masayuki Noguchi, MD,*** Giuseppe Pelosi, MD,††† Charles A. Powell, MD,‡‡‡ Ming Sound Tsao, MD,§§§ and Ignacio Wistuba, MD,‖‖‖*
On Behalf of the WHO Panel

Abstract: The 2015 World Health Organization (WHO) Classification of Tumors of the Lung, Pleura, Thymus and Heart has just been published with numerous important changes from the 2004 WHO classification. The most significant changes in this edition involve (1) use of immunohistochemistry throughout the classification, (2) a new emphasis on genetic studies, in particular, integration of molecular testing to help personalize treatment strategies for advanced lung cancer patients, (3) a new classification for small biopsies and cytology similar to that proposed in the 2011 Association for the Study of Lung Cancer/American Thoracic Society/European Respiratory Society classification, (4) a completely different approach to lung adenocarcinoma as proposed by the 2011 Association for the Study of Lung Cancer/American Thoracic Society/European Respiratory Society classification, (5) restricting the diagnosis of large cell carcinoma only to resected tumors that lack any clear morphologic or immunohistochemical differentiation with reclassification of the remaining former

2015 WHO Classification of Lung Tumors

TABLE 1. 2015 WHO Classification of Lung Tumors[a,b,c]

Histologic Type and Subtypes	ICDO Code
Epithelial tumors	
Adenocarcinoma	8140/3
Lepidic adenocarcinoma[d]	8250/3[d]
Acinar adenocarcinoma	8551/3[d]
Papillary adenocarcinoma	8260/3
Micropapillary adenocarcinoma[d]	8265/3
Solid adenocarcinoma	8230/3
Invasive mucinous adenocarcinoma[d]	8253/3[d]
Mixed invasive mucinous and nonmucinous adenocarcinoma	8254/3[d]
Colloid adenocarcinoma	8480/3
Fetal adenocarcinoma	8333/3
Enteric adenocarcinoma[d]	8144/3
Minimally invasive adenocarcinoma[d]	
Nonmucinous	8256/3[d]
Mucinous	8257/3[d]
Preinvasive lesions	
Atypical adenomatous hyperplasia	8250/0[d]
Adenocarcinoma in situ[d]	
Nonmucinous	8250/2[d]
Mucinous	8253/2[d]
Squamous cell carcinoma	8070/3
Keratinizing squamous cell carcinoma[d]	8071/3
Nonkeratinizing squamous cell carcinoma[d]	8072/3
Basaloid squamous cell carcinoma[d]	8083/3
Preinvasive lesion	
Squamous cell carcinoma in situ	8070/2

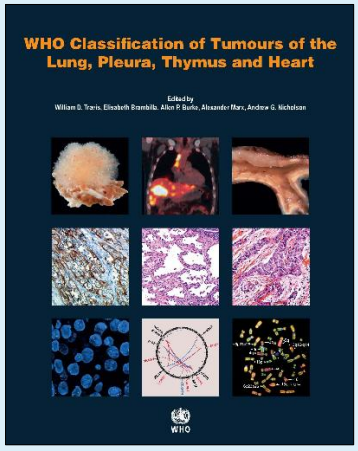
TABLE 1. (*Continued*)

Histologic Type and Subtypes	ICDO Code
Papillomas	
Squamous cell papilloma	8052/0
Exophytic	8052/0
Inverted	8053/0
Glandular papilloma	8260/0
Mixed squamous and glandular papilloma	8560/0
Adenomas	
Sclerosing pneumocytoma[d]	8832/0
Alveolar adenoma	8251/0
Papillary adenoma	8260/0
Mucinous cystadenoma	8470/0
Mucous gland adenoma	8480/0
Mesenchymal tumors	
Pulmonary hamartoma	8992/0[d]
Chondroma	9220/0
PEComatous tumors[d]	
Lymphangioleiomyomatosis	9174/1
PEComa, benign[d]	8714/0
Clear cell tumor	8005/0
PEComa, malignant[d]	8714/3
Congenital peribronchial myofibroblastic tumor	8827/1
Diffuse pulmonary lymphangiomatosis	
Inflammatory myofibroblastic tumor	8825/1
Epithelioid hemangioendothelioma	9133/3
Pleuropulmonary blastoma	8973/3
Synovial sarcoma	9040/3
Pulmonary artery intimal sarcoma	9137/3
Pulmonary myxoid sarcoma with *EWSR1–CREB1* translocation[d]	8842/3[d]
Myoepithelial tumors[d]	
Myoepithelioma	8982/0
Myoepithelial carcinoma	8982/3
Lymphohistiocytic tumors	
Extranodal marginal zone lymphomas of mucosa-associated Lymphoid tissue (MALT lymphoma)	9699/3
Diffuse large cell lymphoma	9680/3
Lymphomatoid granulomatosis	9766/1
Intravascular large B cell lymphoma[d]	9712/3
Pulmonary Langerhans cell histiocytosis	9751/1
Erdheim–Chester disease	9750/1
Tumors of ectopic origin	
Germ cell tumors	
Teratoma, mature	9080/0
Teratoma, immature	9080/1
Intrapulmonary thymoma	8580/3
Melanoma	8270/3
Meningioma, NOS	9530/0
Metastatic tumors	
Neuroendocrine tumors	
Small cell carcinoma	8041/3
Combined small cell carcinoma	8045/3
Large cell neuroendocrine carcinoma	8013/3
Combined large cell neuroendocrine carcinoma	8013/3
Carcinoid tumors	
Typical carcinoid tumor	8240/3
Atypical carcinoid tumor	8249/3
Preinvasive lesion	
Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia	8040/0[d]
Large cell carcinoma	8012/3
Adenosquamous carcinoma	8560/3
Sarcomatoid carcinomas	
Pleomorphic carcinoma	8022/3
Spindle cell carcinoma	8032/3
Giant cell carcinoma	8031/3
Carcinosarcoma	8980/3
Pulmonary blastoma	8972/3
Other and Unclassified carcinomas	
Lymphoepithelioma-like carcinoma	8082/3
NUT carcinoma[d]	8023/3[d]
Salivary gland-type tumors	
Mucoepidermoid carcinoma	8430/3
Adenoid cystic carcinoma	8200/3
Epithelial-myoepithelial carcinoma	8562/3
Pleomorphic adenoma	8940/0

(*Continued*)

[a]The morphology codes are from the ICDO.[3] Behavior is coded /0 for benign tumors, /1 for unspecified, borderline or uncertain behavior, /2 for carcinoma in situ and grade III intraepithelial neoplasia, and /3 for malignant tumors.
[b]The classification is modified from the previous WHO classification[4] taking into account changes in our understanding of these lesions.
[c]This table is reproduced from the 2015 WHO Classification by Travis et al.[1]
[d]These new codes were approved by the International Agency on Cancer Research/WHO Committee for ICDO.
[e]New terms changed or entities added since 2004 WHO Classification.[3]
LCNEC, large cell neuroendocrine carcinoma, WHO, World Health Organization; ICDO International Classification of Diseases for Oncology.

2015 WHO Classification of Tumours of Lung, Pleura, Thymus & Heart, 4th ed.



Highlights

- Multi-Disciplinary Correlation
- Invasive Neoplasm classified according to predominant subtype
- Stop Using the Term “BAC” and “bronchio-alveolar carcinoma”
- Replace BAC with 5 new adenocarcinoma subtypes
  - Add “in situ” classification
  - Add “minimally invasive”
- Add genetic test/markers
  - EGFR, Alk, KRAS, TTF-1, p40
- SCC with minor changes

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Small Biopsy and Cytology Specimens

TABLE 3. Diagnostic Terminology for Small Biopsy/Cytology Compared with the 2015 WHO Terms in Resection Specimens with Small Cell Carcinoma, LCNEC, Adenosquamous Carcinoma, and Sarcomatoid Carcinoma[a]

Small Biopsy/Cytology Terminology/Criteria	2015 WHO Classification in Resections
Small cell carcinoma	Small cell carcinoma
NSCC with NE morphology and positive NE markers, possible LCNEC	LCNEC
NSCC with NE morphology If negative NE markers comment: This is a NSCC where LCNEC is suspected, but stains failed to demonstrate NE differentiation.	Large cell carcinoma with NE morphology (LCNEM)
Morphologic squamous cell and adenocarcinoma patterns present: NSCC, NOS Comment that adenocarcinoma and squamous components are present and this could represent adenosquamous carcinoma.	Adenosquamous carcinoma (if both components ≥10%)
Morphologic squamous cell or adenocarcinoma patterns not present but immunostains favor separate glandular and adenocarcinoma components: NSCC, NOS Specify the results of the immunohistochemical stains and the interpretation and comment this could represent adenosquamous carcinoma.	Adenocarcinoma, squamous cell carcinoma, adenosquamous carcinoma or large cell carcinoma with unclear immunohistochemical features
NSCC with spindle cell and/or giant cell carcinoma (mention if adenocarcinoma or squamous carcinoma are present)	Pleomorphic, spindle cell, and/or giant cell carcinoma

[a]Modified from the articles by Travis et al.[1,7,11]
LCNEC, large cell neuroendocrine carcinoma; NOS, not otherwise specified; NSCC, non–small cell carcinoma; NE, neuroendocrine; WHO, World Health Organization.

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Adenocarcinoma and BAC Changes

TABLE 4. Adenocarcinoma In Situ[a]

Diagnostic criteria

- A small tumor ≤3 cm[a]
- A solitary adenocarcinoma
- Pure lepidic growth
- No stromal, vascular or pleural invasion
- No pattern of invasive adenocarcinoma (such as acinar, papillary, micropapillary, solid, colloid, enteric, fetal or invasive mucinous adenocarcinoma).
- No spread through air spaces
- Cell type mostly nonmucinous (type II pneumocytes or Clara cells), rarely may be mucinous (tall columnar cells with basal nuclei and abundant cytoplasmic mucin, sometimes resembling goblet cells).
- Nuclear atypia is absent or inconspicuous
- Septal widening with sclerosis/elastosis is common, particularly in nonmucinous adenocarcinoma in situ

[a]Modified from the articles by Travis et al.[1,7,11]

In the 2015 WHO classification, the term "predominant" is not listed in the name for the major adenocarcinoma subtypes as it was in the 2011 classification.

However, these tumors still should be classified according to the predominant subtype after evaluation of the tumor using comprehensive histologic subtyping.

While it is theoretically possible to have equal percentages of two prominent components, in practice, a single predominant component should be chosen.

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Adenocarcinoma and BAC Changes

TABLE 5. Minimally Invasive Adenocarcinoma[a]

Diagnostic criteria

- A small tumor ≤3 cm
- A solitary adenocarcinoma
- Predominantly lepidic growth
- ≤0.5 cm invasive component in greatest dimension in any one focus
- Invasive component to be measured includes
  - Any histologic subtype other than a lepidic pattern (such as acinar, papillary, micropapillary, solid, colloid, fetal or invasive mucinous adenocarcinoma)
  - Tumor cells infiltrating myofibroblastic stroma
- Minimally invasive adenocarcinoma diagnosis is excluded if the tumor
  - Invades lymphatics. blood vessels, air spaces or pleura,
  - Contains tumor necrosis,
  - Spreads through air spaces
- The cell type mostly nonmucinous (type II pneumocytes or Clara cells), but rarely may be mucinous (tall columnar cells with basal nuclei and abundant cytoplasmic mucin, sometimes resembling goblet cells).

[a]Modified from the articles by Travis et al.[1,7,11]

Lepidic pattern is defined as a tumor composed of neoplastic cells lining the alveolar lining with no architectural disruption/complexity, and no lymphovascular and/or pleural invasion.

Acinar pattern is characterized by glandular formation.

Cribriform pattern shows distinctive holes in between the cancer cells - Swiss cheese.

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Squamous Cell Carcinoma & Large Cell Carcinoma

- Squamous Cell - Similar to Head & Neck Nasopharyngeal Carcinoma Classification
  - *Basaloid*
  - *Keratinizing*
  - *Non-Keratinizing*

- Large Cell – cannot confirm this histology on small biopsy or cytology
  - *Must be surgically resected tumor*
  - *Most previous subtypes have been reclassified and now in different groups*
  - *Solid Adenocarcinoma – reclassification of large cell based on TTF-1*
  - *Non-Keratinizing Squamous Cell Carcinoma – reclassification based on p40*

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Neuroendocrine Tumors

Table 1

Pathologic Criteria of Neuroendocrine Neoplasms of the Lung

	Typical Carcinoid	Atypical Carcinoid	Large-Cell Neuroendocrine Carcinoma	Small-Cell Lung Cancer
Light microscope morphology	Neuroendocrine morphology	Neuroendocrine morphology	Neuroendocrine morphology, positive immunohistochemical staining or neuroendocrine granules by electron microscopy, cytologic features of non–small-cell lung cancer	Smaller than lymphocytes, scant cytoplasm, finely granular nuclear chromatin, absent or faint nucleoli
Mitoses per 2 mm^2	< 2	≥ 2 and < 10 or coagulative necrosis	≥ 10	≥ 10
Necrosis	No	Often punctate	Often large zones	Frequent, large zones
Histologic grade	Low	Intermediate	High	High

Adapted from Hage et al [12]

- Classified Similar to the GI Track Neuroendocrine Tumors
- NOW INCLUDES
  - *Carcinoid Tumor of Lung – low grade neuroendocrine tumor*
  - *Small Cell Lung Carcinoma – Ki67 confirmation for high grade SCLC*
  - *Large Cell Carcinoma Not Elsewhere Classified*
- Mitotic Count used to differentiate low/high grade

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2018 ICD-O-3 Lung Histology Codes

- 8013/3 – Combined Large Cell Neuroendocrine Carcinoma **(C34._, C37.9)**
- 8023/3 – NUT Carcinoma **(C30.0, C31.9, C34._)**
- 8140/3 – Minimally Invasive Adenocarcinoma, NOS **(C34._)**
- 8144/3 – Enteric Adenocarcinoma **(C34.0, C67._, C65.9, C66.9, C68._)**
- 8250/2 – Adenocarcinoma in situ, non-mucinous **(C34._)**
- 8250/3 – Lepidic Adenocarcinoma **(C34._)**
- 8250/3 – Lepidic Predominant Adenocarcinoma **(C34._)**
- 8253/2 – Adenocarcinoma in situ, mucinous **(C34._)**
- 8253/3 – Invasive Mucinous Adenocarcinoma **(C34._)**
- 8254/3 – Mixed Invasive Mucinous and Non-Mucinous Adenocarcinoma **(C34._)**
- 8256/3 – Minimally Invasive Adenocarcinoma, Non-Mucinous **(C34._)**
- 8257/3 – Minimally Invasive Adenocarcinoma, Mucinous **(C34._)**
- 8265/3 – Micropapillary Adenocarcinoma **(C34._)**
- 8265/3 – Micropapillary Carcinoma, NOS **(C18._, C19.9, C20.9, C34._)**
- 8551/3 – Acinar Adenocarcinoma **(C34._)**
- 8842/3 – Pulmonary Myxoid Sarcoma with EWESR1-CREB1 translocation **(C34._)**

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2018 Grade Coding for Lung Cancer

- Clinical Grade - the grade of a solid primary tumor before any treatment. Treatment may include surgical resection, systemic therapy, radiation therapy, or neoadjuvant therapy. NOTE: All surgical procedures are not treatment, e.g. TURB and endoscopic biopsies.

- Pathological Grade - the grade of a solid primary tumor that has been surgically resected and for which no neoadjuvant therapy was administered. If AJCC pathological staging is being assigned, the tumor must have met the surgical resection requirements in the AJCC manual. This may include the grade from the clinical workup, as all information from diagnosis (clinical staging) through the surgical resection is used for pathological staging.

- Post-Therapy Grade - the grade of a solid primary tumor that has been resected following neoadjuvant therapy. If AJCC post-therapy staging is being assigned, the tumor must have met the surgical resection requirements for yp in the AJCC manual. Neoadjuvant therapy must meet guidelines or standards, and not be that given for variable or unconventional reasons as noted in the AJCC manual.

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2018 Grade Coding for Lung Cancer

Grade Coding Instructions and Tables

Effective with Cases Diagnosed 1/1/2018 and Forward

Published April 2018

Editors: Jennifer Ruhl, MSHCA, RHIT, CCS, CTR, NCI SEER
Jim Hofferkamp, CTR, NAACCR
Elizabeth Ward, PhD, Consultant to NAACCR

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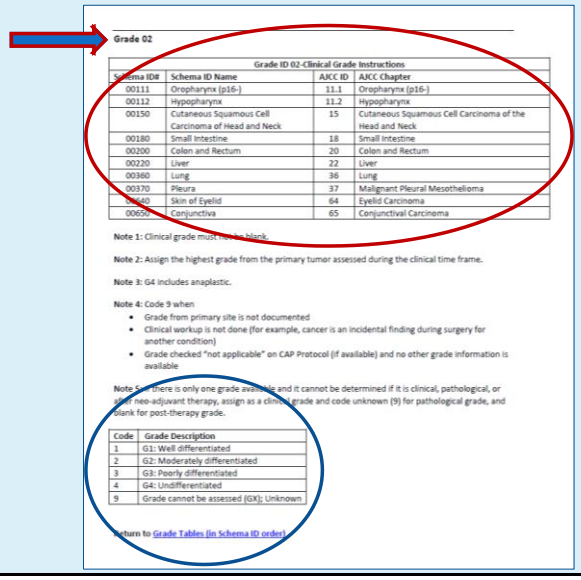


Grade 02

Grade ID 02-Clinical Grade Instructions

Schema ID#	Schema ID Name	AJCC ID	AJCC Chapter
00111	Oropharynx (p16-)	11.1	Oropharynx (p16-)
00112	Hypopharynx	11.2	Hypopharynx
00150	Cutaneous Squamous Cell Carcinoma of Head and Neck	15	Cutaneous Squamous Cell Carcinoma of the Head and Neck
00180	Small Intestine	18	Small Intestine
00200	Colon and Rectum	20	Colon and Rectum
00220	Liver	22	Liver
00360	Lung	36	Lung
00370	Pleura	37	Malignant Pleural Mesothelioma
00690	Skin of Eyelid	64	Eyelid Carcinoma
00650	Conjunctiva	65	Conjunctival Carcinoma

Note 1: Clinical grade must not be blank.

Note 2: Assign the highest grade from the primary tumor assessed during the clinical time frame.

Note 3: G4 includes anaplastic.

Note 4: Code 9 when

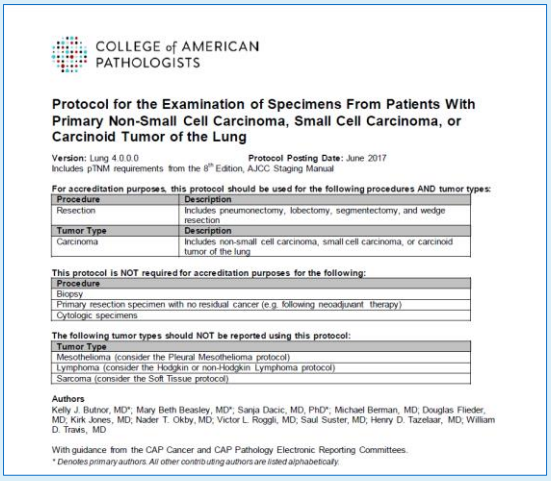
- Grade from primary site is not documented
- Clinical workup is not done (for example, cancer is an incidental finding during surgery for another condition)
- Grade checked "not applicable" on CAP Protocol (if available) and no other grade information is available

Note 5: If there is only one grade available and it cannot be determined if it is clinical, pathological, or after neo-adjuvant therapy, assign as a clinical grade and code unknown (9) for pathological grade, and blank for post-therapy grade.

Code	Grade Description
1	G1: Well differentiated
2	G2: Moderately differentiated
3	G3: Poorly differentiated
4	G4: Undifferentiated
9	Grade cannot be assessed (GX); Unknown

Return to Grade Tables (in Schema ID order)

2018 CAP Protocols for Lung



COLLEGE of AMERICAN PATHOLOGISTS

Protocol for the Examination of Specimens From Patients With Primary Non-Small Cell Carcinoma, Small Cell Carcinoma, or Carcinoid Tumor of the Lung

Version: Lung 4.0.0.0 **Protocol Posting Date:** June 2017
Includes pTNM requirements from the 8th Edition, AJCC Staging Manual

For accreditation purposes, this protocol should be used for the following procedures AND tumor types:

Procedure	Description
Resection	Includes pneumonectomy, lobectomy, segmentectomy, and wedge resection
Tumor Type	**Description**
Carcinoma	Includes non-small cell carcinoma, small cell carcinoma, or carcinoid tumor of the lung

This protocol is NOT required for accreditation purposes for the following:

Procedure
Biopsy
Primary resection specimen with no residual cancer (e.g. following neoadjuvant therapy)
Cytologic specimens

The following tumor types should NOT be reported using this protocol:

Tumor Type
Mesothelioma (consider the Pleural Mesothelioma protocol)
Lymphoma (consider the Hodgkin or non-Hodgkin Lymphoma protocol)
Sarcoma (consider the Soft Tissue protocol)

Authors
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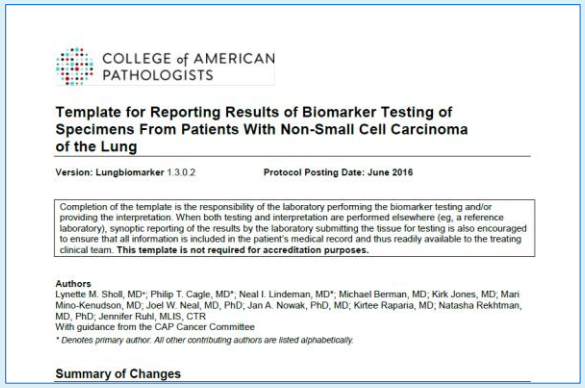
** Denotes primary authors. All other contributing authors are listed alphabetically.*



COLLEGE of AMERICAN PATHOLOGISTS

Template for Reporting Results of Biomarker Testing of Specimens From Patients With Non-Small Cell Carcinoma of the Lung

Version: Lungbiomarker 1.3.0.2 **Protocol Posting Date: June 2016**

Completion of the template is the responsibility of the laboratory performing the biomarker testing and/or providing the interpretation. When both testing and interpretation are performed elsewhere (eg, a reference laboratory), synoptic reporting of the results by the laboratory submitting the tissue for testing is also encouraged to ensure that all information is included in the patient's medical record and thus readily available to the treating clinical team. **This template is not required for accreditation purposes.**

Authors
Lynette M. Sholl, MD*; Philip T. Cagle, MD*; Neal I. Lindeman, MD*; Michael Berman, MD; Kirk Jones, MD; Mari Mino-Kenudson, MD; Joel W. Neal, MD, PhD; Jan A. Nowak, PhD, MD; Kirtee Raparia, MD; Natasha Rekhtman, MD, PhD; Jennifer Ruhl, MLIS, CTR
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** Denotes primary author. All other contributing authors are listed alphabetically.*

Summary of Changes

LUNG: Molecular/Genetic Biomarkers

EGFR, KRAS, MET, LKB1, BRAF, PIK3CA, ALK, RET, and ROS1

- Over half of lung adenocarcinomas contain one of a number of identifiable genetic alterations; some of these can be targeted by a specific therapeutic inhibitor that is either approved by the Food and Drug Administration (FDA) or in clinical trials.
- The National Comprehensive Cancer Network (NCCN) recommends testing for EGFR mutations and ALK rearrangements in all patients with recurrent or metastatic lung adenocarcinomas in order to guide therapy.
- The College of American Pathologists (CAP), International Association for the Study of Lung Cancer (IASLC), and Association for Molecular Pathology (AMP) have prepared a joint guideline that provides a detailed description of the patient and specimen requirements and acceptable testing designs and strategies for the detection of these alterations; details are beyond the scope of this document.

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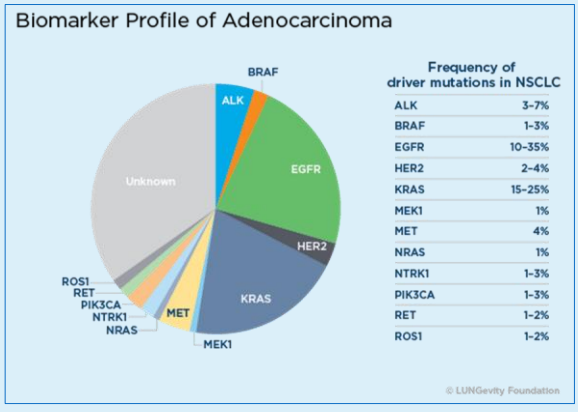
Biomarkers & Genetic Abnormalities

Table 1.07 Major genetic changes in lung cancer

Alterations	Small cell carcinoma (%)	Adenocarcinoma (%)	Squamous cell carcinoma (%)
Mutation			
BRAF	0	< 5	0
EGFR Caucasian	< 1	10–20	< 1
Asian	< 5	35–45	< 5
ERBB2/HER2	0	< 5	0
KRAS Caucasian	< 1	15–35	< 5
Asian	< 1	5–10	< 5
PIK3CA	< 5	< 5	5–15
RB	> 90	5–15	5–15
TP53	> 90	30–40	50–80
Amplification			
EGFR	< 1	5–10	10
ERBB2/HER2	< 1	< 5	< 1
MET	< 1	< 5	< 5
MYC	20–30	5–10	5–10
FGFR1	< 1	< 5	15–25
Gene rearrangement			
ALK	0	5	< 1
RET	0	1–2	0
ROS1	0	1–2	0
NTRK1	0	< 1	0
NRG1	0	< 1	0



Source: WHO Classification of Tumours of the Lung, Pleura, Thymus and Heart, 2015 and Lung Cancer Foundation of America

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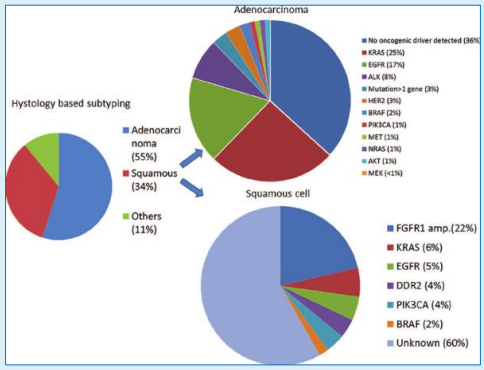
Biomarkers & Genetic Abnormalities

- Class of Antineoplastic Agents for NSCLC – Target Gene Therapy
  - *EGFR – Opdivo/Nivolumab*
  - *EGFR – Tarceva/Erlotinib*
  - *EGFR – Gilotrif/Afatinib*
  - *EGFR – Iressa/Gefitinib*
  - *EGFR – Portrazza/Necitumumab*
  - *EGFR T790M – Tagrisso/Osimertinib*
  - *ALK – Opdivo/Nivolumab*
  - *ALK – Xalkori/Crizotinib*
  - *ALK – Zykadia/Ceritinib*
  - *ALK – Alecensa/Alectinib*
  - *ALK – Alunbrig/Brigatinib*



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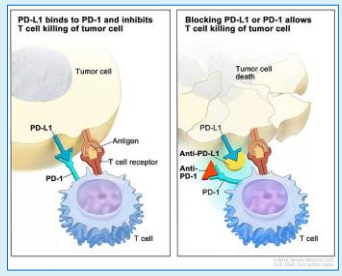
Biomarkers & Genetic Abnormalities

- Class of Antineoplastic Agents for NSCLC – Target Gene Therapy
  - *BRAF V600E – Tafinlar/Dabrafenib)*
  - *BRAF V600E – Mekinist (Trametinib)*
  - *ROS1 – Xalkori (Crizotinib)*
- Class of Antineoplastic Agents for NSCLC – Immunotherapy
  - *PD-1 – Keytruda/Pembrolizumab*
  - *PD-L1 – Tecentriq/Atezolizumab*
- Treatment Targets for NSCLC – Angiogenesis Inhibitors & Targets
  - *Bevacizumab (Avastin)*
  - *VEGF Receptor Ramucirumab (Cyramza)*
- Maintenance Therapy for NSCLC – Chemotherapy
  - *Alimta/Pemetrexed - stable disease, partial/complete response s/p Platinum*



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Biomarkers & Genetic Abnormalities

- Class of Antineoplastic Agents for NSCLC – Target Gene Therapy – Future
  - *HER2/ERBB2 – Trastuzumab – This is a protein not a mutant gene*
  - *MET – Crizotinib*
  - *MET – Cabozantinib*
  - *RET – Cabazantinib*
  - *RET – Vandetanib*
  - *RET – Alectinib*

- Class of Antineoplastic Agents for NSCLC – Future
  - *Molecular Testing – Next Generation Sequencing – Multiple Mutations 1 Test*
  - *FISH and IHC Improvements*
  - *Liquid Biopsy*
  - *Combination Trials*

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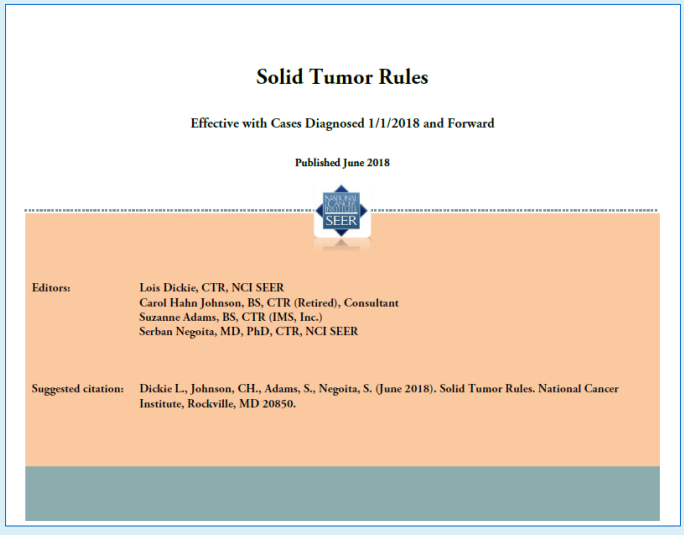
2018 Lung MP/H Rules



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2018 Lung MP/H Rules

- Tumor, mass, tumor mass, lesion, neoplasm, nodule
- The terms tumor, mass, tumor mass, lesion, neoplasm and nodule are **not** used in a **standard manner** in clinical diagnoses, scans, or consults. **Disregard** the terms **unless** there is a **physician's statement** that the term is **malignant/cancer**
- These terms are used **ONLY** to **determine** multiple **primaries**
- **Do not** use these terms for **casefinding** or **determining**

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2018 Lung MP/H Rules

- NSCLC needs further testing to determine if tumor is squamous or adenocarcinoma
- Non-small cell carcinoma **8046**; a broad category which includes all histologies in Table 3 **except** for small cell carcinoma/neuroendocrine tumors (NET Tumors) **8041** and all subtypes
- Major Changes to Classification of Adenocarcinoma of Lung
  - *Pathologists to Discontinue Use of Term "bronchiolo-alveolar carcinoma" or "BAC"*
  - *New Preferred Term is "mucinous adenocarcinoma"*
  - *New Histology Codes for "mucinous adenocarcinoma" of the lung – not same as colon*
  - *Recognition of non-invasive (in-situ) and minimally invasive neoplasms of the lung*
  - *New Histology Codes and Behaviors for "in-situ", "minimally invasive", "acinar", "lepidic" and "micropapillary" adenocarcinoma of lung – use for Lung Only*
  - *In-situ Tumors may be further described by architecture – acinar, lepidic, cribriform*
  - *Multifocal or multiple discrete foci tumors are often present in lepidic adenocarcinoma, minimally invasive adenocarcinoma, and adenocarcinoma in-situ*
  - *Multiple foci may be referred to as ground-glass or lepidic in apperarance on imaging*

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2018 Lung MP/H Rules

The following new terms and codes have been added. The new terms and codes are **for lung only**. See notes in Table 3.

A. Mucinous carcinoma/adenocarcinoma
- **8253/3** when
  - Behavior unknown/not documented (use staging form to determine behavior when available)
  - Invasive
- **8257/3** when
  - Microinvasive
  - Minimally invasive
- **8253/2** when
  - Preinvasive
  - In situ

Note: Previously, only **invasive** /3 codes were available for mucinous adenocarcinoma of the lung. It has been recognized that not all lung cancers are invasive /3 so new codes were implemented.

B. Non-mucinous carcinoma/adenocarcinoma
- **8256/3** when
  - Microinvasive
  - Minimally invasive
- **8250/2** when
  - Preinvasive
  - In situ

Component is not equivalent to subtype/variant.
Component is only coded when the pathologist specifies the component as a second carcinoma

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2018 Lung MP/H Rules

Rule M2 Abstract a **single primary**[i] when there is a **single tumor.**
Note 1: A single tumor is always a single primary.
Note 2: The tumor may overlap onto or extend into adjacent/contiguous site or subsites.
Note 3: The tumor may have in situ and invasive components.
Note 4: The tumor may have two or more histologic components.

Rule M4 Abstract **multiple primaries**[ii] when the patient has a subsequent tumor after being **clinically disease-free** for greater than **three years** after the original diagnosis or last recurrence.
Note 1: **Clinically** disease-free means that there was **no evidence** of recurrence in the same lung on follow-up.
- Scans are NED
- Tumor biomarkers are NED

Note 2: When there is a recurrence less than or equal to three years of diagnosis, the "**clock**" starts over. The time interval is calculated from the **date of last recurrence.** In other words, the patient must have been disease-free for greater than three years from the date of the last recurrence.
Note 3: When it is **unknown/not documented** whether the patient had a recurrence, use **date of diagnosis** to compute the time interval.
Note 4: The physician may state this is a **recurrence**, meaning the patient had a previous lung tumor and now has another lung site tumor. **Follow the rules**; do not attempt to interpret the physician's statement.

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2018 Lung MP/H Rules

MP Rules that Use Table 3 – How to Use Table 3

Table 3: Specific Histologies, NOS, and Subtype/Variants

Rule M5 Abstract **multiple primaries**[ii] when there is **at least one** tumor that is **small cell** carcinoma **8041** or any small cell subtypes/variants and another tumor that is **non-small cell** carcinoma **8046** or any non-small cell carcinoma subtypes/variants.

Note 1: Small cell carcinoma and non-small cell carcinoma are the two major classifications/divisions for lung cancer.

- See Table 3 in Equivalent Terms and Definitions for terms and codes for small cell carcinoma and all of the subtypes/variants
- With the exception of small cell/neuroendocrine carcinoma, **all other histologies** listed in **Table 3** in Equivalent Terms and Definitions are **non-small cell** carcinoma

Note 2: It is **irrelevant** whether the tumors are in the **ipsilateral** (same) lung or are **bilateral** (both lungs).

Rule M6 Abstract **multiple primaries**[ii] when separate/non-contiguous tumors are two or more **different subtypes/variants** in Column 3, Table 3 in the Equivalent Terms and Definitions. Timing is irrelevant.

Note: The tumors may be subtypes/variants of the **same** or **different** NOS histologies.

- **Same NOS**: Colloid adenocarcinoma 8480/3 and lepidic adenocarcinoma 8250/3 are both subtypes of adenocarcinoma NOS 8140/3 but are distinctly different histologies. Abstract multiple primaries.
- **Different NOS**: Keratinizing squamous cell carcinoma 8071/3 is a subtype of squamous cell carcinoma NOS 8070; Typical carcinoid 8240/3 is a subtype of small cell carcinoma/neuroendocrine tumors (NET Tumors) 8041/3. They are distinctly different histologies. Abstract multiple primaries.

Component is not equivalent to subtype/variant.
Component is only coded when the pathologist specifies the component as a second carcinoma

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2018 Lung MP/H Rules

MP Rules that Use Table 3 – How to Use Table 3

Table 3: Specific Histologies, NOS, and Subtype/Variants

Rule M7 Abstract a **single primary**[i] when separate/non-contiguous tumors are on **the same row** in Table 3 in the Equivalent Terms and Definitions. Timing is irrelevant.

Note 1: The tumors **must be the same behavior**. When one tumor is in situ and the other invasive, continue through the rules.

Note 2: The same row means the tumors are:

- The same histology (same four-digit ICD-O code) **OR**
- One is the preferred term (column 1) and the other is a synonym for the preferred term (column 2) **OR**
- A NOS (column 1/column 2) and the other is a subtype/variant of that NOS (column 3)

Rule M8 Abstract **multiple primaries**[ii] when separate/non-contiguous tumors are on **different rows** in Table 3 in the Equivalent Terms and Definitions. Timing is irrelevant.

Note: Each row in the table is a **distinctly different** histology.

Component is not equivalent to subtype/variant.
Component is only coded when the pathologist specifies the component as a second carcinoma

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2018 Lung MP/H Rules

Table 3: Specific Histologies, NOS, and Subtype/Variants

Specific or NOS Histology Term and Code	Synonym of Specific or NOS	Subtype/variant of NOS and Code
Adenocarcinoma 8140 **Note 1:** Mucinous adenocarcinoma for lung only is coded as follows: • **8253/3*** when o Behavior unknown/not documented (use staging form to determine behavior when available) o Invasive • **8257/3*** when o Microinvasive o Minimally invasive • **8253/2*** when o Preinvasive o In situ **Note 2:** Non-mucinous adenocarcinoma for lung only is coded as follows: • **8256/3*** when o Microinvasive o Minimally invasive • **8250/2*** when o Preinvasive o In situ	Adenocarcinoma NOS Adenocarcinoma in situ **8140/2** Adenocarcinoma invasive **8140/3**	Acinar adenocarcinoma **(for lung only) 8551*** Adenoid cystic/adenocystic carcinoma **8200** Colloid adenocarcinoma **8480** Fetal adenocarcinoma **8333** Lepidic adenocarcinoma/ adenocarcinoma, lepidic predominant **8250/3*** Mucinous carcinoma/adenocarcinoma **(for lung only)** in situ **8253/2*** invasive **8253/3*** minimally invasive **8257/3*** microinvasive **8257/3*** preinvasive **8253/2** Micropapillary adenocarcinoma/carcinoma **8265** Mixed invasive mucinous and non-mucinous adenocarcinoma **8254*** Non-mucinous adenocarcinoma **(for lung only)** in situ **8250/2*** microinvasive **8256/3*** minimally invasive **8256/3*** preinvasive **8250/2*** Papillary adenocarcinoma **8260** Pulmonary intestinal-type adenocarcinoma/enteric adenocarcinoma **8144** Solid adenocarcinoma **8230**

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2018 Lung MP/H Rules

Rule M9 Abstract a **single primary**[i] when there are **simultaneous multiple** tumors:

- In **both** lungs **OR**
- In the **same** lung **OR**
- **Single** tumor in one lung; **multiple** tumors in **contralateral** lung

Note 1: Tumors may be combinations of:

- In situ and invasive **OR**
- NOS and subtype/variant (See Table 3 in the Equivalent Terms and Definitions)

Note 2: NOS and subtypes/variants are:

- Adenocarcinoma **8140** and a subtype/variant of adenocarcinoma
- Mucinous adenocarcinoma and a subtype/variant of mucinous adenocarcinoma
- Non-small cell carcinoma **8046** and a subtype/variant of non-small cell carcinoma
- Sarcoma **8800** and a subtype/variant of sarcoma
- Small cell neuroendocrine tumors/NET **8041** and a subtype/variant of small cell neuroendocrine tumor/NET
- Squamous cell carcinoma **8070** and a subtype/variant of squamous cell carcinoma

Note 3: Code multiple primaries only when there is **proof** that one of the tumors is a different histology. Proof is any one of the following:

- **Pathology** from a biopsy or resection **proves** tumors are **different histologies**
- Attending, oncologist, or pulmonologist state **unequivocally** that the tumors are **different primaries**
  - **Unequivocal** means that **no words** such as "**probable**" are used in the statement. Terms which are on the "ambiguous terms" list such as "probable" cannot be used to prove different primaries.

Note 4: When there are multiple tumors in one or both lungs, the physician usually biopsies only one mass/tumor. They treat the patient based on that single biopsy, assuming all of the masses/tumors are the same histology.

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2018 Lung MP/H Rules

Table 3: Specific Histologies, NOS, and Subtype/Variants

Specific or NOS Histology Term and Code	Synonym of Specific or NOS	Subtype/variant of NOS and Code
Small cell carcinoma/neuroendocrine tumors (NET Tumors) 8041 *Note:* Large cell carcinoma with **neuroendocrine differentiation** lacks NE morphology and is coded as large cell carcinoma, **not large cell neuroendocrine** carcinoma	Reserve cell carcinoma Round cell carcinoma SCLC Small cell carcinoma NOS Small cell neuroendocrine carcinoma	Atypical carcinoid **8249** Combined small cell carcinoma **8045** Large cell neuroendocrine carcinoma/combined large cell neuroendocrine carcinoma **8013** Typical carcinoid **8240**
Spindle cell carcinoma 8032		
Squamous cell carcinoma 8070	Epidermoid carcinoma Epidermoid carcinoma NOS Squamous carcinoma Squamous cell carcinoma NOS Squamous cell epithelioma Squamous cell carcinoma in situ **8070/2**	Basaloid carcinoma/basaloid squamous cell carcinoma **8083** Keratinizing squamous cell carcinoma **8071** Non-keratinizing carcinoma **8072**

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2018 Lung MP/H Rules

Table 2: Combination/Mixed Histology Codes

Instructions:

1. Compare the **terms** in the **diagnosis** (pathology, cytology, radiographic, clinical) to the terms in **Column 1.**
2. When the terms **match**, use the **combination code** listed in **Column 2.**
3. The **last row** in the table is a **"last resort"** code: adenocarcinoma mixed subtypes 8255.

Note 1: **Do not** use Table 2 in the following situations:

- For tumors with both **invasive** and **in situ** behavior. The **Histology Rules** instruct to code the invasive histology.
- When one of the histologies is described as **differentiation or features**
- When the terms are a **NOS** and a **subtype/variant** of that NOS. See the **Histology Rules** for instructions on coding a NOS and a subtype/variant in a single tumor or multiple tumors abstracted as a single primary.

Note 2: Some combinations can be either in situ or invasive; others are limited to a /2 or /3 behavior code.

- When a code is **limited to in situ, /2** will be **added** to the code (both components are in situ)
- When a code is **limited to invasive, /3** will be **added** to the code (both components are invasive)

Note 3: This table is not a complete listing of histology combinations.

Column 1 lists the **required terms** for **the combination code.**
Column 2 lists the **combination term** and **code** for histologies **in Column 1.**

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2018 Lung MP/H Rules

Required Terms	Combination Histologies and Code
Giant cell carcinoma **AND** Spindle cell carcinoma *Note:* Sarcomatoid carcinoma is not in the histology table because sarcomatoid tumors primarily originate in the mediastinum. The combination code is added for the rare occasion when a tumor occurs within the lung.	Sarcomatoid carcinoma **8033** *Note:* Both giant cell carcinoma and spindle cell carcinoma are components of sarcomatoid carcinoma. The most accurate code for a combination of giant cell and spindle cell carcinoma is sarcomatoid carcinoma
Epithelial carcinoma **AND** Myoepithelial carcinoma	Epithelial-myoepithelial carcinoma **8562**
Mucinous carcinoma, invasive **AND** Non-mucinous carcinoma, invasive	Mixed invasive mucinous and non-mucinous carcinoma **8254/3***
Small cell carcinoma/neuroendocrine tumor (NET) **AND** **At least one** of the following: • Adenocarcinoma • Adenosquamous carcinoma • Large cell carcinoma • Squamous cell carcinoma • Non-small cell carcinoma *Note:* **Includes subtypes/variants** of small cell/neuroendocrine tumor. See Table 3 for subtypes/variants.	Combined small cell carcinoma **8045**

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2018 Lung MP/H Rules

Required Terms	Combination Histologies and Code
Diagnosis must be a single tumor which meets one of the following two criteria: 1. At least two of the subtypes/variants of adenocarcinoma • Acinar adenocarcinoma • Clear cell adenocarcinoma • Lepidic adenocarcinoma *Note:* Lepidic adenocarcinoma may or may not have mucinous components. • Micropapillary adenocarcinoma • Papillary adenocarcinoma • Solid adenocarcinoma • Well-differentiated fetal adenocarcinoma *Note:* This includes a diagnosis of adenocarcinoma AN[illegible] least two subtypes/variants of adenocarcinoma. 2. A combination of histologies **not listed on previous r**[illegible] of this table.	Adenocarcinoma with mixed subtypes **8255/3** *Note 1:* 8255 is a "last resort" code. *Note 2:* See **2018** lung **Histology** coding **rules** to determine when it is appropriate to use this code for combination histologies other than adenocarcinoma subtypes/variants.

Component is not equivalent to subtype/variant.
Component is only coded when the pathologist specifies the component as a second carcinoma

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2018 Lung MP/H Rules

Rule M11 Abstract **multiple primaries**[ii] when there is a **single** tumor in **each lung** (one tumor in the right lung and one tumor in the left lung).

Note 1: The only **exception** is when there is **proof** that one tumor is **metastatic**. Proof is any one of the following:

- Tissue from both tumors is compared and the pathologic diagnoses definitively says one tumor is metastatic
- Attending physician, oncologist, or pulmonologist state unequivocally that the tumor in the contralateral lung is metastatic
  - Unequivocal means that no words such as "probably possibly, most likely, etc." are used in the statement. Terms which are on the "ambiguous terms" list make the statement equivocal (cannot be used to prove metastases)

Note 2: Lung **metastases usually** present as multiple tumors/masses. A single tumor in each lung is unlikely to be a single primary (e.g. metastatic to the contralateral lung).

Note 3: The term "**bilateral**" is **not** a synonym for a **single primary**. It is simply a statement that there are tumors in both lungs.

Note 4: This rule is based on **long-term epidemiologic studies** of multiple primaries. The specialty medical experts (SME) and the CoC site physician teams reviewed and approved these rules. Many of the CoC site team physicians were also authors, co-authors, or editors of the AJCC Staging Manual.

Note 5: Lymph node involvement is recorded in staging criteria.

Rule M12 Abstract a **single primary**[i] (the invasive) when an **invasive** tumor is diagnosed **less than or equal to 60** days **after** an **in situ** tumor in the same lung.

Rule M13 Abstract **multiple primaries**[ii] when an **invasive** tumor occurs **more than 60** days after an **in situ** tumor in the same lung.

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2018 Lung MP/H Rules

The priority list is used for **single primaries (including multiple tumors abstracted as a single primary)**

This is a hierarchical list of source documentation.
Code the **most specific** pathology/tissue from either **resection** or **biopsy**.
Note: The term "most specific" usually refers to a subtype/variant.

1. **Biomarkers**
2. **Tissue or pathology** report (in priority order)
   A. Addendum(s) and/or comment(s)
   B. Final diagnosis
   C. CAP protocol
      Note 1: Addendums and comments on the pathology report are given a high priority because they often contain information about molecular testing, genetic testing, and/or special stains which give a more specific diagnosis.
      Note 2: The pathologist's diagnosis from the pathology report is always reliable, so the final diagnosis is the second priority.
      Note 3: The CAP protocol is a checklist which:
      - Provides guidelines for collecting the essential data elements for complete reporting of malignant tumors and optimal patient care.
      - Allows physicians to check multiple histologies

      Note: The CAP protocol must be documented in one location. Most frequently, in the:
      - The pathology final diagnosis
      - Addendum to the path report
3. **Cytology** (Fine needle biopsy, pleural fluid)
4. Tissue/pathology from a **metastatic** site
   Note 1: Code the behavior /3.

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2018 Lung MP/H Rules

- Only **code features** when there is **a specific code** for the NOS with features in **Table 3** in the Equivalent Terms and Definitions, **ICD-O** and all **updates.**

The following **ambiguous terminology** is used as a modifier:

- Apparently
- Appears
- Comparable with
- Compatible with
- Consistent with
- Favor(s)
- Malignant appearing
- Most likely
- Presumed
- Probable
- Suspect(ed)
- Suspicious (for)
- Typical (of)

Component is not equivalent to subtype/variant.
Component is only coded when the pathologist specifies the component as a second carcinoma

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Anatomy of the Thorax – Lung & Pleura

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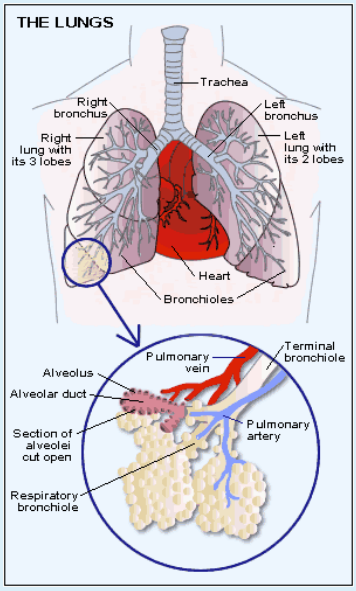
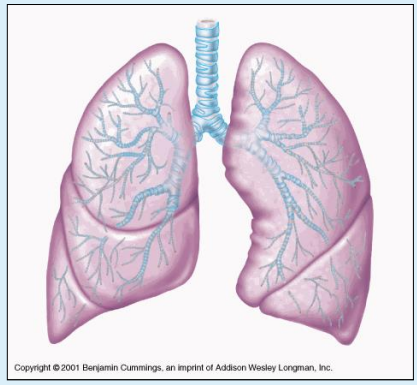
http://www.omnimedicalsearch.com/conditions-diseases/images/lung-cancer.jpg

Lung Anatomy



http://www.damav.com/mare/lung/



http://legacy.owensboro.kctcs.edu

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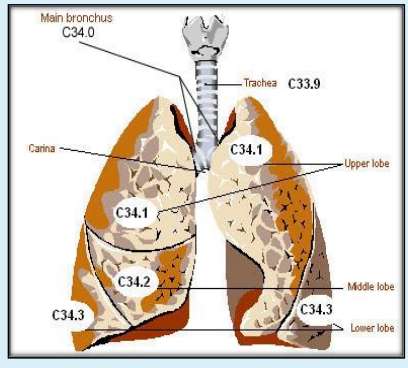
Lung Anatomy

C34.0 Main bronchus
C34.1 Upper lobe, lung
C34.2 Middle lobe, lung
(right lung only)
C34.3 Lower lobe, lung
C34.8 Overlapping lesion
C34.9 Lung, NOS



Source: SEER Training: ICD-O-3 Site Codes

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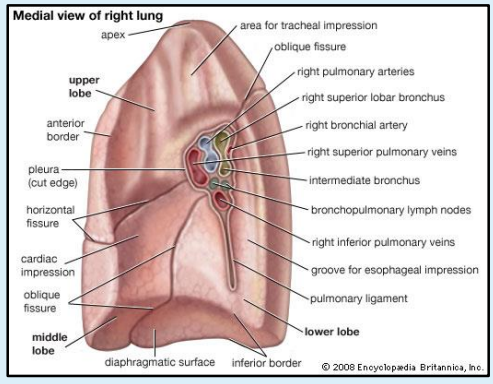
Lung Anatomy

The hilum is the space in each lung where the bronchus and blood vessels enter the lung.

The apex is the rounded area at the top of each lung.



Source: 2008 Encyclopedia Britannica, Inc. on-line

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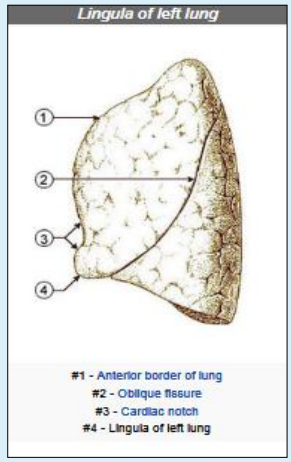
Lung Anatomy

The lingula, found only in the left lung, is a projection of the upper lobe of the left lung thought to be a remnant of an ancient middle lobe of the left lung.



Source: SEER Training: ICD-O-3 Site Codes

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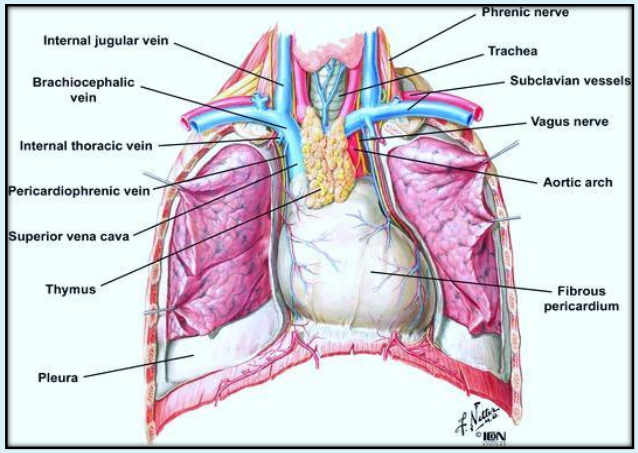
Lung Anatomy



Source: Springer Images. Figure adapted from Atlas of Human Anatomy, 2nd ed. Contents of the superior and middle mediastinum. http://www.springerimages.com/Images/MedicineAndPublicHealth/1-10.1007_978-1-60327-372-5_4-9

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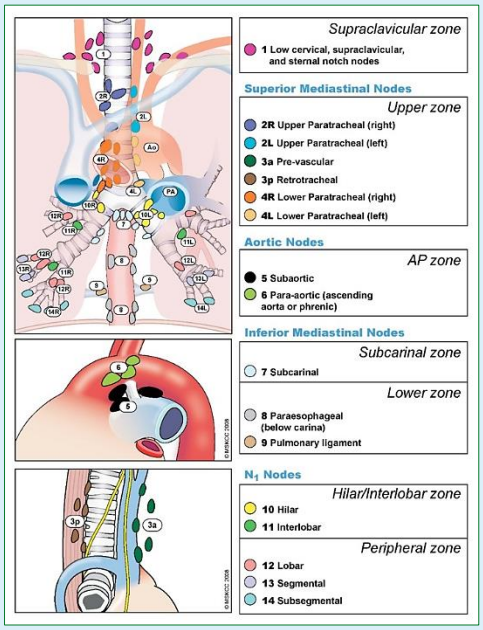

Lung Anatomy

- **NX** Regional lymph nodes cannot be assessed
- **N0** No regional lymph node metastases
- **N1** Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes and intrapulmonary nodes, including involvement by direct extension
- **N2** Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)
- **N3** Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s)

IASLC lymph node map from Memorial Sloan-Kettering Cancer Center, 2009

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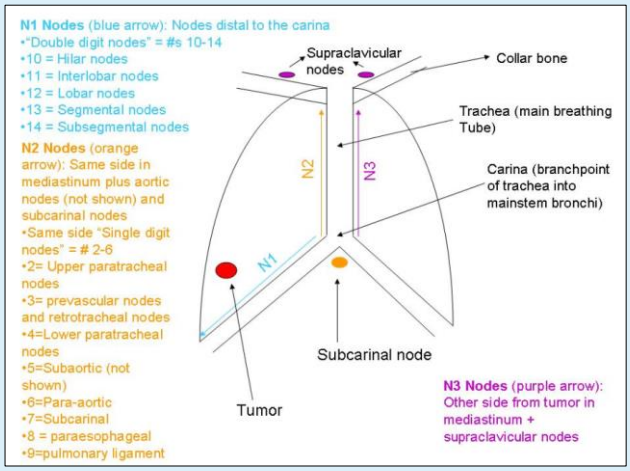
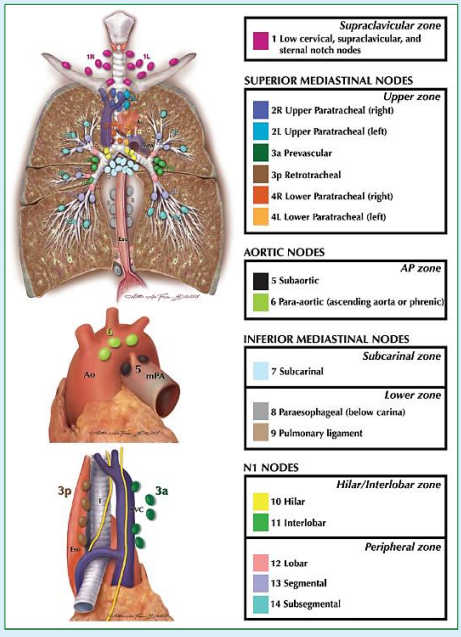
Lung Anatomy



Source: http://cancergrace.org/lung/files/2010/04/simplified-staging.jpg



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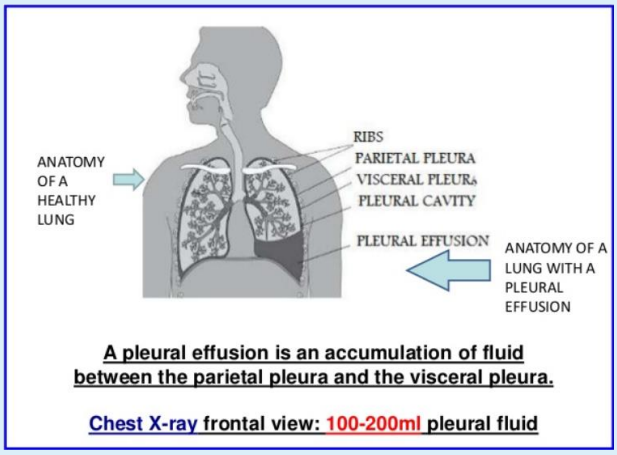
IASLC lymph node map - WHO Classification of Tumours of the Lung, 2015

Lung Anatomy



Source: www.slideshare.net/pleuraleffusion/drmahesh

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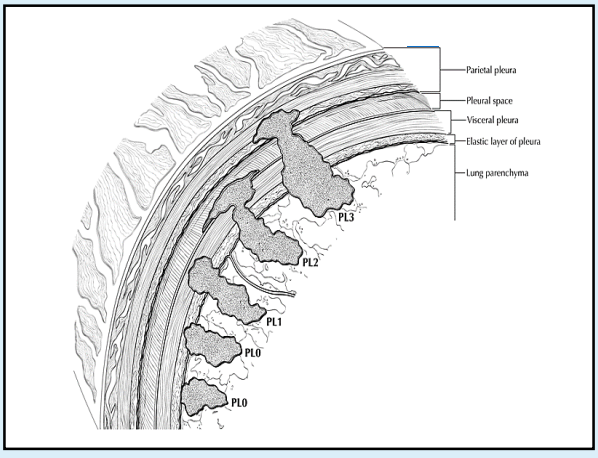
Lung Anatomy



Collaborative Stage Data Collection System, Part I Section II – Lab Tests, Tumor Markers, SSFs

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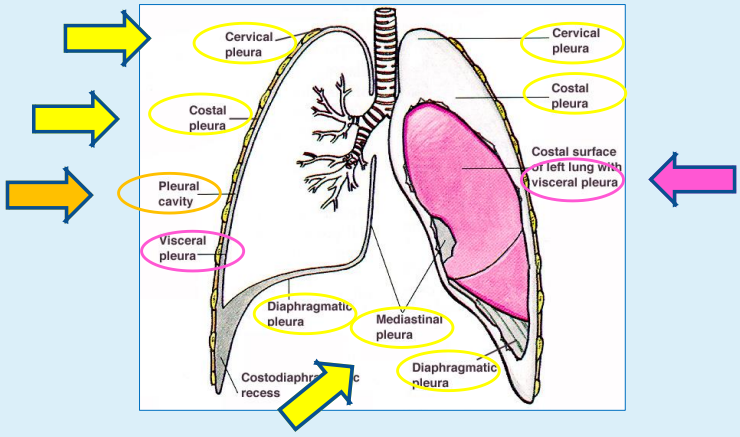
Pleura Anatomy



Source: http://www.depure.org/learning-further-about-anatomy-of-lung/basic-anatomy-of-lung/

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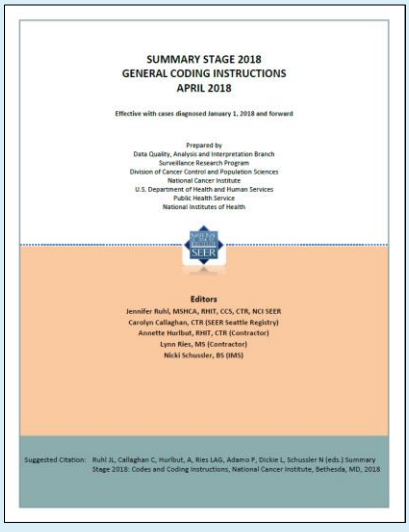
2018 Anatomic Staging – SS2018



SUMMARY STAGE 2018
GENERAL CODING INSTRUCTIONS
APRIL 2018

Effective with cases diagnosed January 1, 2018 and forward

Prepared by
Data Quality, Analysis and Interpretation Branch
Surveillance Research Program
Division of Cancer Control and Population Sciences
National Cancer Institute
U.S. Department of Health and Human Services
Public Health Service
National Institutes of Health

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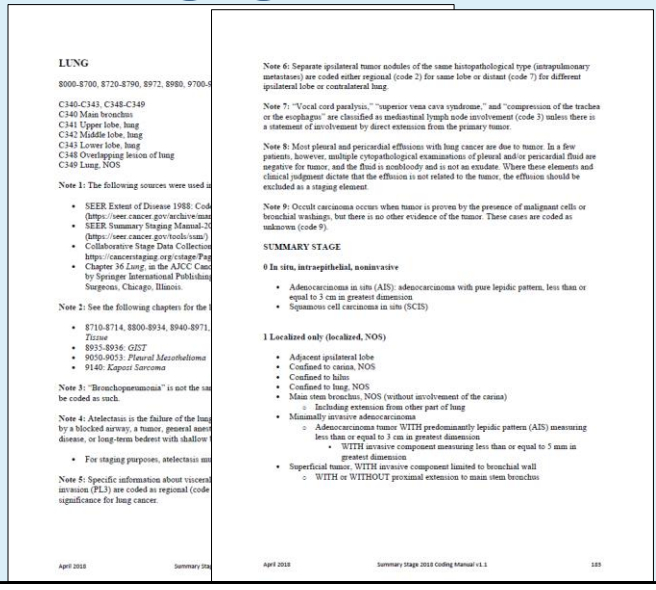

LUNG

8000-8700, 8720-8790, 8972, 8980, 9700-9

C340-C343, C348-C349
C340 Main bronchus
C341 Upper lobe, lung
C342 Middle lobe, lung
C343 Lower lobe, lung
C348 Overlapping lesion of lung
C349 Lung, NOS

Note 1: The following sources were used in

- SEER Extent of Disease 1988: Cod (https://seer.cancer.gov/archive/ma
- SEER Summary Staging Manual-20 (https://seer.cancer.gov/tools/ssm/)
- Collaborative Stage Data Collection https://cancerstaging.org/cstage/Pag
- Chapter 36 *Lung*, in the AJCC Canc by Springer International Publishing Surgeons, Chicago, Illinois.

Note 2: See the following chapters for the t

- 8710-8714, 8800-8934, 8940-8971, *Tissue*
- 8935-8936: *GIST*
- 9050-9053: *Pleural Mesothelioma*
- 9140: *Kaposi Sarcoma*

Note 3: "Bronchopneumonia" is not the sa be coded as such.

Note 4: Atelectasis is the failure of the lung by a blocked airway, a tumor, general anest disease, or long-term bedrest with shallow

- For staging purposes, atelectasis sh

Note 5: Specific information about visceral invasion (PL3) are coded as regional (code significance for lung cancer.

April 2018 Summary Sta

Note 6: Separate ipsilateral tumor nodules of the same histopathological type (intrapulmonary metastases) are coded either regional (code 2) for same lobe or distant (code 7) for different ipsilateral lobe or contralateral lung.

Note 7: "Vocal cord paralysis," "superior vena cava syndrome," and "compression of the trachea or the esophagus" are classified as mediastinal lymph node involvement (code 3) unless there is a statement of involvement by direct extension from the primary tumor.

Note 8: Most pleural and pericardial effusions with lung cancer are due to tumor. In a few patients, however, multiple cytopathological examinations of pleural and/or pericardial fluid are negative for tumor, and the fluid is nonbloody and is not an exudate. Where these elements and clinical judgment dictate that the effusion is not related to the tumor, the effusion should be excluded as a staging element.

Note 9: Occult carcinoma occurs when tumor is proven by the presence of malignant cells or bronchial washings, but there is no other evidence of the tumor. These cases are coded as unknown (code 9).

SUMMARY STAGE

0 In situ, intraepithelial, noninvasive

- Adenocarcinoma in situ (AIS): adenocarcinoma with pure lepidic pattern, less than or equal to 3 cm in greatest dimension
- Squamous cell carcinoma in situ (SCIS)

1 Localized only (localized, NOS)

- Adjacent ipsilateral lobe
- Confined to carina, NOS
- Confined to hilus
- Confined to lung, NOS
- Main stem bronchus, NOS (without involvement of the carina)
  - Including extension from other part of lung
- Minimally invasive adenocarcinoma
  - Adenocarcinoma tumor WITH predominantly lepidic pattern (AIS) measuring less than or equal to 3 cm in greatest dimension
    - WITH invasive component measuring less than or equal to 5 mm in greatest dimension
- Superficial tumor, WITH invasive component limited to bronchial wall
  - WITH or WITHOUT proximal extension to main stem bronchus

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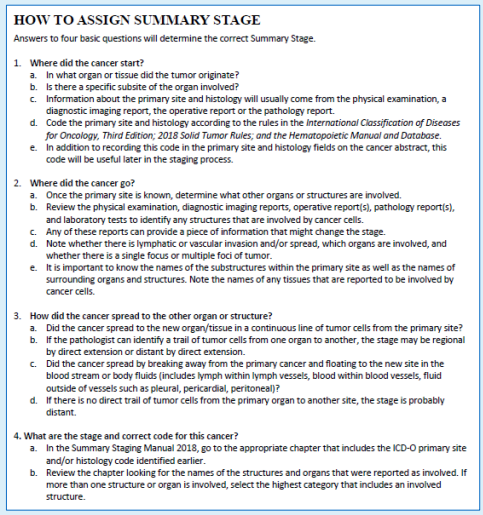
Cancer Staging Basics

1. Where did the cancer start (primary site)?
2. Where did the cancer go (how far did it spread)?
3. How did the cancer get to the other organ or structure?
4. What is the anatomic stage for this cancer?

➢ Incorporate SSDI Required for Staging for all cases.



HOW TO ASSIGN SUMMARY STAGE

Answers to four basic questions will determine the correct Summary Stage.

1. **Where did the cancer start?**
   a. In what organ or tissue did the tumor originate?
   b. Is there a specific subsite of the organ involved?
   c. Information about the primary site and histology will usually come from the physical examination, a diagnostic imaging report, the operative report or the pathology report.
   d. Code the primary site and histology according to the rules in the *International Classification of Diseases for Oncology, Third Edition; 2018 Solid Tumor Rules; and the Hematopoietic Manual and Database.*
   e. In addition to recording this code in the primary site and histology fields on the cancer abstract, this code will be useful later in the staging process.

2. **Where did the cancer go?**
   a. Once the primary site is known, determine what other organs or structures are involved.
   b. Review the physical examination, diagnostic imaging reports, operative report(s), pathology report(s), and laboratory tests to identify any structures that are involved by cancer cells.
   c. Any of these reports can provide a piece of information that might change the stage.
   d. Note whether there is lymphatic or vascular invasion and/or spread, which organs are involved, and whether there is a single focus or multiple foci of tumor.
   e. It is important to know the names of the substructures within the primary site as well as the names of surrounding organs and structures. Note the names of any tissues that are reported to be involved by cancer cells.

3. **How did the cancer spread to the other organ or structure?**
   a. Did the cancer spread to the new organ/tissue in a continuous line of tumor cells from the primary site?
   b. If the pathologist can identify a trail of tumor cells from one organ to another, the stage may be regional by direct extension or distant by direct extension.
   c. Did the cancer spread by breaking away from the primary cancer and floating to the new site in the blood stream or body fluids (includes lymph within lymph vessels, blood within blood vessels, fluid outside of vessels such as pleural, pericardial, peritoneal)?
   d. If there is no direct trail of tumor cells from the primary organ to another site, the stage is probably distant.

4. **What are the stage and correct code for this cancer?**
   a. In the Summary Staging Manual 2018, go to the appropriate chapter that includes the ICD-O primary site and/or histology code identified earlier.
   b. Review the chapter looking for the names of the structures and organs that were reported as involved. If more than one structure or organ is involved, select the highest category that includes an involved structure.

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Criteria Used to Stage Lung Cancer

- <u>What To Look For & Document When Reviewing Lung Cancer Cases</u>
- Physical Exam – paraneoplastic syndrome, nerve or vessel obstruction
- CT Chest – tumor location, tumor size, nodes, pleural effusion
- CT Abdomen – liver or adrenal mets
- CT/MRI Brain – brain mets
- Pathology Report(s) – Resection of Primary and Nodal Status
- Pathology Report(s) – Extension to/thru visceral pleura
- Pathology Report(s) – Extension to parietal pleura
- Cytology Report(s) – Pleural Fluid (blood/exudate)
- Genetic Abnormalities – EGFR, KRAS, BRAF, ALK, ROS1, MET, RET, PDL-1, HER2

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Lung Cancer – SS2018
Stage Criteria & Staging Notes

LUNG

8000-8700, 8720-8790, 8972, 8980, 9700-9701

C340-C343, C348-C349
C340 Main bronchus
C341 Upper lobe, lung
C342 Middle lobe, lung
C343 Lower lobe, lung
C348 Overlapping lesion of lung
C349 Lung, NOS

Note 3: "Bronchopneumonia" is not the same thing as "obstructive pneumonitis" and be coded as such.

Note 4: Atelectasis is the failure of the lung to expand (inflate) completely. This may by a blocked airway, a tumor, general anesthesia, pneumonia or other lung infections disease, or long-term bedrest with shallow breathing. Sometimes called a collapsed lung.

- For staging purposes, atelectasis must present with an obstructing tumor (code 2)

Note 5: Specific information about visceral pleura invasion (PL1 or PL2) or parietal pleural invasion (PL3) are coded as regional (code 2). Elastic layer involvement has prognostic significance for lung cancer.

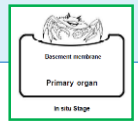
Note 6: Separate ipsilateral tumor nodules of the same histopathological type (intrapulmonary metastases) are coded either regional (code 2) for same lobe or distant (code 7) for different ipsilateral lobe or contralateral lung.

Note 7: "Vocal cord paralysis," "superior vena cava syndrome," and "compression of the trachea or the esophagus" are classified as mediastinal lymph node involvement (code 3) unless there is a statement of involvement by direct extension from the primary tumor.

Note 8: Most pleural and pericardial effusions with lung cancer are due to tumor. In a few patients, however, multiple cytopathological examinations of pleural and/or pericardial fluid are negative for tumor, and the fluid is nonbloody and is not an exudate. Where these elements and clinical judgment dictate that the effusion is not related to the tumor, the effusion should be excluded as a staging element.

Note 9: Occult carcinoma occurs when tumor is proven by the presence of malignant cells or bronchial washings, but there is no other evidence of the tumor. These cases are coded as unknown (code 9).

Lung Cancer – SS2018
Stage Criteria & Staging Notes



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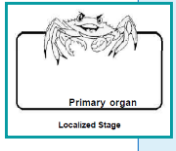
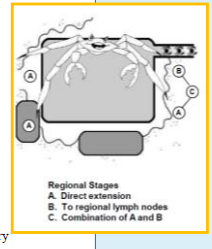


1 Localized only (localized, NOS)

- Adjacent ipsilateral lobe
- Confined to carina, NOS
- Confined to hilus
- Confined to lung, NOS
- Main stem bronchus, NOS (without involvement of the carina)
  - Including extension from other part of lung
- Minimally invasive adenocarcinoma
  - Adenocarcinoma tumor WITH predominantly lepidic pattern (AIS) measuring less than or equal to 3 cm in greatest dimension
    - WITH invasive component measuring less than or equal to 5 mm in greatest dimension
- Superficial tumor, WITH invasive component limited to bronchial wall
  - WITH or WITHOUT proximal extension to main stem bronchus

2 Regional by direct extension only

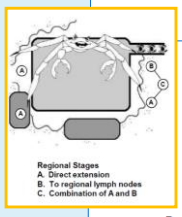
- Atelectasis/obstructive pneumonitis
  - Extends to hilar region, involving part or all of lung
- Blood vessel(s) (major)
  - Aorta
  - Azygos vein
  - Pulmonary artery or vein
  - Superior vena cava (SVC syndrome)
- Carina from lung
- Compression of esophagus or trachea not specified as direct extension
- Diaphragm (separate lesion-see code 7)
- Esophagus
- Main stem bronchus less than 2.0 cm from carina
- Mediastinum, extrapulmonary or NOS
- Nerve(s)
  - Cervical sympathetic (Horner's syndrome)
  - Recurrent laryngeal (vocal cord paralysis)
  - Vagus
- Pancoast tumor (superior sulcus syndrome), NOS
- Parietal pericardium
- Parietal pleura
- Pericardium, NOS
- Phrenic nerve
- Pleura, NOS
- Pulmonary ligament
- Separate tumor nodule(s) in the same lobe as the primary
- Visceral pleura
- Trachea



Lung Cancer – SS2018
Stage Criteria & Staging Notes

Regional lymph node(s) involved only

- IPSILATERAL nodes only
  - Bronchial
  - Carinal (tracheobronchial) (tracheal bifurcation)
  - Hilar (bronchopulmonary) (proximal lobar) (pulmonary roo
  - Intrapulmonary
    - Interlobar
    - Lobar
    - Segmental
    - Subsegmental
  - Mediastinal, NOS
    - Anterior
    - Aortic (above diaphragm), NOS
      - Peri/para-aortic, NOS
        - Ascending aorta (phrenic)
      - Subaortic (aortic-pulmonary window)
    - Inferior mediastinal
      - Paraesophageal
      - Pulmonary ligament
      - Subcarinal
    - Posterior (tracheoesophageal)
    - Superior mediastinal
      - Paratracheal (left, right, upper, low, NOS)
      - Prevascular
      - Retrotracheal
  - Peri/parabronchial
  - Periesophageal
  - Pericardial
  - Peritracheal, NOS
    - Azygos (lower peritracheal)
  - Precarinal
  - Pretracheal, NOS
  - Regional lymph node(s), NOS
    - Lymph node(s), NOS

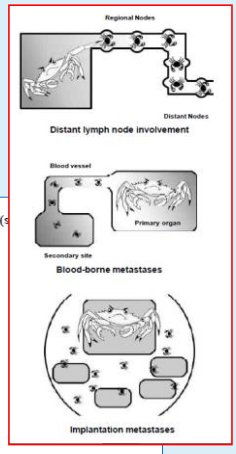


4 Regional by BOTH direct extension AND regional lymph node(s

- Codes (2) + (3)

7 Distant site(s)/lymph node(s) involved

- Distant site(s) (including further contiguous extension)
  - Abdominal organs
  - Adjacent rib
  - Chest wall (thoracic wall)
  - Contralateral lung/main stem bronchus
  - Contralateral main stem bronchus
  - Heart
  - Inferior vena cava
  - Neural foramina
  - Pericardial nodules or pleural effusion (malignant) (ipsilateral, contralateral, bilateral, NOS)
  - Pleural tumor foci or nodules on ipsilateral lung (separate from direct extension) or contralateral lung
  - Rib
  - Separate tumor nodule(s) in contralateral lung
  - Separate tumor nodule(s) in a different ipsilateral lobe
  - Skeletal muscle



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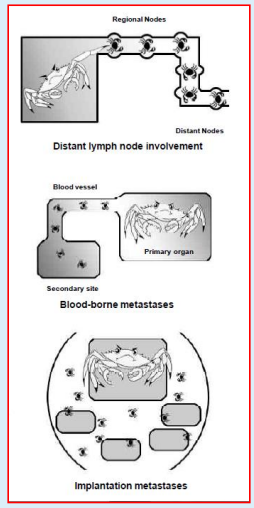
Lung Cancer – SS2018
Stage Criteria & Staging Notes

  - Skin of chest
  - Sternum
  - Vertebra(e) (vertebral body)
  - Visceral pericardium
- Distant lymph node(s), NOS
  - IPSILATERAL or CONTRALATERAL
    - Low cervical
    - Proximal root
    - Pulmonary root
    - Scalene (inferior deep cervical)
    - Sternal notch
    - Supraclavicular (transverse cervical)
  - CONTRALATERAL/BILATERAL nodes
    - Bronchial
    - Cervical
    - Hilar (bronchopulmonary) (proximal lobar) (pulmonary root)
    - Mediastinal
      - Anterior
      - Aortic (above diaphragm), NOS
        - Peri/para-aortic, NOS
          - Ascending aorta (phrenic)
        - Subaortic (aortic-pulmonary window)
      - Inferior mediastinal
        - Paraesophageal
        - Pulmonary ligament
        - Subcarinal
    - Posterior (tracheoesophageal)
    - Superior mediastinal
      - Paratracheal (left, right, upper, low, NOS)
      - Prevascular
      - Retrotracheal
- Distant metastasis, NOS
  - Carcinomatosis
  - Distant metastasis WITH or WITHOUT distant lymph node(s)

9 Unknown if extension or metastasis



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FCDS Lung Audits – 2014/2015 Diagnosis

- Clarify the Difference between Atelectasis, Obstructive Pneumonitis, Consolidation, and (Malignant/Non-Malignant) Pleural Effusion
  - *Atelectasis/Pneumothorax = Complete or Partially Collapsed Lung*
  - *Pneumonitis - inflammation of the walls of the alveoli in the lungs, often caused by a virus.*
  - *Obstructive Pneumonitis – pneumonitis resulting in bronchial obstruction*
  - *Consolidation - a region of lung tissue that has filled with liquid or blood or pus instead of air*
  - *Pleural Effusion/Hemothorax - a buildup of extra fluid in the space between the lungs and the chest wall.*
    - Most pleural effusions are hemorrhagic or bloody which indicates malignant pleural effusion without even looking at cytology
    - Any pleural effusion in lung cancer is deemed "malignant" and must be proven "negative" x 2-3 cytology examinations
    - When pleural effusion described as "minimal" or "small" it may not be 'treated' as with involvement – still code as malignant pleural effusion for consistency in staging cases
  - *Primary Tumor Extension to either Pleura is not the same as pleural effusion*

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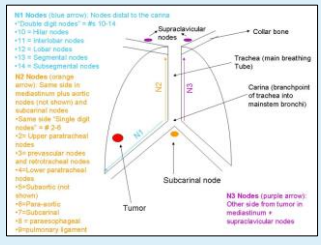
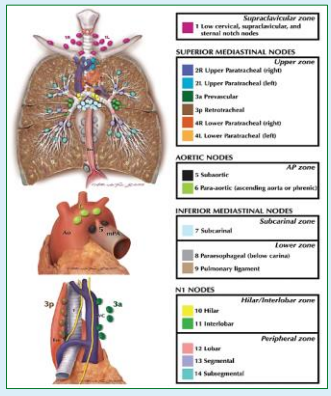
FCDS Lung Audits – 2014/2015 Diagnosis

- Tumor Size 000 (no evidence of primary tumor) vs. 999 (unk)
- Several Regional Lymph Node Issues
- N1, N2 and N3 are ALL "regional lymph nodes"





Source: International Association for the Study of Lung Cancer, 2008

- Must look at whether hilar or mediastinal nodes – do not treat as same
- Coding FNA of Regional Lymph Node in Scope of Reg Lymph Node Surgery
- Coding Regional Lymph Nodes Examined / Regional Lymph Nodes Positive
- Disconnect between Surgery of Primary Site Code 30 versus 33 and "regional" node definitions – often code 33 is for mediastinal node removal

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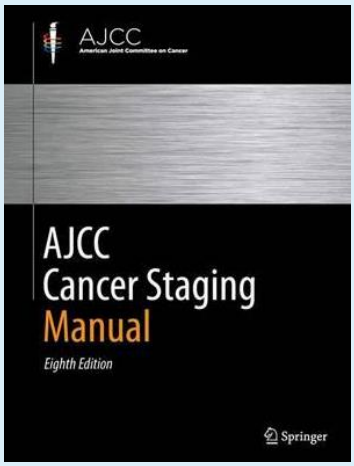

DESCRIPTOR	SEVENTH EDITION	EIGHTH EDITION
T component		
0 cm (pure lepidic adenocarcinoma ≤3 cm total size)	T1a if ≤2 cm; T1b if >2-3 cm	Tis (AIS)
≤0.5 cm invasive size (lepidic predominant adenocarcinoma ≤3 cm total size)	T1a if ≤2 cm; T1b if >2-3 cm	T1mi
≤1 cm	T1a	T1a
>1-2 cm	T1a	T1b
>2-3 cm	T1b	T1c
>3-4 cm	T2a	T2a
>4-5 cm	T2a	T2b
>5-7 cm	T2b	T3
>7 cm	T3	T4
Bronchus <2 cm from carina	T3	T2
Total atelectasis/pneumonitis	T3	T2
Invasion of diaphragm	T3	T4
Invasion of mediastinal pleura	T3	-
N component		
No assessment, no involvement, or involvement of regional lymph nodes	NX, N0, N1, N2, N3	No change
M component		
Metastases within the thoracic cavity	M1a	M1a
Single extrathoracic metastasis	M1b	M1b
Multiple extrathoracic metastases	M1b	M1c

Abbreviations: AIS, adenocarcinoma in situ; mi, minimally invasive adenocarcinoma; Tis, tumor in situ.

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Lung Cancer—Major Changes in the American Joint Committee on Cancer Eighth Edition Cancer Staging Manual

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CME CNE

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Abstract: The revision for the eighth edition of the tumor, node, and metastasis (TNM) classification of lung cancer was based on analyses of the International Association for the Study of Lung Cancer database, which included 77,156 evaluable patients diagnosed with lung cancer from 1999 to 2010. Among tumor (T) descriptors, the following new tumor-size groups were created: T1a, ≤1 cm; T1b, >1 to 2 cm; T1c, >2 to 3 cm; T2a, >3 to 4 cm; T2b, >4 to 5 cm; T3, >5 to 7 cm; and T4, >7 cm. Tis and T1mi were introduced for adenocarcinoma in situ and minimally invasive adenocarcinoma, respectively. Endobronchial tumors located <2 cm from the carina have better prognosis than those with any other T3 descriptor and were classified as T2. Total atelectasis/pneumonitis was classified as a T2 descriptor, because it has a T2 prognosis. Diaphragmatic invasion is now T4. Visceral pleural invasion remains unchanged, and mediastinal pleura invasion, which is seldom used, disappears as a T descriptor. The lymph node (N) component descriptors are unchanged, but the number of involved nodal stations has prognostic impact. For the metastasis (M) component, M1a (intrathoracic metastases) remains unchanged, but extrathoracic metastases are divided into a single extrathoracic metastasis (new M1b) and multiple extrathoracic metastases in a single organ or multiple organs (M1c). Stage IA is now divided into IA1, IA2, and IA3 to accommodate T1a, T1b, and T1cN0M0 tumors, respectively; all N1 disease is stage IIB except for T3-T4N1M0 tumors, which are stage IIIA; a new stage IIIC is created for T3-T4N3M0 tumors; and stage IV is divided into IVA (M1a and M1b) and IVB (M1c). This revision enhances our capacity for prognostication and will have an important impact in the management of patients with lung cancer and in future research. CA Cancer J Clin 2017;67:138–155. © 2017 American Cancer Society.

Keywords: lung cancer, lung cancer staging, nonsmall cell lung cancer, regional lymph node map, small cell lung cancer, stage grouping, TNM classification, visceral pleural invasion

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TABLE 9. Schematic Summary of Patterns of Disease and TNM Classification in Patients Who Have Lung Cancer With Multiple Pulmonary Sites of Involvement

VARIABLE	SECOND PRIMARY LUNG CANCER	SEPARATE TUMOR NODULE (INTRAPULMONARY METASTASIS)	MULTIFOCAL GG/L NODULES	PNEUMONIC TYPE OF ADENOCARCINOMA
Imaging features	Two or more distinct masses with imaging characteristics of lung cancer (eg, spiculated)	Typical lung cancer (eg, solid, spiculated) with separate solid nodule	Multiple ground-glass or part-solid nodules	Patchy areas of ground glass and consolidation
Pathologic features	Different histotype or different morphology by comprehensive histologic assessment	Distinct masses with the same morphologic features by comprehensive histologic assessment	Adenocarcinomas with prominent lepidic component (typically varying degrees of AIS, MIA, LPA)	Same histologic features throughout (most often invasive mucinous adenocarcinoma)
TNM classification	Separate cTNM and pTNM for each cancer	Location of separate nodule relative to primary site determines if T3, T4 or M1a; single N and M	T based on highest T lesion with (#/m) indicating multiplicity; single N and M	T based on size or T3 if in single lobe, T4 or M1a if in different ipsilateral or contralateral lobes; single N and M
Conceptual view	Unrelated tumors	Single tumor, with intrapulmonary metastasis	Separate tumors, albeit with similarities	Single tumor, diffuse pulmonary involvement

Abbreviations: AIS, adenocarcinoma in situ; GG/L, ground glass/lepidic; LPA, lepidic-predominant adenocarcinoma; MIA, minimally invasive adenocarcinoma; p, pathologic; TNM, tumor, node, metastasis. [a]Reprinted from: Detterbeck FC, Nicholson AG, Franklin WA, et al. The IASLC Lung Cancer Staging Project: summary of proposals for revisions of the classification of lung cancers with multiple pulmonary sites of involvement in the forthcoming eighth edition of the TNM classification. *J Thorac Oncol*. 2016;11:539-650[19] with permission from Elsevier.

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Cancer Staging Basics

- There are three components to AJCC Cancer Stage and to assign Summary Stage 2018:
  - *Where and how big the original mass or primary tumor is = T*
  - *Which nodes the cancer has spread to including how many positive = N*
  - *Whether the cancer has spread to 1 or more distant site(s) = M*
- The T, N, and M information is joined to assign a Summary Stage and an AJCC "Stage Group" (now called **Anatomic Stage/Prognostic Group** with addition of genetic and bio-molecular tumor markers and other prognostic factors in the AJCC 8th edition)
  - All cancers must be assigned 2018 Summary Stage – SS2018
  - All cancers can be assigned clinical stage – verify histology inclusion for TNM Chapter
  - Surgically resected cancers can be assigned pathological stage – verify histology inclusion list
- Patients completing pre-surgical chemo, radiation, or other therapy can be assigned post-treatment stage

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Site/Histo = AJCC Schema + Schema ID

Histology	AJCC ID	Description
8000, 8010, 8012-8013, 8022-8023, 8031-8033, 8040-8042, 8045, 8070-8072, 8082-8083, 8140, 8144, 8200, 8230, 8240, 8246, 8249-8250, 8252-8257, 8260, 8265, 8333, 8430, 8480-8481, 8551, 8560, 8562, 8972, 8980	36	Lung
8001-8005, 8011, 8014-8021, 8030, 8034-8035, 8043-8044, 8046-8060, 8073-8081, 8084-8131, 8141-8143, 8145-8191, 8201-8221, 8231, 8241-8245, 8247-8248, 8251, 8261-8264, 8270-8332, 8334-8420, 8440-8474, 8482-8550, 8552, 8561, 8570-8700, 8720-8790, 9700-9701	XX	Other Lung

Name	Default Value	Description	NAACCR Item
Schema ID	00360		NAACCR #3800
AJCC ID	XX		NAACCR #995

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Site/Histo = AJCC Schema + Schema ID

Chapter Numb	Disease Number	Chapter Title	Disease Title	Disease ID	Code	Description	Attribute 2
36	36	Lung	Lung	THO-LUN	8000	Neoplasm, malignant	Surveillance
36	36	Lung	Lung	THO-LUN	8010	Carcinoma, NOS	Surveillance
36	36	Lung	Lung	THO-LUN	8012	Large cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8013	Large cell neuroendocrine carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8013	Combined large cell neuroendocrine carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8022	Pleomorphic carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8023	NUT carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8031	Giant cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8032	Spindle cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8033	Pseudosarcomatous carcinoma	Surveillance
36	36	Lung	Lung	THO-LUN	8040	Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia	Clinical
36	36	Lung	Lung	THO-LUN	8041	Small cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8042	Oat cell carcinoma	Surveillance
36	36	Lung	Lung	THO-LUN	8045	Combined small cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8070	Squamous cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8070	Squamous cell carcinoma in situ	Clinical
36	36	Lung	Lung	THO-LUN	8071	Keratinizing squamous cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8072	Non-keratinizing squamous cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8082	Lymphoepithelioma-like carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8083	Basaloid squamous cell carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8140	Adenocarcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8140	Adenocarcinoma in situ	Clinical
36	36	Lung	Lung	THO-LUN	8140	Adenocarcinoma in situ, non-mucinous	Clinical
36	36	Lung	Lung	THO-LUN	8144	Enteric adenocarcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8200	Adenoid cystic carcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8230	Solid adenocarcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8240	Typical carcinoid	Clinical
36	36	Lung	Lung	THO-LUN	8246	Neuroendocrine carcinoma, NOS	Surveillance
36	36	Lung	Lung	THO-LUN	8249	Atypical carcinoid	Clinical
36	36	Lung	Lung	THO-LUN	8250	Lepidic adenocarcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8252	Bronchiolo-alveolar carcinoma, non-mucinous	Surveillance
36	36	Lung	Lung	THO-LUN	8253	Invasive mucinous adenocarcinoma	Clinical
36	36	Lung	Lung	THO-LUN	8253	Adenocarcinoma in situ, mucinous	Clinical

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Clinical Classification - cTNM

- Based on Evidence Acquired Before Any Treatment
  - *Physical Exam*
  - *Imaging (CT Scan, PET Scan)*
  - *Laboratory Tests*
  - *Thoracentesis*
  - *Endoscopy with ultrasound or biopsy (core/FNA)*
    - Bronchoscopy (EBUS)
    - Esophagoscopy (EUS)
    - Mediastinoscopy
    - Thoracoscopy (VATS without resection of primary tumor)
  - *Exploratory Thoracotomy*

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Pathologic Classification - pTNM

- Includes Any Evidence Acquired Before Any Treatment PLUS
- Pathologic Assessment of Resected Primary Tumor (to highest pT) *
- Pathologic Assessment of Regional Lymph Nodes (to highest pN) *
- Isolated Tumor Cells (ITCs) in Lymph Node(s) are Classified N0 or M0
  - *pN0*
  - *pN0(i-)*
  - *pN0(i+)*
  - *pN0(mol-)*
  - *pN0(mol+)*
- pM can be either cM or pM when the T and/or N categories are valid

* *"Pathologic staging depends on the proven anatomic extent of disease, whether or not the primary lesion has been completely removed. If a biopsied primary tumor technically cannot be removed…and if the highest T and N categories or the M1 category of the tumor can be confirmed microscopically, the criteria for pathologic classification and staging have been satisfied without total removal of the primary cancer."*

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Post-Neoadjuvant p Classification - ypTNM

- **Best Demonstrates Need for Accurate Clinical Stage** when the first cancer surgery follows radiation therapy, chemotherapy, hormones, immunologic agents meant to alter the tumor behavior, size, extension, lymph node status, etc. resulting in down-stage of disease at time of first surgery and with some current regimens showing no primary tumor and negative nodes at surgery.

- *Patient must have received planned presurgical therapy(s):*
  - *Radiation Therapy (any modality)*
  - *Chemotherapy*
  - *Hormone(s)*
  - *Biologic Agent (BRM/Immuno)*
  - *Combination of above*

- *Patient must have post-therapy excision of primary site and nodes sufficient to meet the criteria to assign AJCC Stage Pathologic Classification or pTNM.*

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T Category

CATEGORY	SUBCATEGORY	DESCRIPTORS
T: Primary tumor		
TX		Primary tumor cannot be assessed, or tumor proven by the presence of malignant cells in sputum or bronchial washings but not visualized by imaging or bronchoscopy
T0		No evidence of primary tumor
Tis		Carcinoma in situ: • Tis (AIS): adenocarcinoma • Tis (SCIS): squamous cell carcinoma
T1		Tumor 3 cm or less in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobar bronchus (ie, not in the main bronchus); the uncommon superficial spreading tumor of any size with its invasive component limited to the bronchial wall, which may extend proximal to the main bronchus, is also classified as T1a
	T1mi	Minimally invasive adenocarcinoma
	T1a	Tumor 1 cm or less in greatest dimension
	T1b	Tumor more than 1 cm but not more than 2 cm in greatest dimension
	T1c	Tumor more than 2 cm but not more than 3 cm in greatest dimension
T2		Tumor more than 3 cm but not more than 5 cm; or tumor with *any* of the following features (T2 tumors with these features are classified T2a if 4 cm or less or if size cannot be determined and as T2b if greater than 4 cm but not larger than 5 cm): • Involves main bronchus regardless of distance to the carina, but without involving the carina • Invades visceral pleura • Associated with atelectasis or obstructive pneumonitis that extends to the hilar region, either involving part of the lung or the entire lung
	T2a	Tumor more than 3 cm but not more than 4 cm in greatest dimension
	T2b	Tumor more than 4 cm but not more than 5 cm in greatest dimension
T3		Tumor more than 5 cm but not more than 7 cm in greatest dimension or one that directly invades any of the following: parietal pleura (PL3), chest wall (including superior sulcus tumors), phrenic nerve, parietal pericardium; or associated separate tumor nodule(s) in the same lobe as the primary
T4		Tumors more than 7 cm or one that invades any of the following: diaphragm, mediastinum, heart, great vessels, trachea, recurrent laryngeal nerve, esophagus, vertebral body, carina; separate tumor nodule(s) in a different ipsilateral lobe to that of the primary

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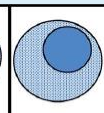
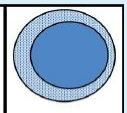
T Category

cT*	CT image on HRCT						
	Solid part Total tumor size including GG Pathologic Differential Diagnosis	0 ≤0.5 cm AAH‡, AIS, MIA	0 cm 0.6-3.0 cm AIS, MIA, LPA	≤0.5 cm† ≤3.0 cm†† MIA, LPA, AIS	0.6-1.0 cm† 0.6-3.0 cm†† LPA, Invasive AD, MIA	1.1-2.0 cm † 1.1-3.0 cm†† LPA, Invasive AD	2.1-3.0 cm† 2.1-3.0 cm†† Invasive AD
	Clinical Stage*		cTis	cT1mi	cT1a	cT1b	cT1c
pT	Invasive part	0	0 cm	≤0.5 cm†	0.6-1.0 cm†	1.1-2.0 cm†	2.1-3.0 cm†
	Total tumor size including lepidic growth part	Usually ≤0.5 cm‡	≤3.0 cm	≤3.0 cm	0.6-3.0 cm††	1.1-3.0 cm††	2.1-3.0 cm††
	Pathology	AAH	AIS	MIA	Lepidic predominant AD or Invasive AD with lepidic component	Invasive AD with a lepidic component or lepidic predominant AD	Invasive AD with lepidic component
	Pathologic Stage		pTis	pT1mi	pT1a	pT1b	pT1c

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N Category

N: Regional lymph nodes	
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes and intrapulmonary nodes, including involvement by direct extension
N2	Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)
N3	Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral, or contralateral scalene, or supraclavicular lymph node(s)

Isolated Tumor Cells (ITCs) in Lymph Node(s) are Classified N0 or M0

- pN0
- pN0(i-)
- pN0(i+)
- pN0(mol-)
- pN0(mol+)

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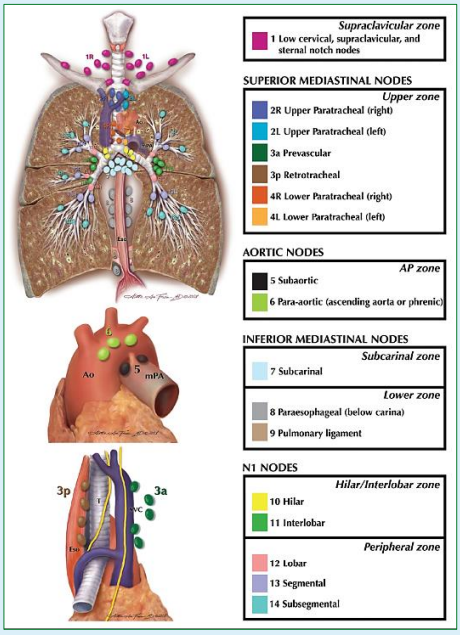

Lung Anatomy

- **NX** Regional lymph nodes cannot be assessed
- **N0** No regional lymph node metastases
- **N1** Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes and intrapulmonary nodes, including involvement by direct extension
- **N2** Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)
- **N3** Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s)

IASLC lymph node map - WHO Classification of Tumours of the Lung, 2015

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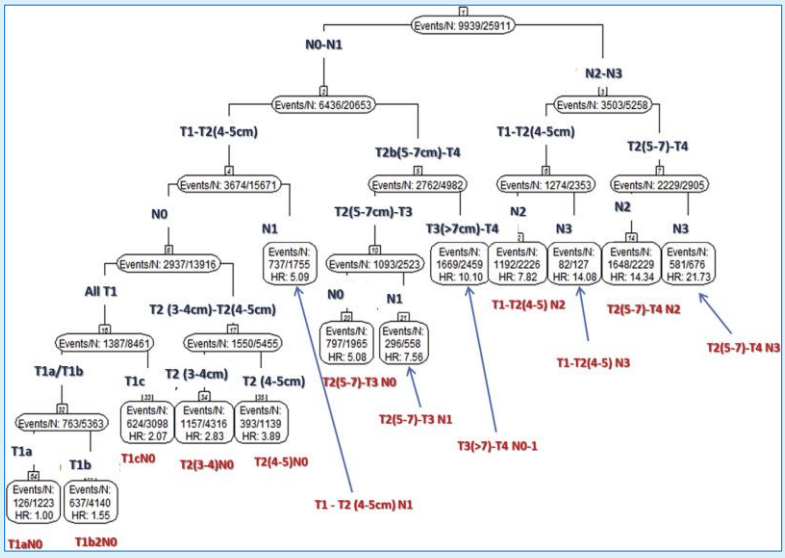
IASLC Staging Survival Tree



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M Category

M: Distant metastasis		
M0		No distant metastasis
M1		Distant metastasis
	M1a	Separate tumor nodule(s) in a contralateral lobe; tumor with pleural nodules or malignant pleural or pericardial effusion; most pleural (pericardial) effusions with lung cancer are due to tumor; in a few patients, however, multiple microscopic examinations of pleural (pericardial) fluid are negative for tumor, and the fluid is nonbloody and is not an exudate; where these elements and clinical judgment dictate that the effusion is not related to the tumor, the effusion should be excluded as a staging descriptor
	M1b	Single extrathoracic metastasis in a single organ and involvement of a single distant (nonregional) node
	M1c	Multiple extrathoracic metastases in one or several organs

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Anatomic Stage/Prognostic Groups

- Stage IA is now divided into IA1, IA2, and IA3 for T1a, T1b, and T1cN0M0 tumors
- ALL N1 disease is stage IIB except for T3-T4N1M0 tumors, which are stage IIIA
- New Stage IIIC is created for T3-T4N3M0 tumors
- Stage IV is divided into IVA (M1a and M1b) and IVB (M1c)

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Anatomic Stage/Prognostic Groups

STAGE	T	N	M
Occult carcinoma	TX	N0	M0
0	Tis	N0	M0
IA1	T1mi	N0	M0
	T1a	N0	M0
IA2	T1b	N0	M0
IA3	T1c	N0	M0
IB	T2a	N0	M0
IIA	T2b	N0	M0
IIB	T1a,b,c	N1	M0
	T2a,b	N1	M0
	T3	N0	M0
IIIA	T1a,b,c	N2	M0
	T2a, b	N2	M0
	T3	N1	M0
	T4	N0	M0
	T4	N1	M0
IIIB	T1a,b,c	N3	M0
	T2a,b	N3	M0
	T3	N2	M0
	T4	N2	M0
IIIC	T3	N3	M0
	T4	N3	M0
IVA	Any T	Any N	M1a
	Any T	Any N	M1b
IVB	Any T	Any N	M1c

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Small Cell Lung Cancer VALG Stage

- **Veterans Administration Lung Study Group's (VALG)** Staging Classification for Small Cell Lung Cancer
- **Limited-Stage:** AJCC (8th edition) Stage I-III (excludes most T3-T4 due to multiplicity of tumors in same lung – cannot radiate for local control)
- **Extensive-Stage:** AJCC (8th edition) Stage IV and most T3-T4

Still use AJCC TNM when can be more specific. But, most clinicians will refer to the VALG "limited" or "extensive" when assessing for treatment options, particularly for inclusion/exclusion of XRT to chest when T3-T4.

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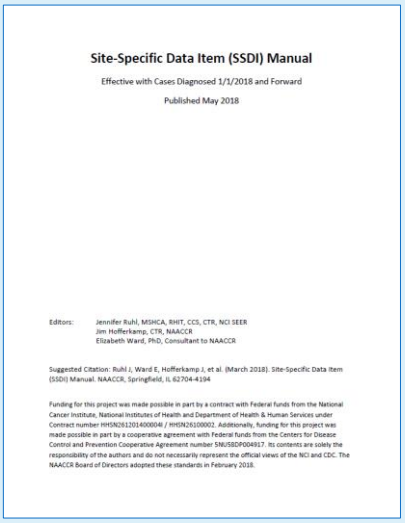
2018 Lung Site-Specific Data Items

- **REQUIRED for Staging – NONE**
- **RECOMMENDED for Clinical Care – CoC Required**
  - *Separate Tumor Nodules*
  - *Visceral and Parietal Pleural Invasion*
- **Registry Data Collection Variables - SSDIs not yet defined**
  - *Resection Margins*
  - *Adequacy of Mediastinal Dissection*
  - *EGFR Mutation*
  - *ALK Gene Rearrangement*
  - *Symptoms*
  - *Weight Loss*
  - *Performance Status*
  - *Prophylactic Cranial Radiotherapy*
  - *LVI and Perineural Invasion*
  - *Type of Visceral Pleural Invasion – PL1 versus PL2*
  - *SUV of Primary Tumor*



Site-Specific Data Item (SSDI) Manual

Effective with Cases Diagnosed 1/1/2018 and Forward

Published May 2018

Editors: Jennifer Ruhl, MSHCA, RHIT, CCS, CTR, NCI SEER
Jim Hofferkamp, CTR, NAACCR
Elizabeth Ward, PhD, Consultant to NAACCR

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Lung Cancer Primary Treatment Options

- Appropriate treatment for lung cancer is based on whether the tumor is small cell (13%) or non-small cell (84%), as well as the stage and molecular characteristics of the cancer.
- For early-stage non-small cell lung cancers, surgery is the usual treatment, sometimes with chemotherapy, alone or in combination with radiation therapy.
- Advanced-stage non-small cell lung cancer is usually treated with chemotherapy, targeted drugs (or a combination of the two), or immunotherapy.
- Small cell lung cancer is usually treated with chemotherapy, alone or combined with radiation; a large percentage of patients on this regimen experience remission, although the cancer often returns.

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Standard Chemotherapy

- Cisplatin
- Carboplatin
- Paclitaxel (Taxol)
- Nab-Paclitaxel (Abraxane)
- Docetaxel (Taxotere)
- Gemcitabine (Gemzar)
- Vinorelbine (Navelbine)
- Irinotecan (Camptosar)
- Etoposide (VP-16)
- Vinblastine
- Pemetrexed (Alimta)

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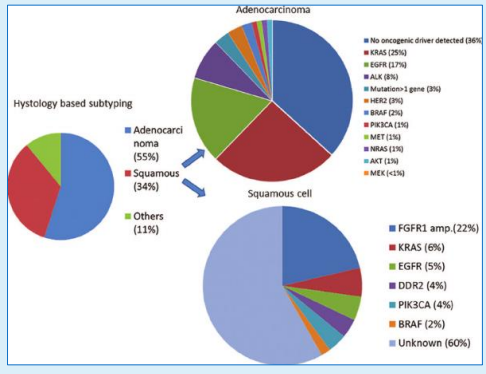
Targeted Therapies

- Class of Antineoplastic Agents for NSCLC – Target Gene Therapy
  - *EGFR – Opdivo/Nivolumab*
  - *EGFR – Tarceva/Erlotinib*
  - *EGFR – Gilotrif/Afatinib*
  - *EGFR – Iressa/Gefitinib*
  - *EGFR – Portrazza/Necitumumab*
  - *EGFR T790M – Tagrisso/Osimertinib*
  - *ALK – Opdivo/Nivolumab*
  - *ALK – Xalkori/Crizotinib*
  - *ALK – Zykadia/Ceritinib*
  - *ALK – Alecensa/Alectinib*
  - *ALK – Alunbrig/Brigatinib*



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Targeted Therapies

- Class of Antineoplastic Agents for NSCLC – Target Gene Therapy
  - *BRAF V600E – Tafinlar/Dabrafenib)*
  - *BRAF V600E – Mekinist (Trametinib)*
  - *ROS1 – Xalkori (Crizotinib)*
- Class of Antineoplastic Agents for NSCLC – Immunotherapy
  - *PD-1 – Keytruda/Pembrolizumab*
  - *PD-L1 – Tecentriq/Atezolizumab*
- Treatment Targets for NSCLC – Angiogenesis Inhibitors & Targets
  - *Bevacizumab (Avastin)*
  - *VEGF Receptor Ramucirumab (Cyramza)*
- Maintenance Therapy for NSCLC – Chemotherapy
  - *Alimta/Pemetrexed - stable disease, partial/complete response s/p Platinum*

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Targeted Therapies

- Class of Antineoplastic Agents for NSCLC – Target Gene Therapy – Future
  - *HER2/ERBB2 – Trastuzumab – This is a protein not a mutant gene*
  - *MET – Crizotinib*
  - *MET – Cabozantinib*
  - *RET – Cabazantinib*
  - *RET – Vandetanib*
  - *RET – Alectinib*
- Class of Antineoplastic Agents for NSCLC – Future
  - *Molecular Testing – Next Generation Sequencing – Multiple Mutations 1 Test*
  - *FISH and IHC Improvements*
  - *Liquid Biopsy*
  - *Combination Trials*

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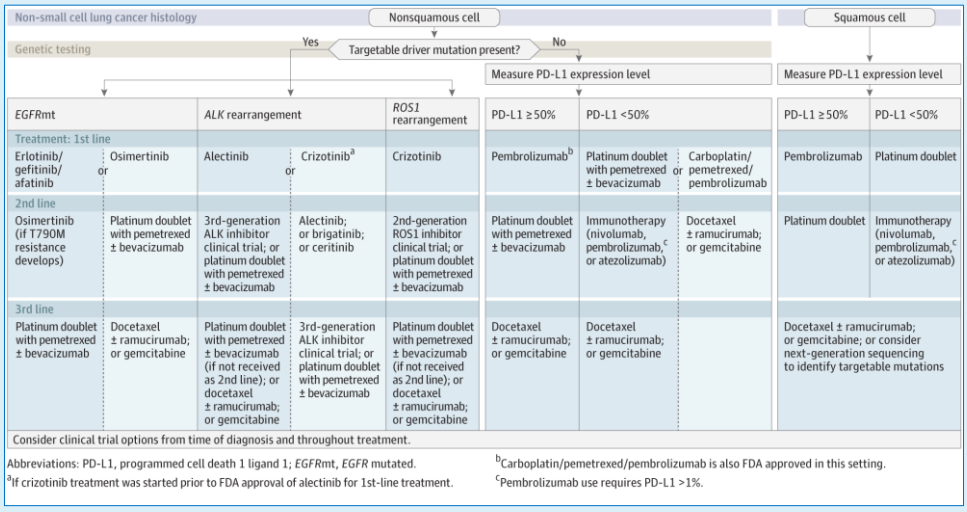
Targeted Therapies



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What about Small Cell Lung Cancer?

- Standard Chemotherapy
  - *Cisplatin and etoposide*
  - *Carboplatin and etoposide*
  - *Cisplatin and irinotecan*
  - *Carboplatin and irinotecan*
- Radiation Therapy
  - *limited stage*
  - *post-chemo*
  - *brain mets*
  - *palliation*
- Surgery – rare for SCLC

Grade	Traditional	ENETs, WHO	Moran *et al*
Low	Carcinoid Tumour	Neuro endocrine tumour, grade 1	Neuroendocrine carcinoma grade 1
Intermediate	Carcinoid Tumour	Neuro endocrine tumour grade 2	Neuroendocrine carcinoma grade2
High	Small cell carcinoma,	Neuroendocrine carcinoma grade 3, small cell carcinoma	Neuroendocrine carcinoma grade 3, small cell carcinoma
	Large cell neuroendocrine carcinoma	Neuroendocrine carcinoma grade 3, large cell neuroendocrine carcinoma	Neuroendocrine carcinoma grade 3, large cell neuroendocrine carcinoma

*Taken from North American Neuroendocrine Tumour Society guidelines,
WHO: World Health Organization

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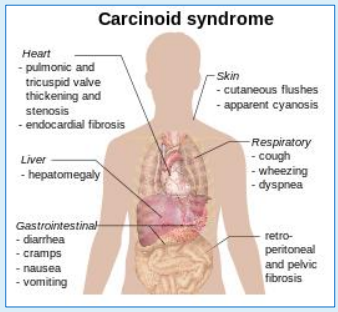
What about Carcinoid Tumor of Lung?

- Standard Chemotherapy
  - *Streptozocin*
  - *Etoposide (VP-16)*
  - *Cisplatin*
  - *Carboplatin*
  - *Temozolomide*
  - *Cyclophosphamide (Cytoxan®)*
  - *5-fluorouracil (5-FU)*
  - *Doxorubicin (Adriamycin®)*
  - *Dacarbazine (DTIC)*



- Somatostatin Analogs – NOT TREATMENT FOR CANCER – treats symptoms of carcinoid syndrome
  - *Octreotide/Sandostatin*
  - *Lanreotide/Somatuline*
- *Alpha Interferon*
- Targeted Drugs – clinical trials – *Sunitinib/Sutent & Everolimus/Afinitor*

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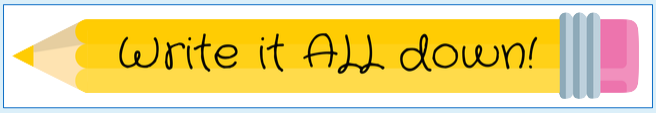
Text Documentation



- Dates
- CT Scans
- Screening
- Tumor Size – clinical and pathological
- Nodal Status – clinical and pathological
- All Metastatic Sites
- Results of Genetic Profile – what is positive and what marker studies were performed
- Specific Agents for Chemotherapy
- Specific Agents for Targeted Therapies
- Radiation Fields and Dosage

- ALL Surgical Procedures to Primary Site
- ALL Surgical Procedures to Lymph Nodes
- Caution: Do not code Surgery to Other Regional or Distant Sites unless cancer-related.
- When assigning post-treatment stage be very cautious that patient meets criteria for *yp.*
- *This year we do not collect yc – perhaps next yr*

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PRACTICE CASES

Practice Cases

- We will not include Histology Coding Practice Cases until we can confirm with MPH.
- We will not include Staging Practice Cases until we can confirm with AJCC & SS2018.
- We hope that by late 2018 we can provide a selection of practice cases from multiple sites and histologies for registrars to code number of primaries (MP/H Rules), histology and behavior (ICD-O-3 Codes and MP/H Rules) and to stage cases using SS2018 - Summary Stage 2018 with references to AJCC Cancer Staging, 8th ed and 2018 Site-Specific Data Items.

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Questions