

Staging of Head & Neck Cancers

TNM staging is Simple, costs less, objective and accurate, no special technology is needed for it

TNM classification assumes that an orderly progression of the disease takes place with enlargement of and invasion by the primary tumor (T)

Staging of Head & Neck cancer is a system designed to express the severity, or extent of the disease

Objectives of Staging

1. To aid the clinician in planning the treatment
2. To give some indication of prognosis
3. To assist in evaluation of results of treatment
4. To facilitate exchange of information with other centers
5. To contribute to research

Accuracy

Depends on:
Uniform data collection
Knowledge of TNM
Accurate staging

Limitations:
1. Inconsistencies
2. Observer variability
3. Bias

N indicates progression of the disease to involve regional lymph nodes

Individual TNM classifications are assembled into 4 stage groups (I-IV), each with similar survival outcomes

M indicates spread to distant areas (Distant Metastasis)

History of TNM Staging

AJCC Head and Neck task force utilized data from National cancer data base to arrive at a staging system

Americans use AJCC classification (American Joint committee against cancer)

Staging for thyroid cancers has been altered with a change in the increased risk age from 45 to 55

History of TNM

1. It was developed with contributions from both sides of the Atlantic
2. This is the system followed in Europe
3. It was devised by Pierre Denoix
4. In 1968 the first TNM booklet "Livre de poche" was published

All skin malignancies excluding melanoma has been taken out of general category and placed under head and neck category

A separate staging algorithm has been created for high risk human papilloma virus associated cancer of oropharynx

Current version of TNM classification has eliminated T0 category in sites other than nasopharynx

General rules of staging

TNM applies only to carcinomas

Components of TNM

TNM staging is based on 3 components:

1. T – Extent of primary tumor
2. N – Absence / presence and extent of regional node metastasis
3. M – Absence / presence of distant metastasis

All cases should be confirmed histopathologically

Midline nodes are considered ipsilateral except in thyroid cancers

If there is doubt regarding the exact T, N, or M category to which a particular case belongs then the lower category is to be chosen

cTNM is essential to select and evaluate therapy. pTNM provides the most precise data to estimate prognosis and calculate end results

Two classifications should be documented for each site:
Clinical pretreatment classification cTNM
and pathological (post surgical histopathological) classification pTNM

Salivary gland carcinoma

Are classified according to the rules for tumors of their anatomic site of origin.

Histopathologic Grading

Patients with poorly differentiated tumors are candidates for chemotherapy because distant metastasis is common in them and the tumor responds well to chemo

Histopathology

Histological staging of sq cell carcinoma represents estimation by the pathologist of the expected biological behavior of the neoplasm.

Well differentiated tumors have low incidence of metastasis

This remains an adjunctive part of TNM

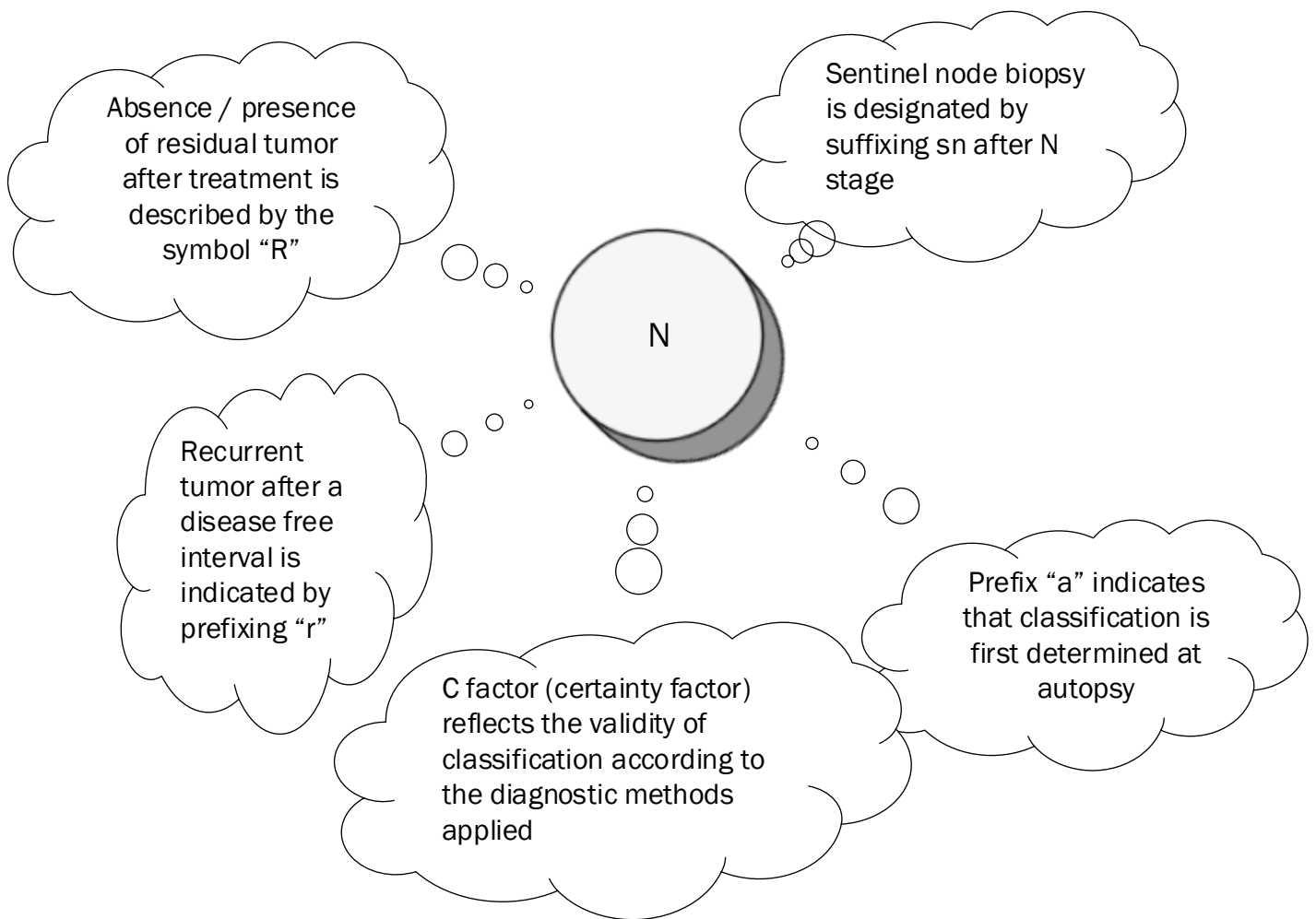
Grading

Gx: Grade of differentiation cannot be assessed
G1: Well differentiated
G2: Moderately differentiated
G3: Poorly differentiated
G4: Undifferentiated

3.4% of poorly differentiated tumors had distant metastasis while 1.8% of well differentiated ones had distant metastasis at the time of presentation

46% of patients with poorly differentiated tumors had nodal metastasis at presentation compared with only 28% of differentiated tumors

Additional Descriptors



C Factor

1. It is also known as certainty factor
2. Currently dropped from rules on staging
3. It reflects the validity of classification according to the diagnostic methods applied (C1-C5)
4. C1 indicates evidence from standard diagnostic means
5. C2 indicates evidence obtained by special diagnostic means like radiology, CT, and MRI
6. C5 is evidence from autopsy
7. Pretherapeutic clinical staging of head and neck cancers should be based on a C2 factor

Stage Grouping

Grouping adopted is designed to ensure as far as possible that each group is more or less homogenous in respect of survival and in addition the survival rates of these groups for each cancer site are distinctive

It is necessary to condense these into a convenient number of TNM stage groups

A tumor with 4 degrees of T, 3 degrees of N and 2 degrees of M will have 24 potential TNM categories

Carcinoma in situ is categorized as stage 0

Carcinoma with distant metastasis is classified as stage IV

Exception to this grouping system include:
P16 positive oropharyngeal ca,
nasopharyngeal ca and
thyroid ca

General Stage Grouping

Stage Grouping

Stage	T	N	M
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
Stage II	T2	N0	M0
Stage III	T1, T2	N1	M0
	T3	N0, N1	M0
Stage IVA	T1,T2, T3	N2	M0
	T4a	N0,N1,N2	M0
Stage IVB	Any T	N3	M0
	T4b	Any N	M0
Stage IVC	Any T	Any N	M1

Stage Grouping HPV(p16 positive) oropharyngeal cancer

Stage	T	N	M
Stage I	T1, T2	N0, N1	M0
Stage II	T1,T2	N2	M0
	T3	N0,N1,N2	M0
Stage III	T1-T3	N3	M0
	T4	Any N	M0
Stage IV	Any T	Any N	M1

Stage grouping for nasopharynx & thyroid malignancies

Stage Grouping Nasopharynx

Stage	T	N	M
Stage I	T1	N0	M0
Stage II	T1	N1	M0
	T2	N0, N1	M0
Stage III	T1-T2	N2	M0
	T3	N0-2	M0
Stage IVA	T4	N0-2	M0
Stage IVB	Any T	N3	M0
Stage IVC	Any T	Any N	M1

Stage Grouping Medullary ca

Stage	T	N	M
Stage I	T1a, T1b	N0	M0
Stage II	T2, T3	N0	M0
Stage III	T1, T2, T3	N1a	M0
Stage IVA	T1,T2,T3	N1b	M0
	T4a	Any N	M0
Stage IVB	T4b	Any N	M0
Stage IVC	Any T	Any N	M1

Stage Grouping differentiated thyroid ca

Stage	T	N	M
Papillary or follicular ca under 55 years			
Stage I	Any T	Any N	M0
Stage II	Any T	Any N	M1
Papillary or follicular 55 yrs and older			
Stage	T	N	M
Stage I	T1a,T1b,T2	N0	M0
Stage II	T3	N0	M0
	T1,T2,T3	N1	M0
Stage III	T4a	Any N	M0
Stage IVA	T4b	Any N	M0
Stage IVB	Any T	Any N	M1

Stage Grouping Anaplastic thyroid ca

Stage	T	N	M
Anaplastic (All cases are stage IV)			
Stage IVa	T1,T2,T3a	N0	M0
Stage IVB	T1,T2,T3a	N1	M0
	T3b,T4a,T4b	N0,N1	M0
Stage IVC	Any T	Any N	M1

Staging Methods

CT chest should be obtained in preference to x-ray chest to look for metastasis

Screening for synchronous tumors and distant metastasis is important for advanced tumors

Aim

1. To define in each patient all factors relevant to the natural history and outcome of the relevant disease. This is done in order to group them with similar such patients
2. The Age, Sex, duration and severity of symptoms and signs and the presence and severity of intercurrent disease should all be documented
3. CT/ MRI imaging is done to delineate the size and extent of the primary and to identify secondary nodal deposits if any
4. Scans to evaluate the primary site should be performed prior to biopsy to prevent upstaging due to the effects of oedema caused by tissue biopsy

Panendoscopy is recommended for symptomatic patients or patient with primary tumors known to have significant risk of second primary

Endoscopy and biopsy should be performed by a senior surgeon preferably the person who is going to be responsible for other procedures

cTNM classification based on imaging, endoscopy & biopsy should be clearly documented in the case file

Regional Nodes

Imaging for detection of neck nodes is advisable

Nodes are described as ipsilateral, bilateral, contralateral and midline

Location of nodal metastasis has prognostic significance

Importance

1. The status of regional nodes in head & neck cancer has prognostic significance.
2. It should be assessed for each patient and each tumor

Size, number and anatomic location described

Imaging for neck nodes:

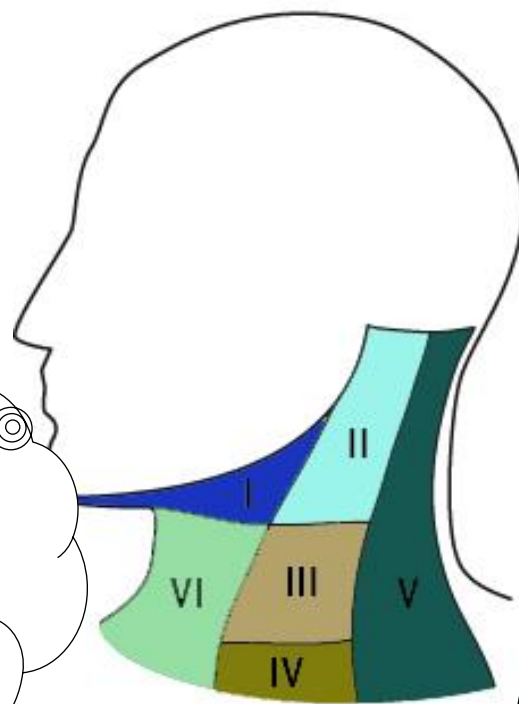
1. For node detection if there is a high chance of occult nodes as in supraglottic growth
2. For assessing the extent of nodal involvement
3. To assess for nodal fixation
4. Useful in detecting secondary nodal deposits in irradiated neck

N categories

N categories are the same for most of head and neck masses. A patient with evidence of extra nodal extension pushes the stage to N3b.

Nodal Nomenclature

Levels of Cervical Lymph Nodes



Level I:
Nodes in the
submental &
submandibular
triangles

Nodal levels

Level II:
Upper jugular
nodes extends
from hyoid
bone inferiorly
to the skull
base
superiorly

Level III:
Middle jugular
nodes from
hyoid
superiorly to
cricothyroid
membrane
inferiorly

Level IV:
Contains lower
jugular nodes
from
cricothyroid
membrane
superiorly to the
clavicle inferiorly

Level V:
Contains the posterior
triangle nodes bounded by
anterior border of trapezius
posteriorly, the posterior
border of sternomastoid
anteriorly and clavicle
inferiorly

Level VI: Contains
anterior compartment
nodes from hyoid bone
superiorly to the
suprasternal notch
inferiorly. On each side
carotid sheath forms
lateral border

Level VII:
Contains nodes inferior to the
suprasternal notch in the upper
mediastinum

Clinical N Stage General

Nx – Regional nodes cannot be assessed

N0 – No regional lymph node metastasis

N1 – Metastasis in a single ipsilateral node 3 cms or less in greatest dimension without extranodal extension

N2 – N2a – Metastasis in a single ipsilateral node more than 3 cm but not more than 6 cm in greatest dimension without extranodal extension

N2b – Metastasis in multiple ipsilateral nodes none more than 6 cm in greatest dimension without extranodal extension

N2c – Metastasis in bilateral / contralateral nodes none more than 6 cm in greatest dimension, without extranodal extension

N3a – Metastasis in nodes more than 6 cm in greatest dimension without extranodal extension

N3b – Metastasis in a single or multiple nodes with clinical extranodal extension (fixed node).

Clinical N stage for HPV p16 positive oropharyngeal cancer

Nx – Regional nodes cannot be assessed

N0 – No regional nodal metastasis

N1 – One or more ipsilateral nodes none larger than 6 cms

N2 – Contralateral / bilateral nodes none greater than 6 cms

N3 – Nodes larger than 6 cm

N staging for Nasopharynx

Nx – Regional nodes cannot be assessed

N0 – No nodal metastasis

N1 – Unilateral metastasis / unilateral / bilateral metastasis in retropharyngeal nodes under 6 cm above the caudal border of cricoid cartilage

N2 – Bilateral metastasis 6 cm or less above the caudal border of cricoid cartilage

N3 – Metastasis in cervical nodes greater than 6 cm below the caudal border of cricoid

N staging for thyroid carcinoma

Nx – Regional nodes cannot be assessed

N0 – No regional node metastasis

N1 – Regional node metastasis

N1a – Metastasis in Level VI

N1b – Metastasis is Unilateral / bilateral / contralateral cervical levels I-IV or retropharyngeal nodes

T staging

Lip & oral cavity

T1 – Tumor 2 cm or less in greatest dimension and 5 mm or less depth invasion

T2 – Tumor 2 cm or less in greatest dimension and more than 5 mm but no more than 10 mm depth of invasion / tumor more than 2 cm but not more than 4 cm in greatest dimension and depth of invasion no more than 10 mm

T3 – Tumor more than 4 cm in greatest dimension or more than 10 mm depth of invasion

T4a – Lip: Tumor invades through cortical bone inferior alveolar nerve, floor of mouth, or skin

T4a – Oral cavity – Tumor invades through cortical bone into deep extrinsic muscle of tongue, maxillary sinus or skin of face

T4b – Lip / oral cavity – Tumor invades masticator space, pterygoid plates or skull base, or encases the internal carotid artery

Oropharynx p16 negative tumors

T1 – Tumor 2 cm or less

T2 – Tumor more than 2 cm but not more than 4 cm

T3 – Tumor more than 4 cm in greatest dimension / extension into lingual surface of epiglottis

T4a – Tumor invades – larynx, deep extrinsic muscles of tongue, medial pterygoid, mandible and hard palate

T4b – Tumor invades lateral pterygoid muscle, pterygoid plates, lateral nasopharynx, skull base, or encases the carotid

Oropharynx p16 positive cancers

T1 – Tumor 2 cm or less in greatest dimension

T2 – Tumor more than 2 cm but not more than 4 cm in greatest diameter

T3 – Tumor more than 4 cm in greatest dimension or extension to lingual surface of the epiglottis

T4 – Tumor invades larynx, deep extrinsic muscles of tongue, medial pterygoid, mandible and hard palate, lateral pterygoid muscle, pterygoid plates, lateral nasopharynx, skull base or encases the carotid artery

T Staging Contd..

Nasopharynx

T1 - Tumor confined to nasophx, / extends to oropharynx / nasal cavity without parapharyngeal involvement

T2 - Tumor with extension to parapharyngeal space / infiltration of the medial pterygoid, lateral pterygoid / prevertebral muscles

T3 - Tumor invades bony structures of skull base, cervical vertebrae, pterygoid structures / PNS

T4 - Tumor with intracranial extension / involvement of cranial nerves, hypopharynx, orbit, parotid gland / infiltration beyond lateral surface of the lateral pterygoid muscle

Hypopharynx

T1 - Tumor limited to one subsite of hypopharynx and 2 cm or less in greatest dimension

T2 - Tumor invades more than one subsite of hypopharynx / adjacent site / measures 2-4 cm in greatest dimension, without fixation of hemi larynx

T3 - Tumor measures >4cm in greatest dimension / with fixation of hemi larynx or extension to oesophagus

T4a - Tumor invades any of the following: thyroid/cricoid cartilage, hyoid bone, thyroid gland, oesophagus, central compartment of soft tissue

T4b - Tumor invades prevertebral fascia, encases carotid artery / invades mediastinal structures

T stage of laryngeal growth

Supraglottis

T1 – Tumor limited to one subsite of supraglottis with normal vocal cord mobility

T2 – Tumor invades mucosa of more than one adjacent subsite of supraglottis without fixation of larynx

T3 – Tumor limited to larynx with vocal cord fixation / it invades any of the following (post cricoid area, pre epiglottic tissues, paraglottic space / thyroid cartilage erosion

T4a – Tumor invades through thyroid cartilage / invades tissues beyond the larynx (trachea, soft tissues of the neck, muscles of the tongue, thyroid and oesophagus.

T4b – Tumor invades prevertebral space, mediastinal structures, or encases carotid artery

Glottis

T1 – Tumor limited to vocal cord (s) (may involve anterior or posterior commissure) with normal mobility.

T1a – Tumor limited to one vocal cord

T1b – Tumor involving both cords

T2 – Tumor extends to supraglottis / subglottis and with impaired vocal fold mobility

T3 – Tumor limited to larynx with vocal cord fixation / invasion to paraglottic space/ with minor thyroid cartilage erosion (inner cortex)

T4a – Tumor invades through thyroid cartilage / invades tissues beyond the larynx i.e trachea, soft tissues of neck, strap muscles, thyroid and oesophagus

T4b – Tumor invades prevertebral space, mediastinal structures, or encases the carotid

T stage Subglottis

Subglottis

T1 - Tumor limited to subglottis

T2 - Tumor extends to vocal cord (s) with normal or impaired mobility

T3 - Tumor limited to larynx with vocal cord fixation

T4a - Tumor invades through cricoid / thyroid cartilage / invades tissues beyond larynx (trachea, soft tissues of neck, strap muscles, thyroid and oesophagus)

T4b - Tumor invades prevertebral space, mediastinal structures / encases the carotid

T stage of Paranasal sinuses

Maxillary sinus

T1 – Tumor limited to antral mucosa with no erosion or destruction of bone

T2 – Tumor causing bone erosion including extension into hard palate / middle meatus, except extension to posterior wall of maxillary sinus and pterygoid plates

T3 – Tumor invades any of the following – bone of posterior wall of maxillary sinus, subcutaneous tissue, floor or medial wall of orbit, pterygoid fossa / ethmoid sinus

T4a – Tumor invades any of the following: anterior orbital contents, skin of cheek, pterygoid plates, infratemporal fossa, cribriform plate and sphenoid / frontal sinus

T4b – Tumor invades any of the following: orbital apex, dura, brain, middle cranial fossa, cranial nerves other than maxillary division of trigeminal nerve, nasopharynx, clivus.

Nasal cavity & Ethmoids

T1 - Tumor restricted to one subsite of nasal cavity or ethmoid sinus without bone destruction

T2 – Tumor involves two subsites or extends to involve an adjacent site within the nasoethmoidal complex, with or without bony erosion

T3 – Tumor extends to invade the medial wall or floor of orbit, maxillary sinus, palate or cribriform plate

T4a – Tumor invades any of the following: anterior orbital contents, skin of nose or cheek, minimal extension to anterior cranial fossa, pterygoid plates, sphenoid or frontal sinuses

T4b – Tumor invades any of the following: orbital apex, dura, brain, middle cranial fossa, cranial nerves other than maxillary division of trigeminal nerve, nasopharynx and clivus

T stage for Salivary glands & Thyroid

Salivary gland

T1 – Tumor 2 cm or less in greatest dimension without extraparenchymal extension

T2 – Tumor more than 2 cm but no more than 4 cm in greatest dimension without extraparenchymal extension

T3 – Tumor more than 4 cm / or with extraparenchymal extension

T4a – Tumor invades skin, mandible, ear canal or facial nerve

T4b – Tumor invades base of skull, pterygoid plates or encases the carotid

Thyroid gland

T1 – Tumor 2 cm or less in greatest dimension limited to the thyroid

T1a – Tumor 1 cm or less in greatest dimension limited to thyroid

T1b – Tumor more than 1 cm but not more than 2 cm in greatest dimension, limited to thyroid

T2 – Tumor more than 2 cm but not more than 4cm in greatest dimension, limited to thyroid

T3 – Tumor more than 4 cm limited to thyroid / any tumor with gross extrathyroid extension involving only the strap muscles

T3a – Tumor more than 4 cm limited to thyroid

T3b – Tumor of any size with gross extrathyroidal extension invading strap muscles of neck

T4a – Tumor extends beyond thyroid capsule and invades subcutaneous tissue, larynx, trachea, oesophagus, recurrent laryngeal nerve

T4b - Tumor invades prevertebral fascia, mediastinal vessels or encases the carotid.

Anaplastic carcinoma of thyroid has two stages only. T4a tumor any size limited to thyroid, T4b – tumor any size extends beyond thyroid capsule

N stage Limitations

N Limitations

1. Palpable nodes do not always harbor tumor
2. The size of the node should be measured using calipers allowance should be given to intervening soft tissues
3. There is inter / intra observer error
4. Most masses over the size of 3 cm are not single nodes but may represent a confluent of nodes