The 8th TNM staging system

Impact on surgical strategy in early and advanced NSCLC

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Disclosure slide

No conflicts of interest to declare

7TH TNM CLASSIFICATION[1]

Retrospective data collection

Database sampling 1990 – 2000

81915 patients

20 Countries

4 Continents	Europe	58%
	USA	21%
	Asia	14%

[1] enacted 2010

8TH TNM CLASSIFICATION[1]

Retrospective data collection

Database sampling 1999 – 2010

77156 patients

16 Countries

4 Continents	Europe	49%
	USA	5%
	Asia	44%

[1] to be enacted 2017

Goldstraw P, J Thorac Oncol 2015:;11:39-51

7TH TNM CLASSIFICATION		8TH TNM CLASSIFICATION	
Surgery only	41%	Surgery only[1]	58%
Combined treatments	25%	Combined treatments[2]	32%
Chemotherapy only	23%	Chemotherapy only	9%
Radiotherapy only	11%	Radiotherapy only	2%

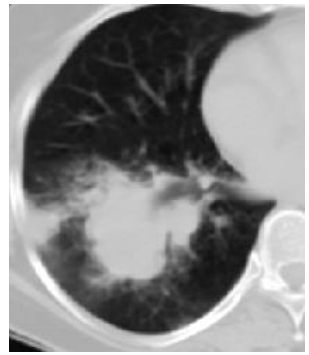
[1]Complete resection 28150 (94%)
[2]CHT+S 21%, RT+S 2%, trimodal 4%

→ Surgery in > 80% of patients

Goldstraw P, J Thorac Oncol 2015:;11:39-51

THE 8TH TNM CLASSIFICATION: *T-DESCRIPTORS*





1. CORRELATION OF SURVIVAL WITH TUMOR SIZE

1-5 cm tumors: progressive degradation of survival for each 1cm cut point

- Important for screening programs (60% stage I; 50% ≤ 1cm)
- Important for studies with sublobar resections

5-7cm tumors correspond to T3 survival

>7cm tumors correspond to T4 survival

Rami-Porta R, J Thorac Oncol 2015;10:990-1003

THE 8TH TNM CLASSIFICATION: *T-DESCRIPTORS*

2. INVOLVEMENT OF MAIN BRONCHUS BUT NOT CARINA

   Corresponds to a T2 prognosis *(including poststenotic pneumonia)*

   - T2N0-1M0 → upfront resection *(sleeve lobectomy)*

3. INVASION OF DIAPHRAGM

   Corresponds to T4 prognosis *(5y survival <30% after resection)*

4. MEDIASTINAL PLEURAL INVASION

   Mostly in combination with true mediastinal invasion *(T4 prognosis)*

Rami-Porta R, J Thorac Oncol 2015;10:990-1003

THE 8TH TNM CLASSIFICATION: *T-DESCRIPTORS*

T1 < 3cm, surrounded by lung/visceral pleura ≤ lobar bronchus

T1a(mi)	Minimally invasive adenocarcinoma (≤ 5mm invasion)
T1a	≤ 1 cm
T1b	> 1cm but ≤ 2cm
T1c	> 2cm but ≤ 3 cm

T2 > 3cm but <7 cm <5 cm,

or invades visceral pleura / main bronchus > 2cm carina but not carina

T2a	> 3cm but ≤ 4cm
T2b	> 4cm but ≤ 5cm

Rami-Porta R, J Thorac Oncol 2015;10:990-1003

THE 8TH TNM CLASSIFICATION: *T-DESCRIPTORS*

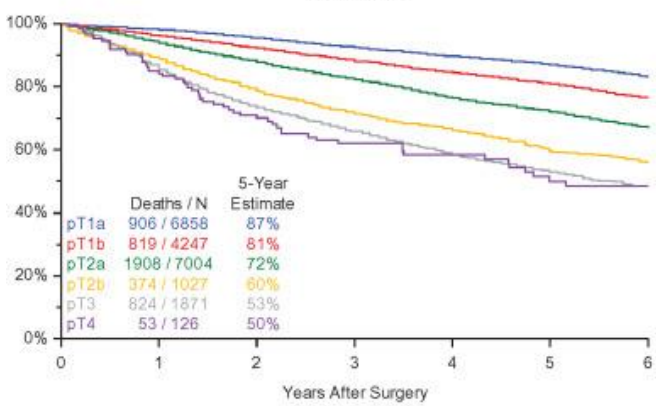
T3 > 7cm > 5cm but ≤ 7cm,
or satellite nodules in same lobe,
or invades chest wall / phrenic nerve / pericardium / diaphragm / mediastinal pleura / main bronchus < 2cm carina

T4 > 7 cm,
or invasion of mediastinum / diaphragm / heart / great vessels / carina / trachea / recurrent nerve / esophagus / vertebrae,
or separate nodule in a different ipsilateral lobe

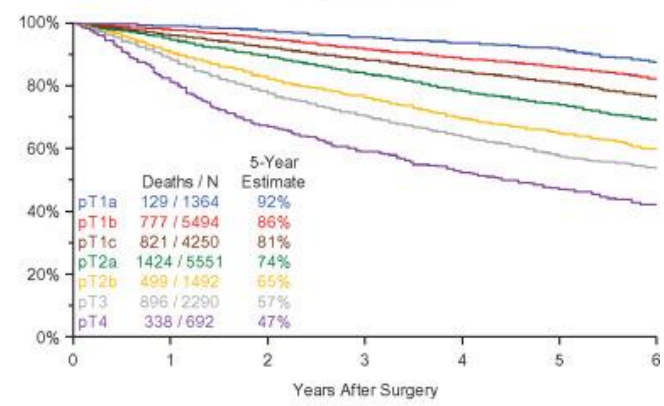
Rami-Porta R, J Thorac Oncol 2015;10:990-1003

THE 8TH TNM CLASSIFICATION: *T-DESCRIPTORS*

7th edition T categories

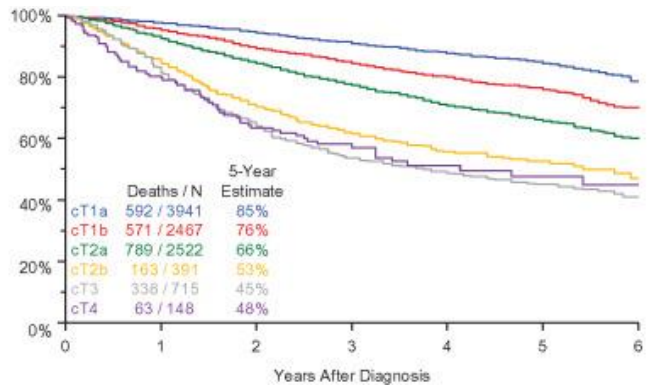


8th editon T categories

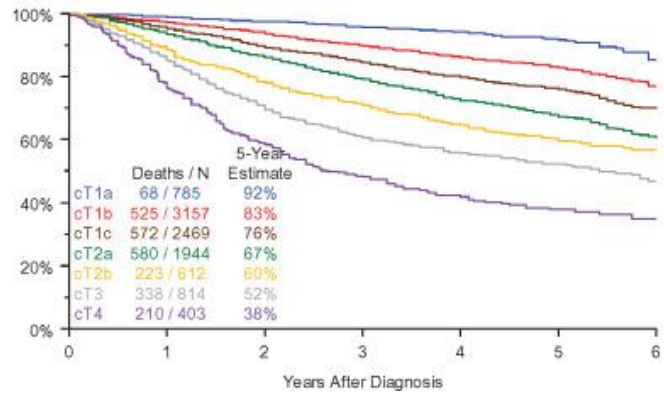


pT1-4N0M0R0 cases

7th editon T categories



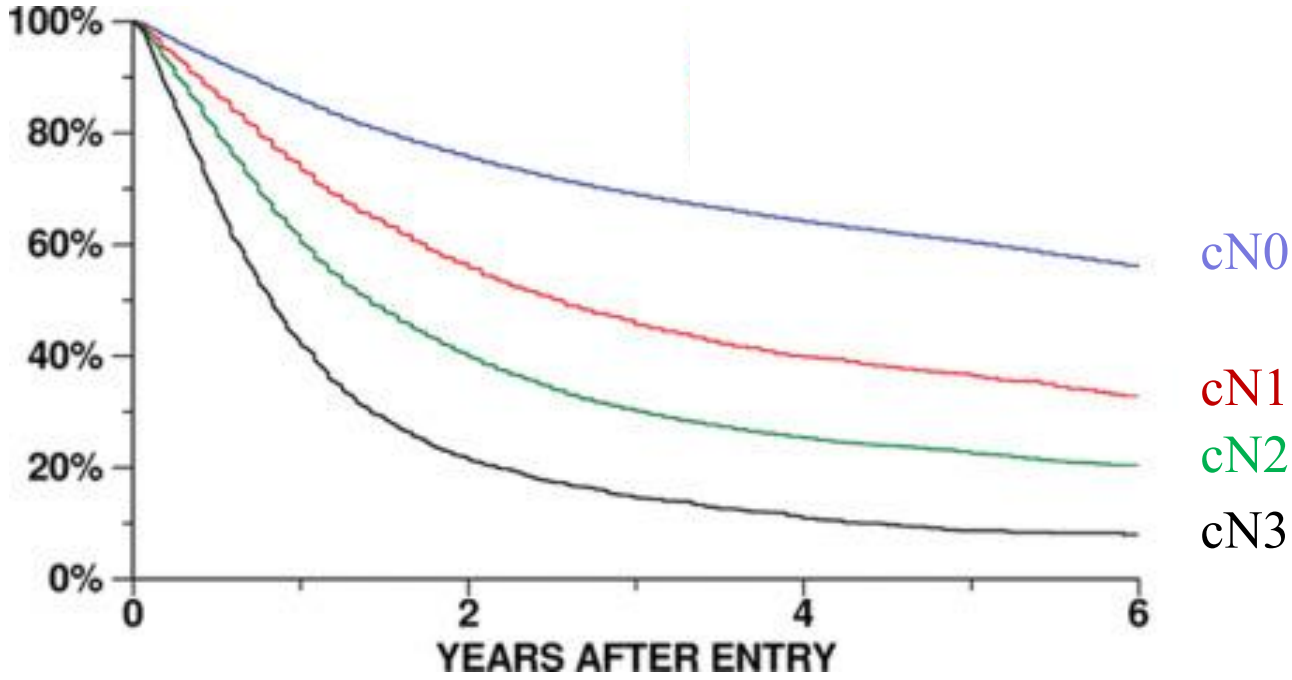
8th editon T categories



cT1-4N0M0 cases

Rami-Porta R, J Thorac Oncol 2015;10:990-1003

THE 8TH TNM CLASSIFICATION: *N-DESCRIPTORS*



The current (7th) N0-N3 descriptors consistently separate prognostically distinct groups for both, cN and pN status

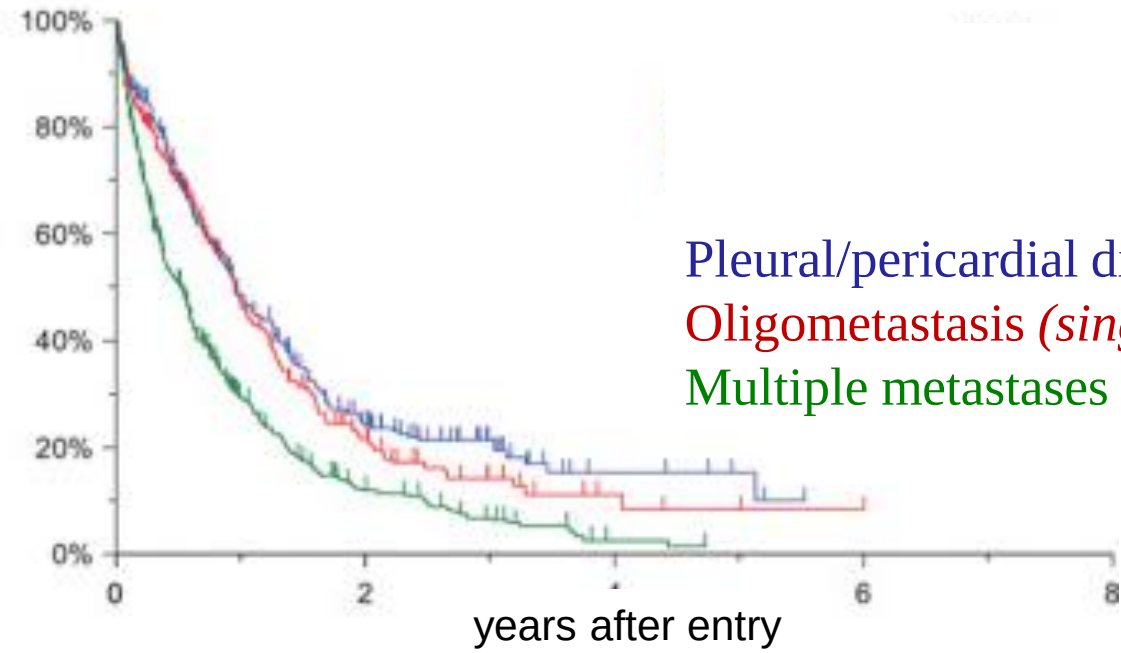
Assamura H, J Thorac Oncol 2015;10:1675-84

THE 8TH TNM CLASSIFICATION: *N-DESCRIPTORS*

N0	No node metastases
N1	Peribronchial / hilar metastases *(including extension involvement)*
N2	Ipsilateral /subcarinal metastases
N3	Contralateral mediastinal / hilar metastases or scalene / supraclavicular metastases *(ipsi/contralateral)*

Assamura H, J Thorac Oncol 2015;10:1675-84

THE 8TH TNM CLASSIFICATION: *M-DESCRIPTORS*



Pleural/pericardial dissemination
Oligometastasis *(single extrathoracic metastasis)*
Multiple metastases in one/multipe organs

Oligometastatic disease has a similar prognosis than pleural / pericardial dissemination which holds true for all organs systems involved

THE 8TH TNM CLASSIFICATION: *M-DESCRIPTORS*

M0	No distant metastases
M1a	Malignant pleural / pericardial dissemination /effusion, or contralateral / bilateral tumor nodules
M1b	Distant metastases Single extrathoracic metastasis *(oligometastatis)*[1]
M1c	Multiple extrathoracic metastases in one / more organs

[1]Include single distant non regional lymph node

Eberhardt WE, J Thorac Oncol 2015;10:1515-22

THE 8TH TNM CLASSIFICATION: *SURVIVAL*

Survival curves are the result from a combination of tumor characteristics and treatment efforts

Improved overall and stage-for stage-survival compared to the 7th edition

- Improvements in diagnosis / staging *(screening / PET / HRCT / EBUS)*
- Improvements in treatments *(adjuvant chemotherapy / VATS / MLND)*
- More radical options for less fit patients
- Improvement in patient care *(interdisciplinarity / case load)*

Goldstraw P, J Thorac Oncol 2015:;11:39-51
Rami-Porta R, J Thorac Oncol 2015;10:990-1003

THE 8TH TNM CLASSIFICATION

IMPACT ON SURGICAL STRATEGIES FOR NSCLC

The revised TNM edition is a refinement of the classification
and is not designed to formulate new treatment recommendations!

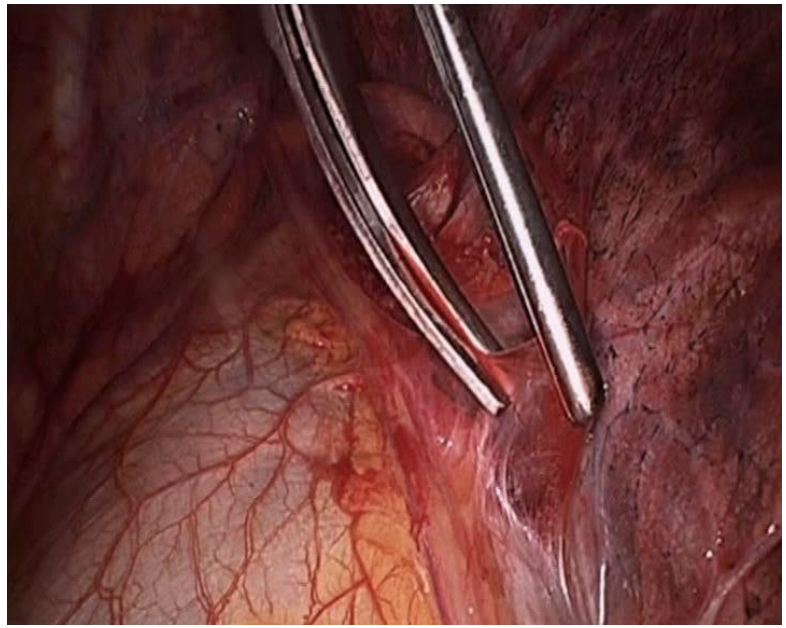
Changes of established treatments should be based on new trials

- Sublobar resections for small tumors?
- New multimodal approaches including surgery for T3/T4 tumors?
- Surgical approaches for oligometastatic disease?

Goldstraw P, J Thorac Oncol 2015:;11:39-51
Rami-Porta R, J Thorac Oncol 2015;10:990-1003

CURRENT TREATMENT OF STAGE I/II NSCLC

SURGERY REMAINS THE MAINSTAY OF TREATMENT IN OPERABLE PATIENTS



Lobectomy and mediastinal lymph node dissection (MLND) 1B
VATS procedures preferred in experienced centers 2C

ACCP Guidelines (3rd ed) Chest 2013;143 Suppl

CURRENT TREATMENT OF STAGE I/II NSCLC

SUBLOBAR RESECTIONS

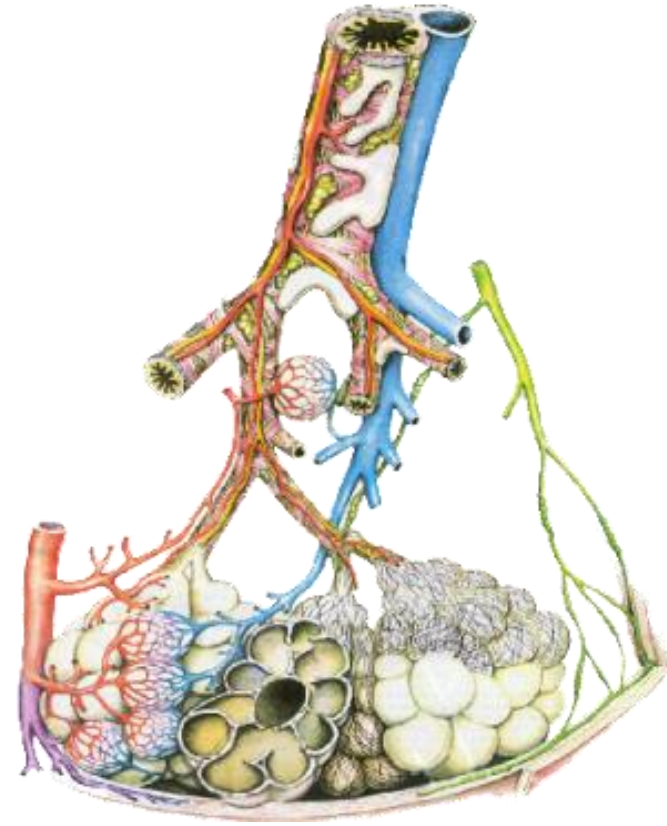
Patients with stage I NSCLC who can tolerate surgery but not a lobectomy 1B

Anatomical segmentectomy is preferred over wedge resection 2C

ACCP Guidelines (3rd ed) Chest 2013;143 Suppl

→ *Is there a place for segmentectomy in patients who can tolerate a lobectomy?*

ANATOMICAL SEGMENTECTOMY

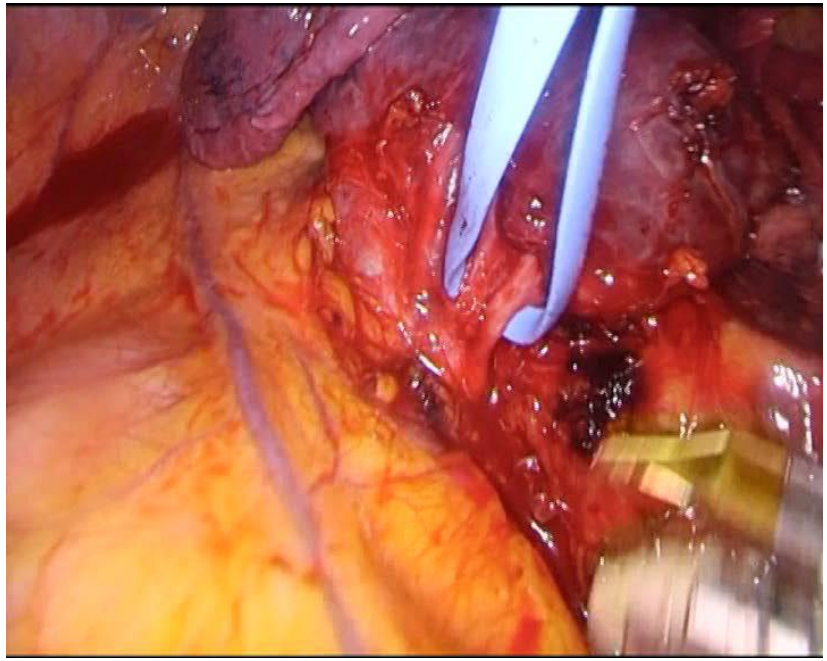


Individual isolation and division of the targeted segmental pedicle

Resection of the venous / lymphatic supply *(intersegmental plane)*

Hilar and mediastinal lymph node dissection / sampling

VATS *VS* OPEN SEGMENTECTOMY FOR STAGE I NSCLC[1]



Simlar postoperative outcomes, overall and cancer-specific survival

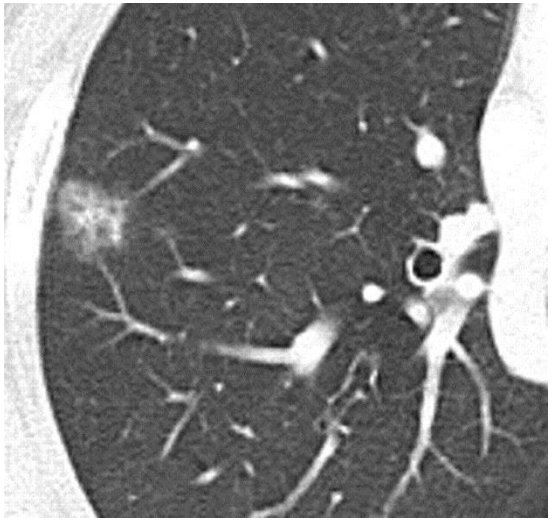
[1]SEERS DATABASE Propensity score matching 577 stage I NSCLC < 65y, 424 open, 153 VATS

Smith CB, J Thorac Oncol 2014;9:383-9

THE 8TH TNM CLASSIFICATION

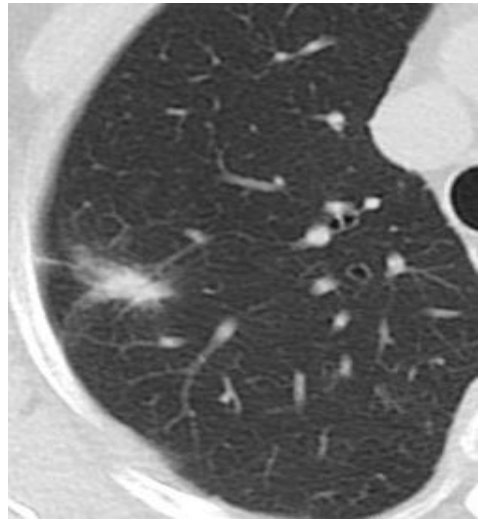
SURGICAL PERSPECTIVES FOR EARLY STAGE NSCLC

1. TRIALS WITH SUBLOBAR RESECTIONS FOR T1N0 TUMORS *(SCREENING)*



GROUND GLASS OPACITY

>5mm and increases in size develops solid component



PART SOLID LESION

> 8mm and persistant

SOLID NODULE

Clinically suspect
PET-CT positive

ACCP Guidelines (3rded) Chest 2013;143 Suppl

SEGMENTECTOMY *VS* LOBECTOMY FOR STAGE cI NSCLC

PROPENSITY SCORE MATCHED PAIRS

	N	SIZE	5Y OS	10Y OS	5Y DFS	10Y DFS	
Koike 2016							
Lobectomy	87	<2cm	85%	66%	80%	64%	ns
Segmentectomy	87	<2cm	84%	63%	77%	58%	
Kodama 2016							
Lobectomy	69	<1.5cm	90%	88%	97%	97%	
Segmentectomy	69	<1.5cm	97%	83%	97%	95%	ns

SEGMENTECTOMY *VS* LOBECTOMY FOR STAGE cI NSCLC

PROPENSITY SCORE MATCHED PAIRS

	N	SIZE	5Y OS	10Y OS	5Y DFS	10Y DFS	
Tsutani 2013							
Lobectomy	81	0.7cm	93%	-	93%	-	ns
Segmentectomy	81	0.8cm	96%	-	91%	-	
Landrenau 2014							
Lobectomy[1]	312	2.2±1cm	60%	-	71%[2]	-	ns
Segmentectomy[1]	312	2.2±1cm	54%	-	70%[2]	-	

[1] Stage IB: segmentectomy group 26%, lobectomy group 31%

RESECTION FOR SUBCENTRIMETRIC cT1N0M0 NSCLC *(N=135)*

CT/PET-CT → RESECTION + MLND/SAMPLING

	N	5Y OS	5Y DFS	pN1/2
Pure GGO	64	100%	100%	-
Part solid	45	100%	93%	0%
Pure solid	26	87%	75%	32%
Suv_{max}<2.5				3%
Suv_{max}>2.5				50%

→ *Risk of N1-2 disease in ≤1cm pure solid NSCLC with a high* SUV_{max}

Hattori A, Eur J Cardiothorac Surg 2015;47:244-9

THE 8TH TNM CLASSIFICATION

SURGICAL PERSPECTIVES FOR EARLY STAGE NSCLC

2. TRIALS WITH STEREOTACTIC RT *VS* SURGERY FOR T1N0 TUMORS

CURRENT INDICATION FOR SBRT

Patients who do not tolerate a segmentectomy or unfavorable tumor localization

ACCP Guidelines (3rded) Chest 2013;143 Suppl

SBRT *VS* SURGERY FOR OPERABLE STAGE cI NSCLC

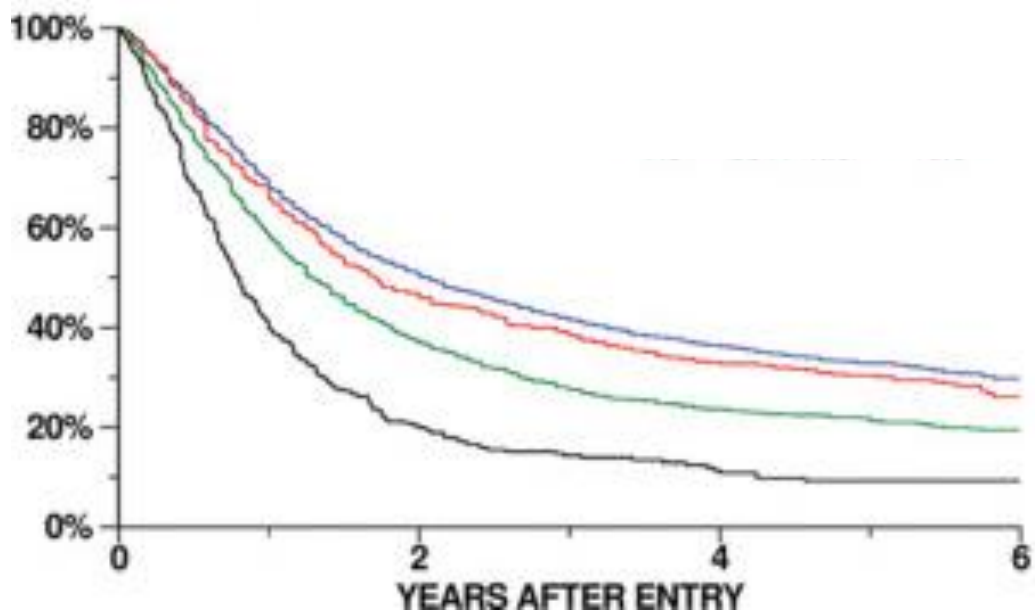
	MORTALITY	FOLLOW UP MTS	RECURRENCE LOCO-REGIONAL	OS
Chang$_{2015}$				
S = 27	4%	35	4%[1]	79%[1] (3y)
RT= 31	0%	40	16.1%	95% (3y)
Hamaji$_{2015}$				
S = 41	0%	54	8%[2]	69%[2] (5y)
RT = 41	0%	41	38%	37% (5y)
vandenBergh$_{2015}$				
S = 143	-	61	13%[3]	58%[3] (5y)
RT = 197[3]	-	61	23%	32% (5y)

[1]Combined analysis of failed ROSEL/STARS trials, 30% patients in SABR group without histology
[2]Blinded, prospensity score matching, all patients in SABR with histology
[3]Matched pairs, 78% patients in SABR group without histology

THE 8TH TNM CLASSIFICATION

SURGICAL PERSPECTIVES FOR LOCALLY ADVANCED NSCLC

1. NEW TRIALS WITH INDUCTION THERAPY→ SURGERY FOR T3 TUMORS

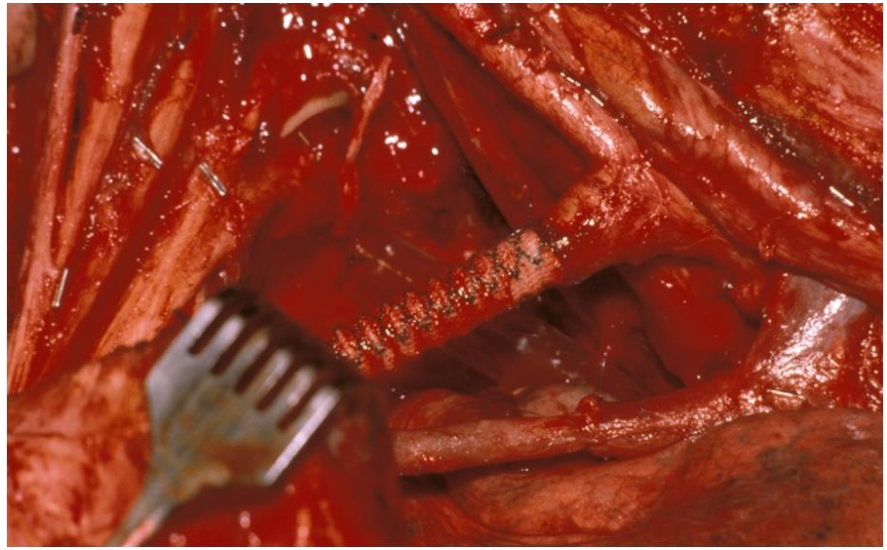


T3N0M0: 5y survival 33%[1]
T3N1M0: 5y survival 30%
T3N2M0: 5y survival 21%

[1] 8th Edition

Assamura H, J Thorac Oncol 2015;10:1675-84

INDUCTION THERAPY → SURGERY FOR T3N0-2 TUMORS



PANCOAST TUMOR

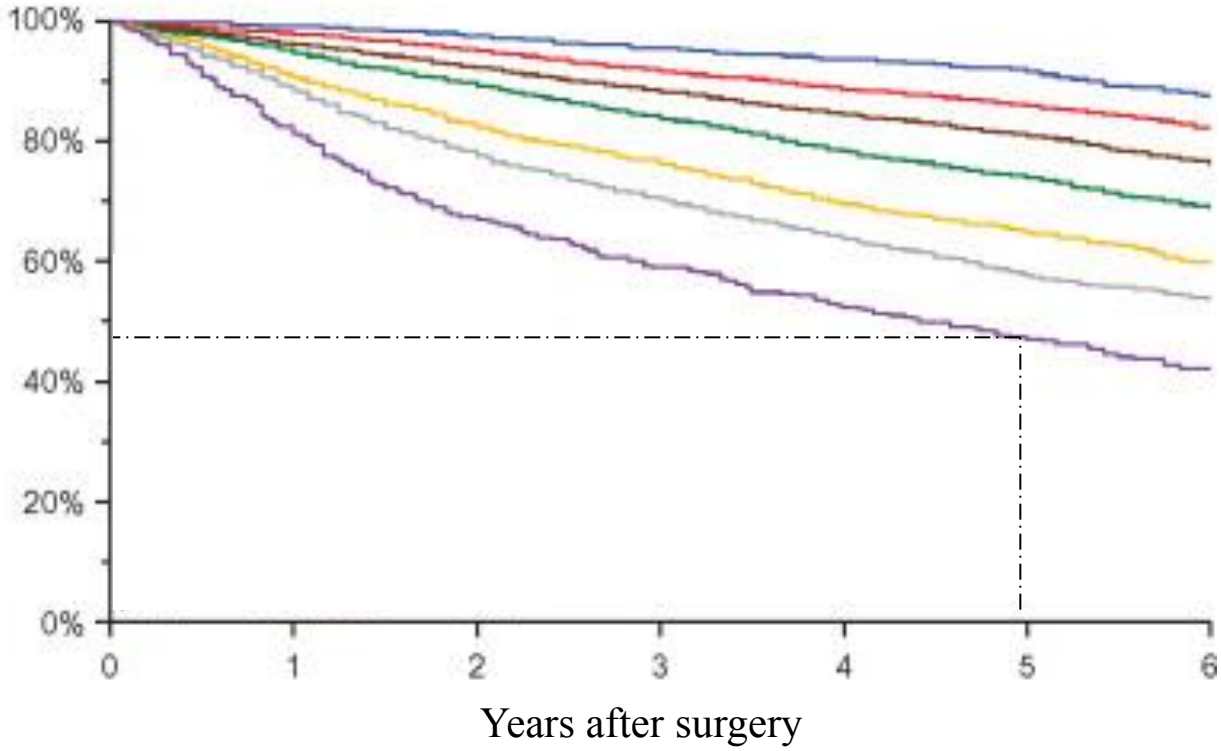
CHEST WALL INVASION

TUMOR SIZE >5 cm

THE 8TH TNM CLASSIFICATION

SURGICAL PERSPECTIVES FOR LOCALLY ADVANCED NSCLC

3. NEW TRIALS WITH INDUCTION → SURGERY FOR $T4_{invasive}$ TUMORS

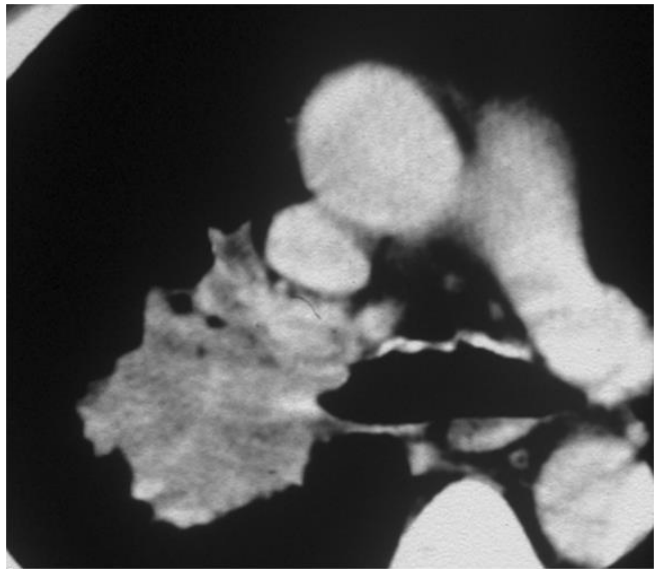


pT4N0M0R0
47% 5y survival[1]

[1] 8th Edition

R Rami-Porta, J Thorac Oncol 2015;10:990-1003

INDUCTION THERAPY AND RESECTION FOR $T4_{invasive}$ N0-1 NSCLC



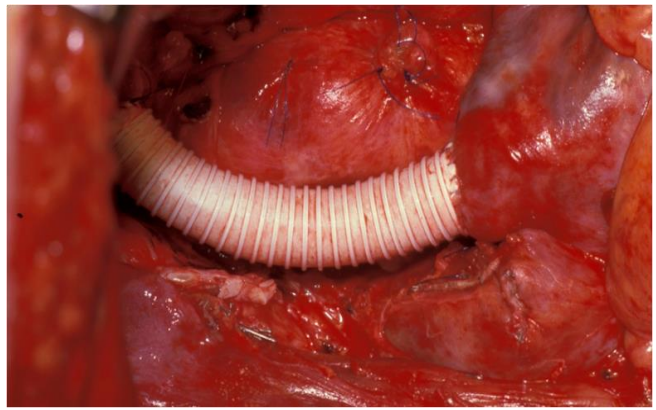
CHT / RT-CHT → resection can result in long-term survival in experienced centers even in presence of N2 disease (*per continuitatem* invasion)

ACCP Guidelines (3rd ed) Chest 2013;143 Suppl

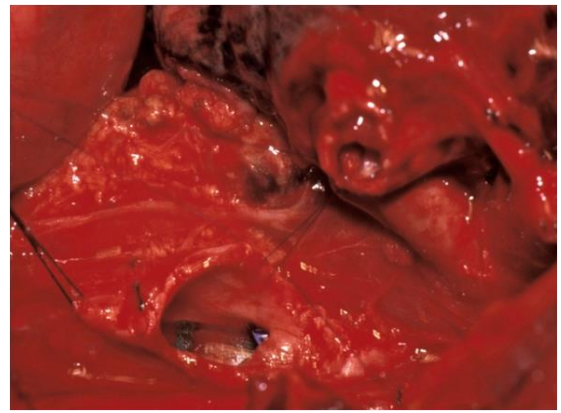
INDUCTION THERAPY AND RESECTION FOR $T4_{invasive}$ N0-2 NSCLC

POTENTIALLY RESECTABLE T4 TUMORS

Superior vena cava / carina / recurrent nerve / vertebral body / left atrium



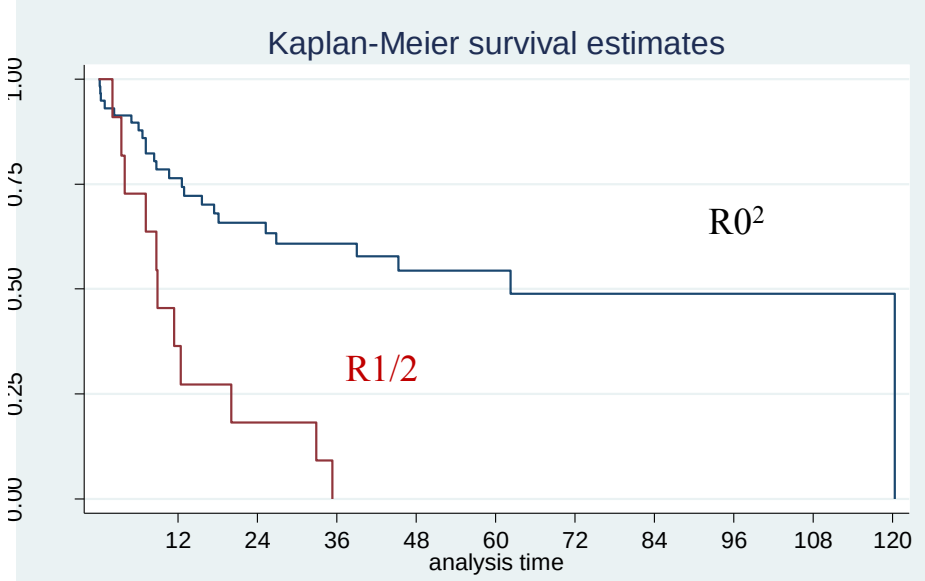
SVC RECONSTRUCTION

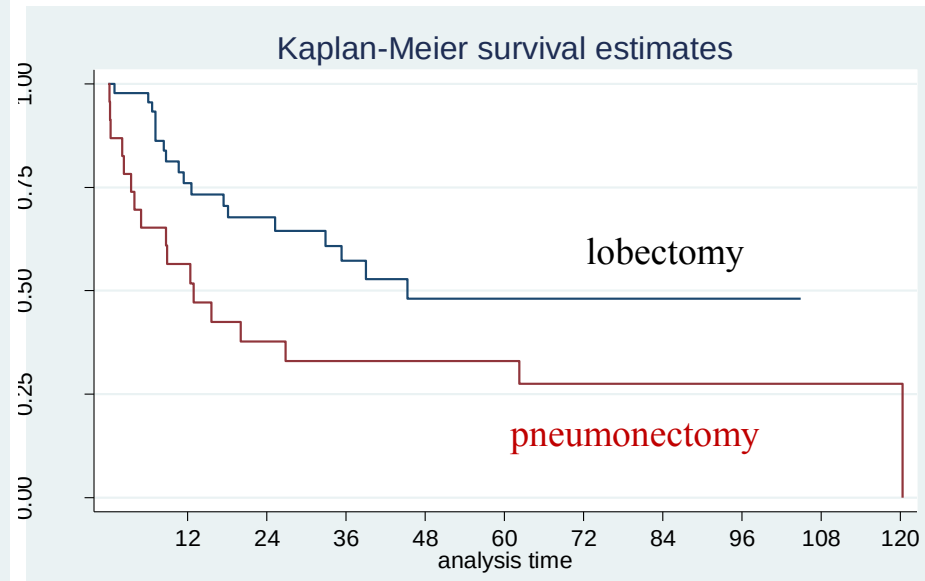


CARINAL RESECTION / RECONSTRUCTION

ACCP Guidelines (3rd ed) Chest 2013;143 Suppl

NEOADJUVANT CHT-RT⟶RESECTION FOR $T4_{Invasive}$ N0-2 NSCLC *(N=72)*[1]



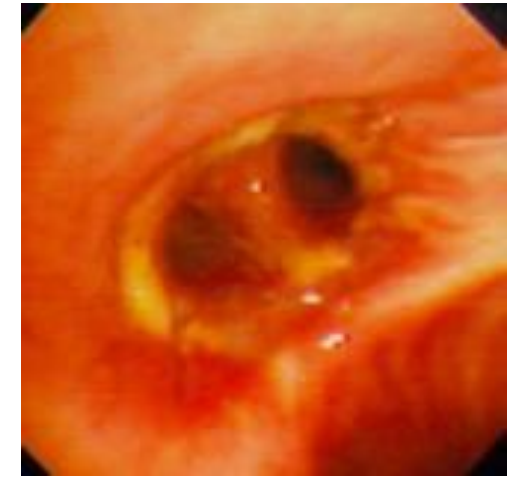


	TOTAL N=72	LOBECTOMY N=48	PNEUMONECTOMY N=24	
90d mortality	8%	2%	21%	*p=0.01*
5y survival	45%	50%	33%	*p=0.01*

[1]49% T4N0-1, 51% T4N2
[2]R0 resections 84%

Perentes Y, Ann Thorac Surg 2014;94:1815-22

SLEEVE RESECTIONS AFTER INDUCTION THERAPY



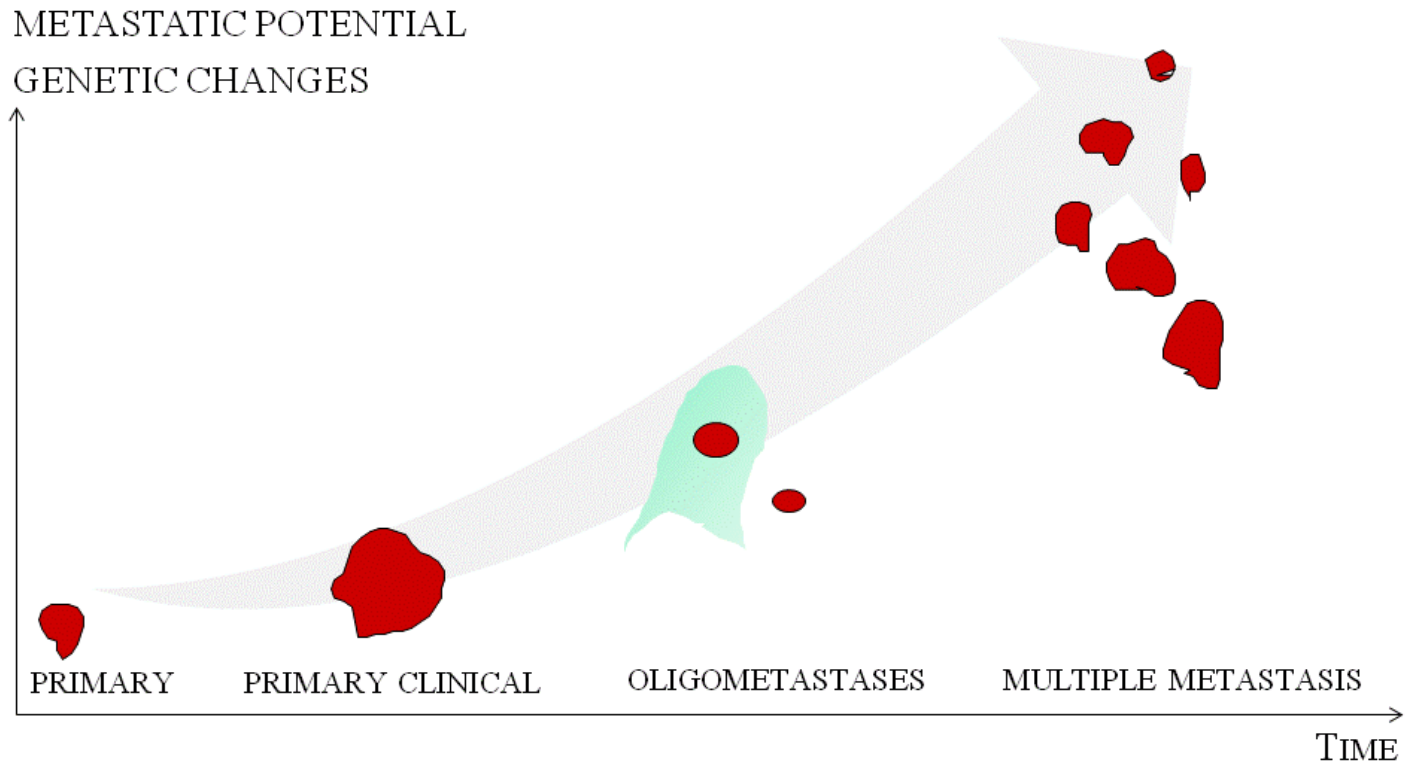
	N	AP /SVC[1]	COMPLICATIONS	MORTALITY
Veronesi 2002	27	10	7%	0
Rendina 1997	27	11	11%	0
Ohta 2003	20		35%	0
Pezzetta 2005	24	6	15%	4%

[1]additional AP=pulmonary artery / SVC=super vena cava resection/reconstruction

THE 8TH TNM CLASSIFICATION

SURGICAL PERSPECTIVES FOR LOCALLY ADVANCED NSCLC

4. SURGICAL TRIALS FOR OLIGOMETASTATIC T1-2N0 DISEASE



→ VATS resection and ablation of isolated metastasis *(brain / adrenal)*

THE 8TH TNM CLASSIFICATION

IMPACT ON SURGICAL STRATEGIES FOR NSCLC

The revised classification is not designed to formulate new treatment recommendations, and treatment changes must be based on new trials

The improved stage-for-stage survival observed in the revised edition is the result of a combination of tumor characteristics and improvements in staging and treatments *(mainly surgery)* → keep surgery as part of new trials

- new trials to examine the role of sublobar resections and non-surgical ablation of early NSCLC

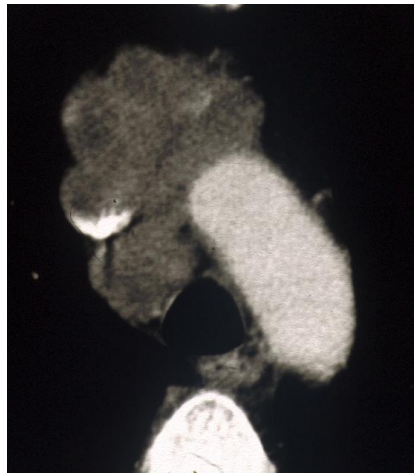
- new trials with multimodal treatments including surgery for locally advanced / oligometastatic disease

Thank you for your attention

THE 8TH TNM CLASSIFICATION

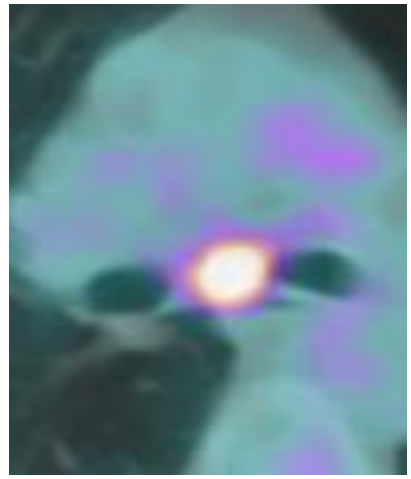
SURGICAL PERSPECTIVES FOR LOCALLY ADVANCED NSCLC

2. TRIALS WITH NOVEL INDUCTION → SURGERY FOR N2 DISEASE



INFILTRATIVE N2
BULKY/MULTILEVEL

RT-CHT



PREOPERATIVE
« DISCRETE » N2

RT-CHT *or*
CHT→ Surgery

INCIDENTAL pN2
AFTER SURGERY

Adjuvant CHT

ACCP Guidelines (3rded) Chest 2013;143 Suppl

THE 8TH TNM CLASSIFICATION: *N-DESCRIPTORS*

4. Significant difference in survival according to geographic regions for pN0/pN1 disease with a survival benefit for Asians compared to Europeans
   - for pN0: 25%
   - for pN1: 20%

5. Naruke mapping[1] which is different from the ATS lymph node mapping accounts for 75% of all pN cases

[1]Subcarinal space along inferior border of main stem bronchus → N1

Assamura H, J Thorac Oncol 2015;10:1675-84

THE 8TH TNM CLASSIFICATION: *N-DESCRIPTORS*

2. A combination of location of nodal metastases (single vs multiple stations) and absence / presence of skip metastases may result in a more accurate prognosis:
   - pN1a single station pN1b multiple stations
   - pN2a single station[1] pN2b multiple stations

3. The tumor burden at regional lymph nodes is not reflected *(micrometastasis vs bulky /extracapsular disease)*

[1] pN2a1 single station without N1 involvement *(skip metastases)*
pN2a2 single station with N1 involvement

Assamura H, J Thorac Oncol 2015;10:1675-84

The 8th TNM Classification

Stage groupings

Stage IA1	T1a[1]	N0	M0
Stage IA2	T1b	N0	M0
Stage IA3	T1c	N0	M0
Stage IB	T2a	N0	M0
Stage IIA	T2b	N0	M0
Stage IIB	T1	N1	M0
	T2	N1	M0
	T3	N0	M0

[1] Including T1a(mi)

Goldstraw P, J Thorac Oncol 2015:;11:39-51

The 8th TNM Classification

Stage groupings

Stage IIIA	T1-2	N2	M0
	T3	N1	M0
	T4	N0-1	M0
Stage IIIB	T1-2	N3	M0
	T3	N2	M0
	T4	N2	M0
Stage IIIC	T3	N3	M0
	T4	N0	M0
Stage IV	T_{any}	N_{any}	M1a,b,c

Goldstraw P, J Thorac Oncol 2015:;11:39-51