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New York, NY

Mount Sinai Hospital

## I Have No Conflicts of Interest

## Why the Interest in Cervical Lymph Nodes?

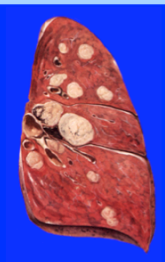
Why are these nodes so important?

## Most Deaths Now Occur From Distant Metastases and Second Primary Tumors

Today, more patients with head and neck cancers are living longer and are not dying as often from primary or regional neck disease (as in the past). They are dying from distant metastases and second primary tumors.

## What are the Major Predictors of Distant Metastases

With an increased likelihood of distant metastases, What are the major predictors of metastases?



## A Major Predictor of Distant Metastases is Nodal Metastasis

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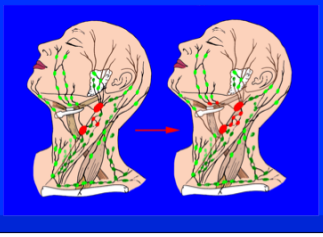
## Impact of Cervical Nodal Metastasis

In general, the presence of nodal metastasis reduces survival by 50%
(compared to a N0 neck).
The presence of nodal metastasis doubles the incidence of distant metastasis
(13.6% versus 6.9%).

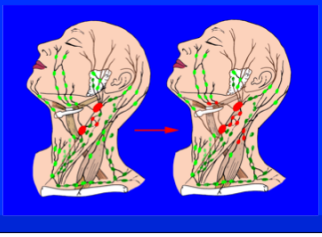
## Impact of Cervical Nodal Metastasis

In general, the greater the number of nodes affected the worse the prognosis.



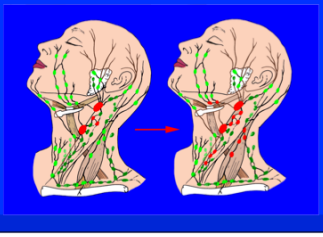
## Impact of Cervical Nodal Metastasis

The more nodal chains involved the worse the prognosis.



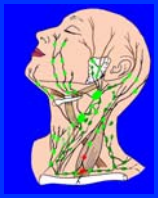
## Impact of Cervical Nodal Metastasis

The lower the nodal level in the neck the worse the prognosis.



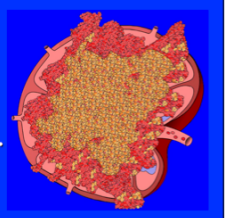
## Impact of Cervical Nodal Metastasis

If there are no metastatic nodes in the mid-to-upper neck and only low neck nodes, look for a primary tumor below the clavicles (mainly lung, breast or gut).



## Impact of Macroscopic Extracapsular Nodal Spread (ECS)

The presence of ECS triples the incidence of distant metastasis (19.1% versus 6.7%), reduces survival by 50%, and is associated with a 7-10 fold increase in recurrences.



## Lymphatic Capillary Structure

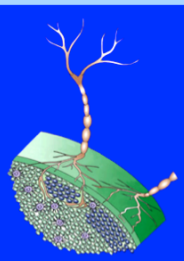
Unlike vascular capillaries, lymphatic capillaries have loose inter-endothelial cell junctions, valve openings, no basement membrane and no surrounding pericytes.

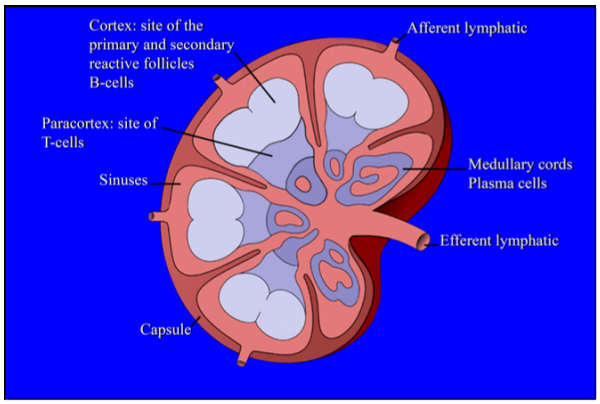
## Lymphatic Capillary Structure

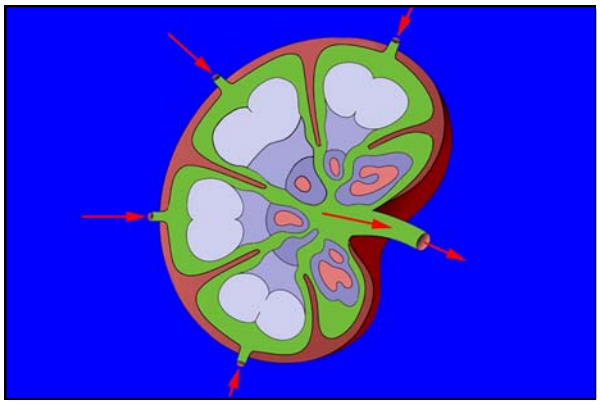
As a result, molecules and cells may passively flow into the peripheral lymphatic capillaries from the interstitial fluids driven by hydrostatic pressure.

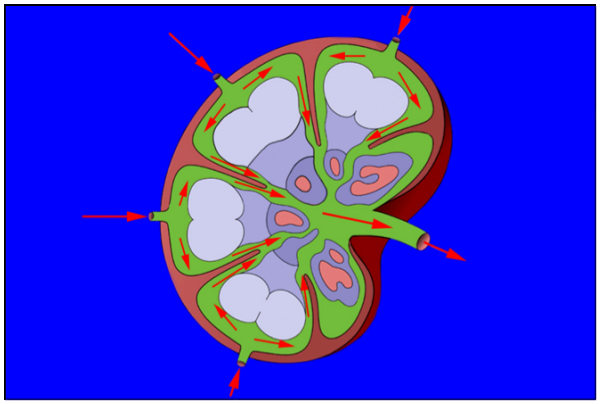
## Passive Entrance into the Lymphatic Vessels

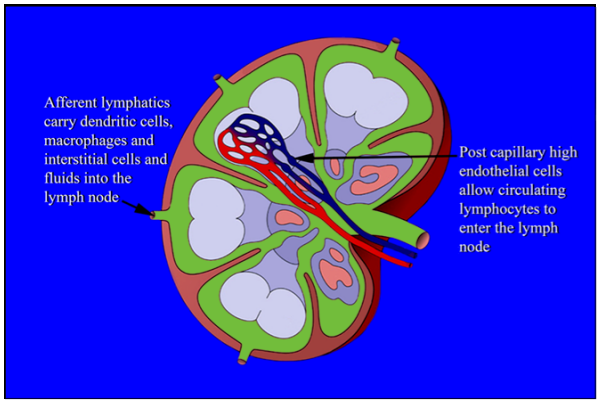
Thus, inflammatory cell and tumor cell entrance into the lymphatic vessels is considered to be a passive process.

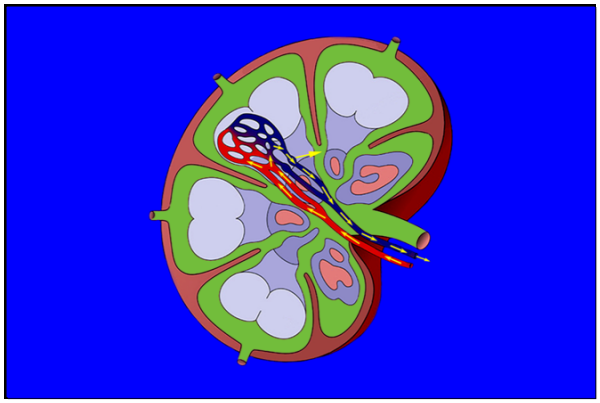




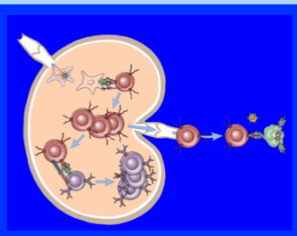







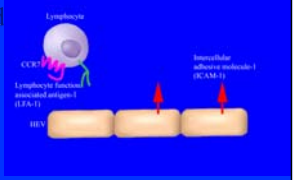



## The Aim is to Form an Antibody Response



## How Lymphocytes Enter the Node From the Circulating Blood

The chemokine CCR7 and its ligands CCL19 and CCL21 are critical to the migration of circulating lymphocytes into the lymph node via the high endothelial cells in the post capillary venules.



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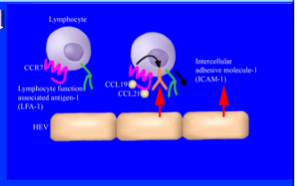


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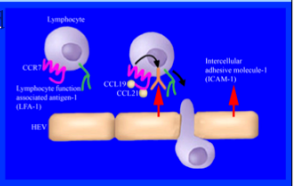


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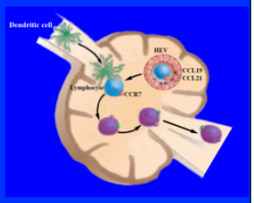
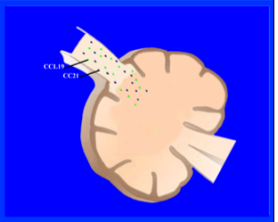


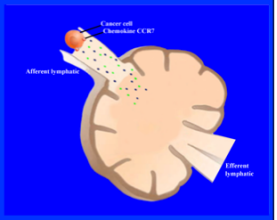

## Cancer Cells Follow a Chemokine Gradient

Cancer cells secrete the ligands CCL21 & CCL19 which passively flow into the lymph nodes via the interstitial tissue fluids and concentrate down stream in the nodes.




## Cancer Cells Follow a Chemokine Gradient

The cancer cells also make the chemokine CCR7 for which CCL21 & CCL19 are the ligands. This assists the migration of the cancer cells into the lymph nodes by following chemokine gradients.

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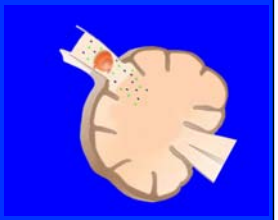

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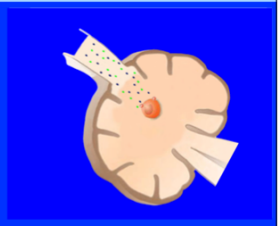
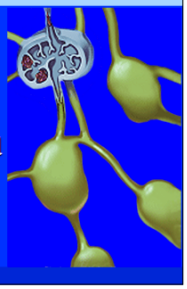


## Cancer Spreads From One Node to Another

Once cancer is within a lymph node, the cancer can mature and spread to other nodes.
Whether hematogenous tumor spread from metastatic nodes occurs remains unclear.



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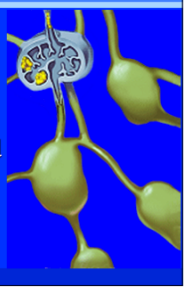

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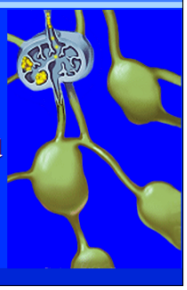

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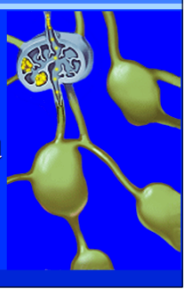

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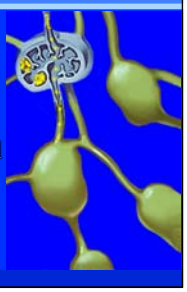

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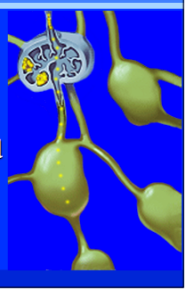

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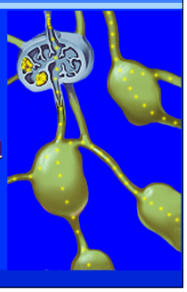
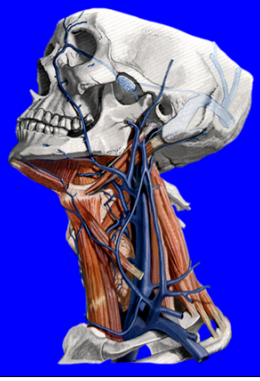
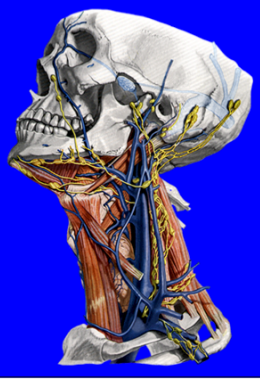
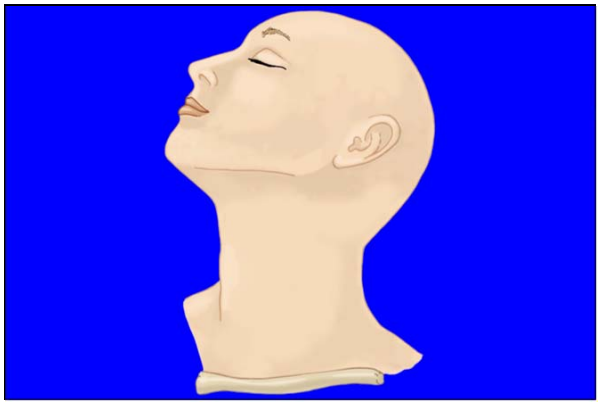


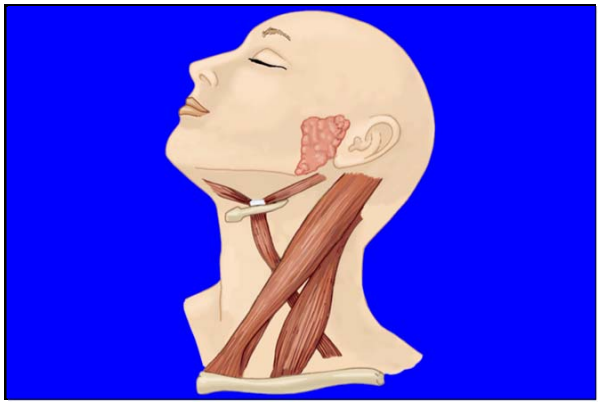
## Regarding Cervical Lymph Nodes

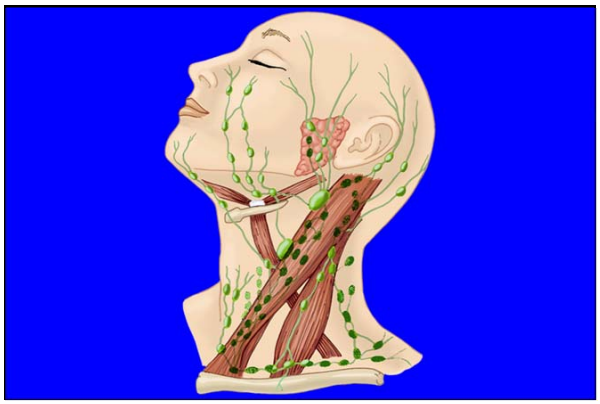
1) What is their anatomic distribution?
2) What is nodal staging and how does it differ from nodal classification?
3) What are criteria to assess pathologic lymph nodes?

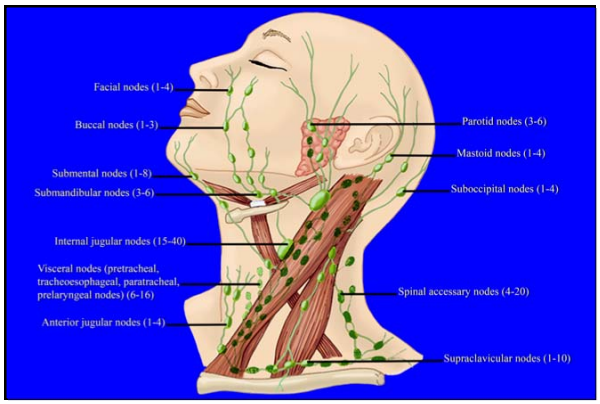


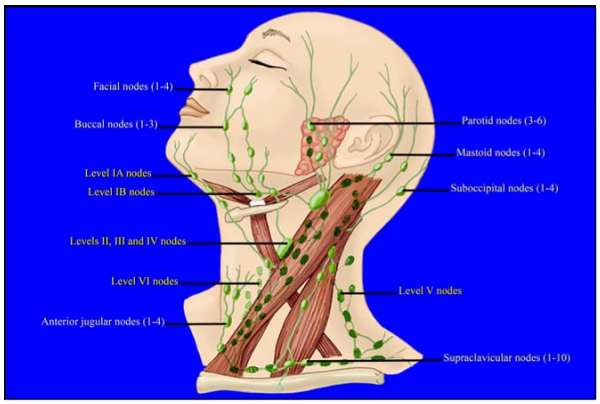


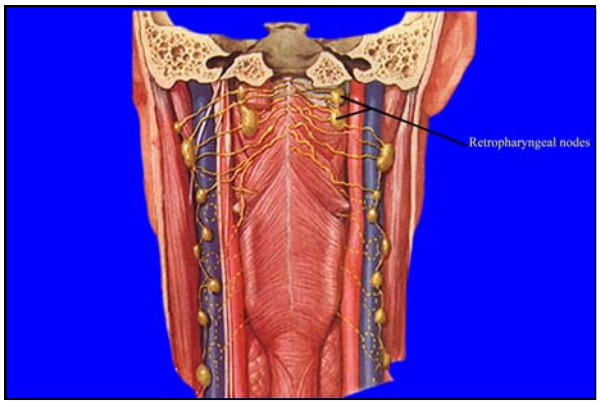


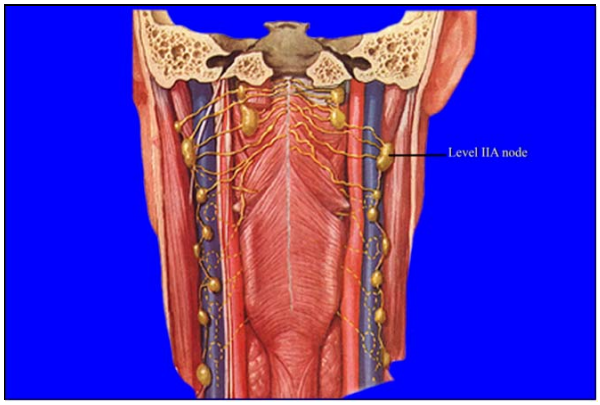


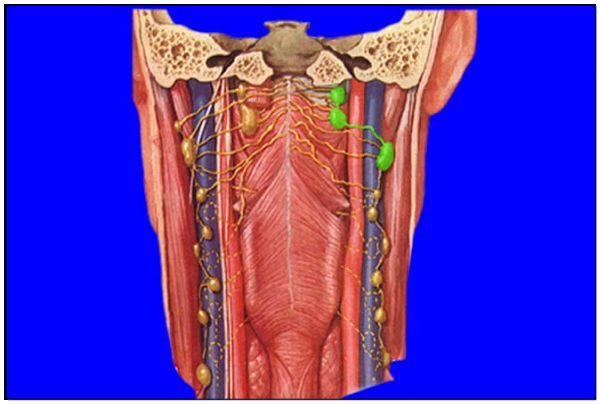



Facial nodes (1-4)
Buccal nodes (1-3)
Submental nodes (1-8)
Submandibular nodes (3-6)
Internal jugular nodes (15-40)
Visceral nodes (pretracheal, tracheoesophageal, paratracheal, prelaryngeal nodes) (6-16)
Anterior jugular nodes (1-4)
Parotid nodes (3-6)
Mastoid nodes (1-4)
Suboccipital nodes (1-4)
Spinal accessary nodes (4-20)
Supraclavicular nodes (1-10)

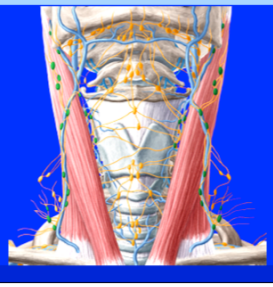

Facial nodes (1-4)
Buccal nodes (1-3)
Level IA nodes
Level IB nodes
Levels II, III and IV nodes
Level VI nodes
Anterior jugular nodes (1-4)
Parotid nodes (3-6)
Mastoid nodes (1-4)
Suboccipital nodes (1-4)
Level V nodes
Supraclavicular nodes (1-10)


Retropharyngeal nodes



## Superficial Lymphatics (Primary for Skin Neoplasias)



## Nodal Staging

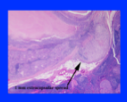
Nodal Staging relates certain nodal characteristics to prognosis and treatment options. It is part of the TNM tumor staging system of the AJCC.

| | |
|---|---|
| Nodal Size: | <3cm, 3-6cm, >6cm |
| Number of nodes: | 0, 1, >1 |
| Side(s) of neck involved: | ipsilateral, contralateral, bilateral |

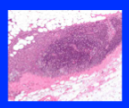
## The Definition of Extracapsular Tumor Spread

Extracapsular spread is defined as:

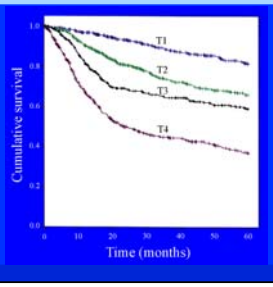
Microscopic tumor spread: <2mm (invisible to the eye on scans)

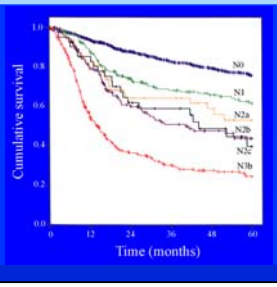


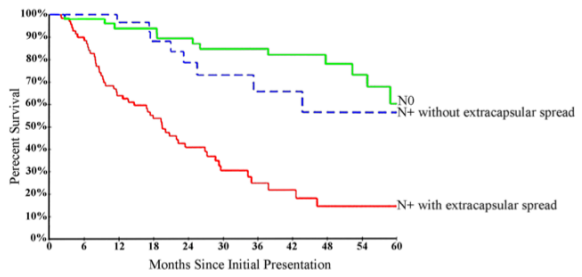
Macroscopic tumor spread: >2mm (visible to the eye on scans)



## AJCC Staging 2018 Survival Based on Tumor and Node Staging

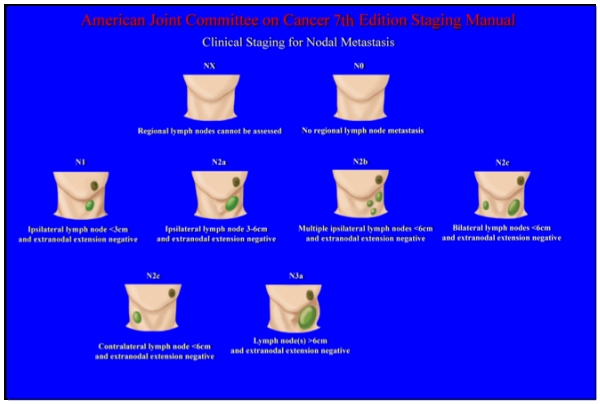


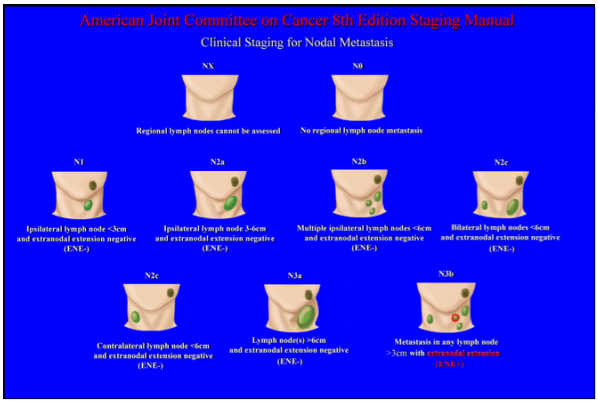



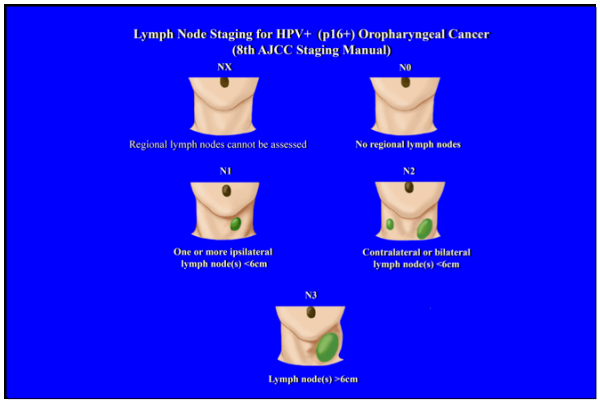


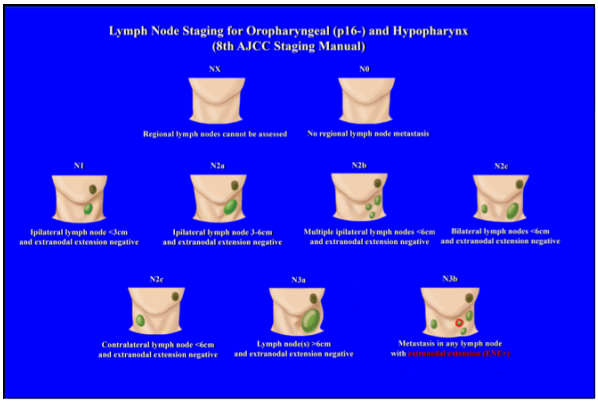

**Extracapsular spread to adjacent organs,but seperable from the organ (ecp1) and extracapsular spread invading adjacent organs requiring excision of nodes and organ (ecp2).**

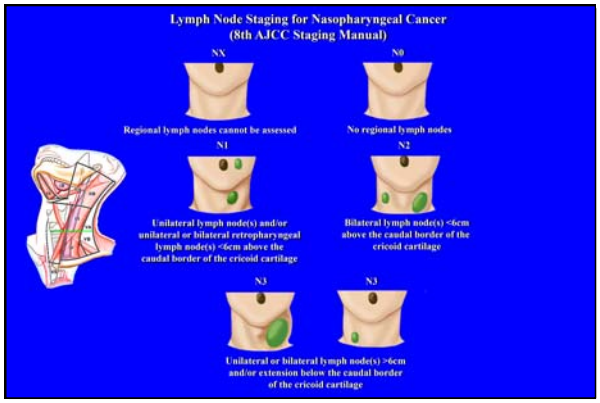
Yasuhiro, et al. 2007;31 (6): 1196-1203

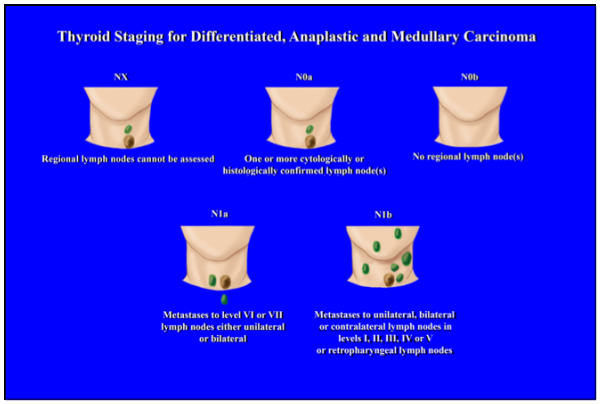


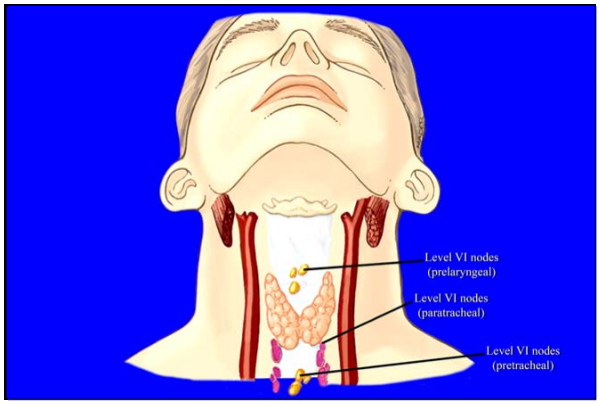



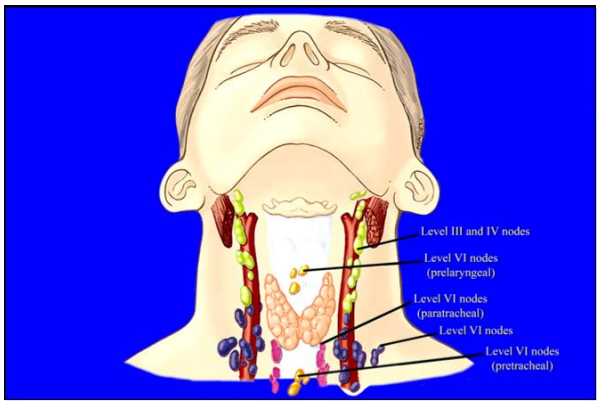



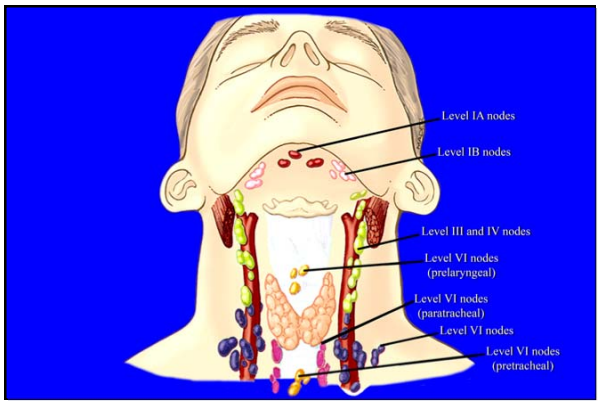



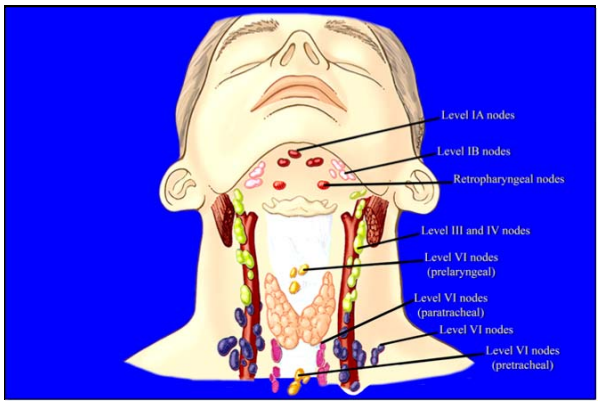





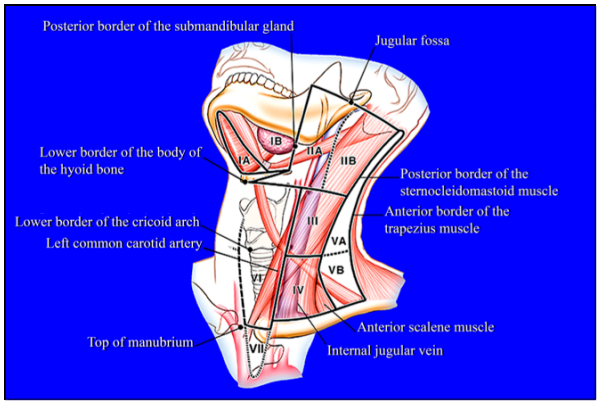



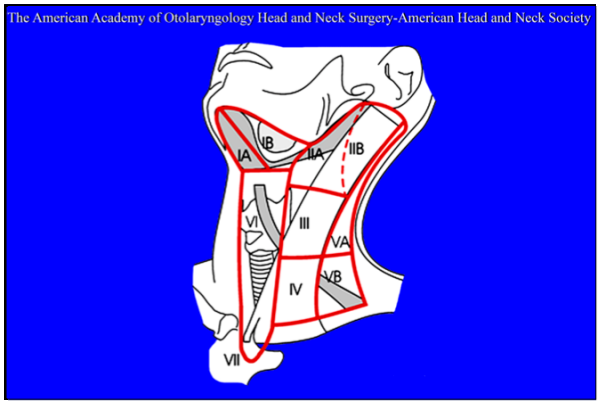



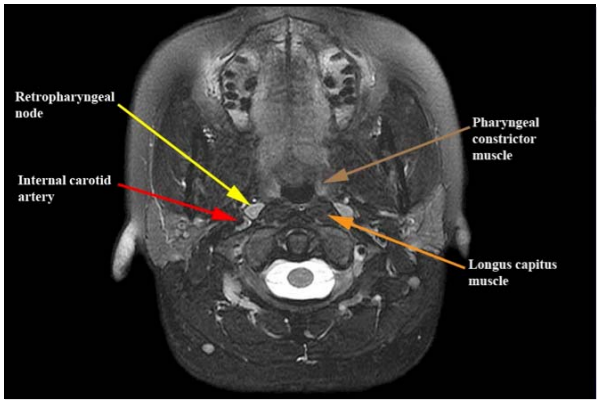



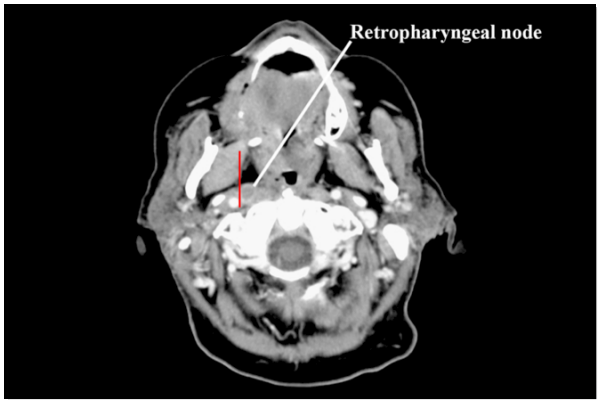

## Nodal Classification

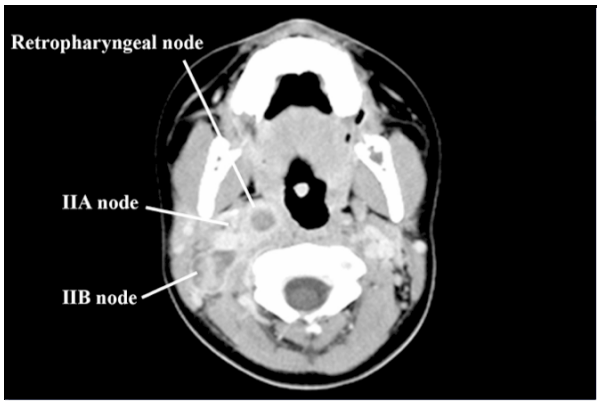
Nodal Classification places the node(s) in defined anatomic locations so that communication between physicians is clear. The anatomic regions are defined primarily to aid selection of the type of neck dissection or the radiation fields best suited to that particular patient.

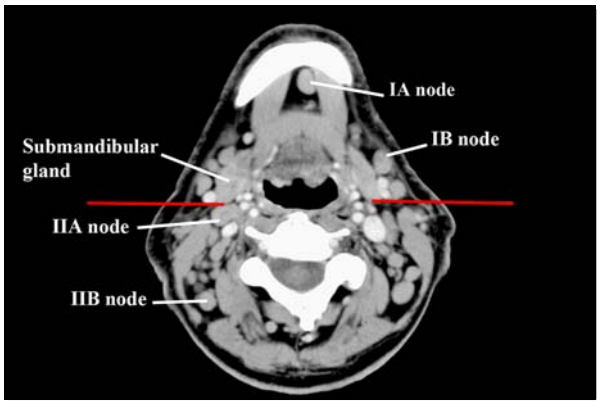

Posterior border of the submandibular gland
Jugular fossa
Lower border of the body of the hyoid bone
Posterior border of the sternocleidomastoid muscle
Anterior border of the trapezius muscle
Lower border of the cricoid arch
Left common carotid artery
Anterior scalene muscle
Top of manubrium
Internal jugular vein
IA
IB
IIA
IIB
III
IV
VA
VB
VI
VII

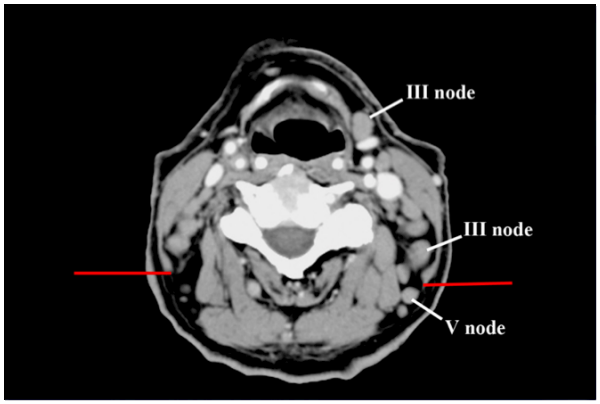

The American Academy of Otolaryngology Head and Neck Surgery-American Head and Neck Society
IA
IB
IIA
IIB
III
IV
VA
VB
VI
VII


Retropharyngeal node
Internal carotid artery
Pharyngeal constrictor muscle
Longus capitus muscle


Retropharyngeal node


Retropharyngeal node
IIA node
IIB node

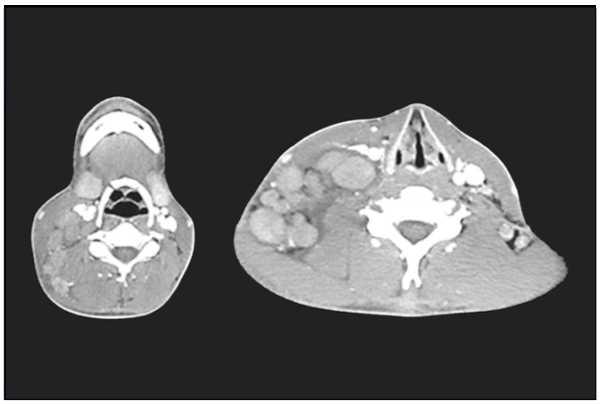

IA node
IB node
Submandibular gland
IIA node
IIB node

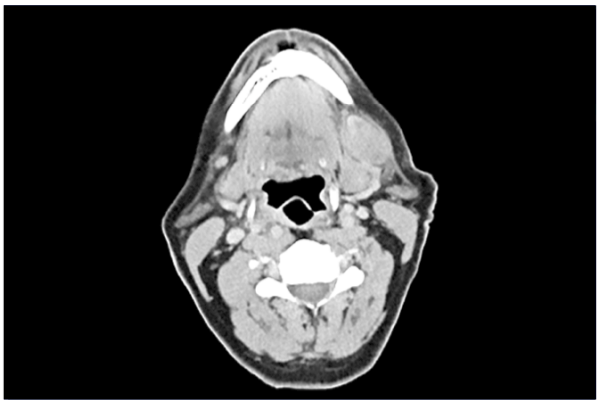


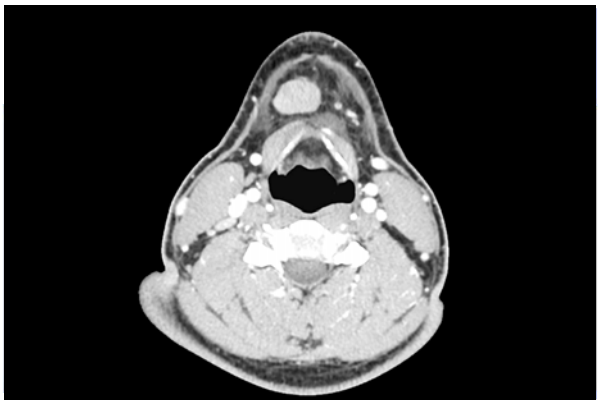


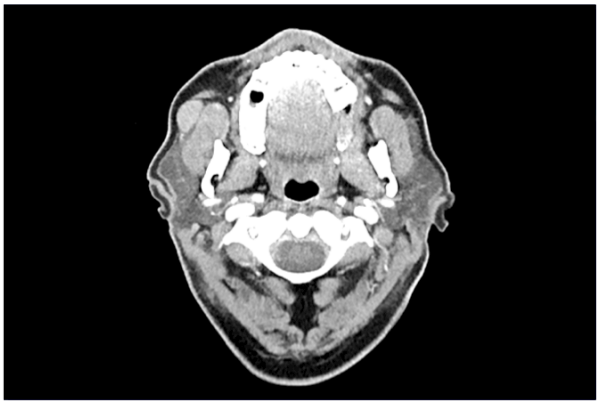
## Lymphoma

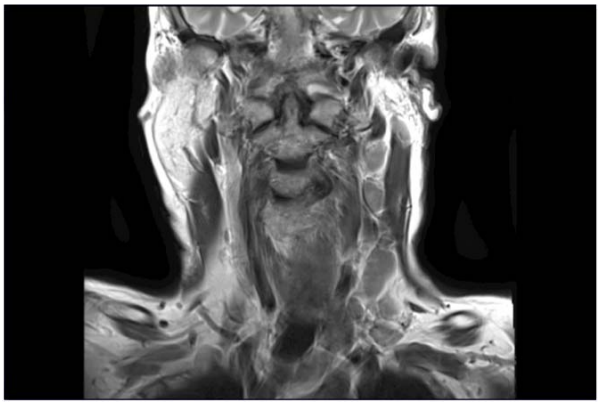
Lymphoma is the most common cause of multiple unilateral homogeneous cervical adenopathy. Lymphoma can also occur as an isolated buccal, suboccipital or a level I node.

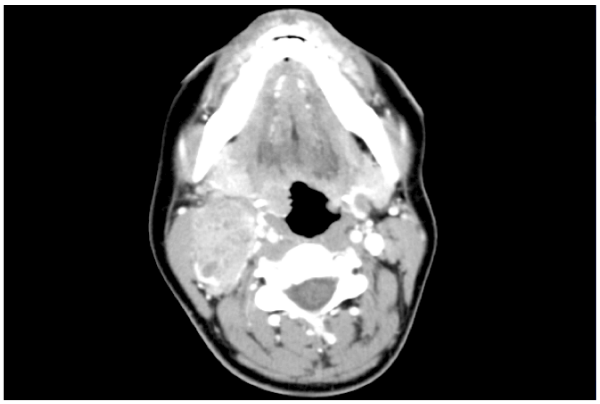


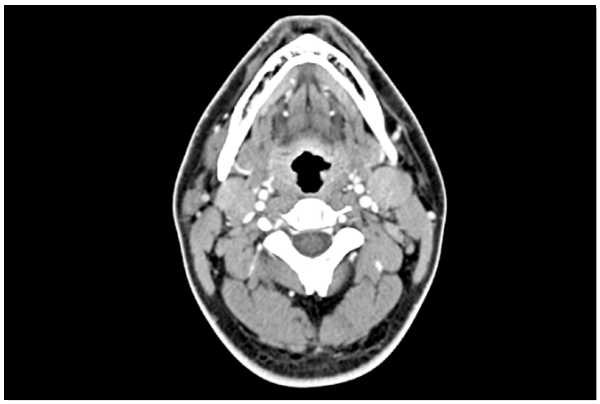


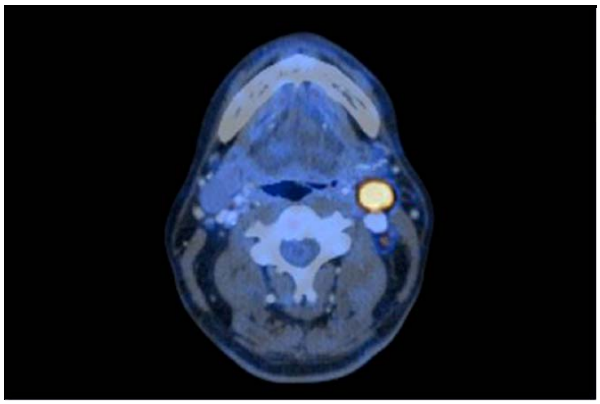


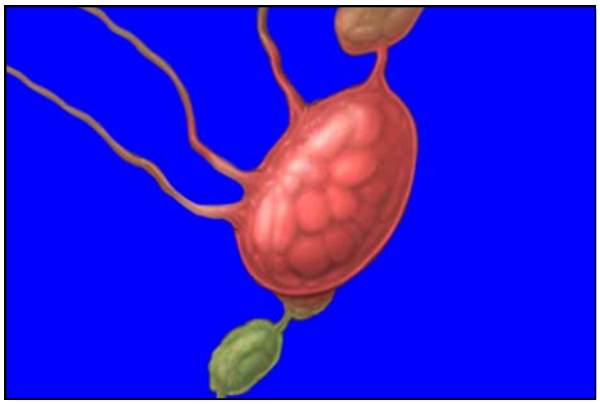




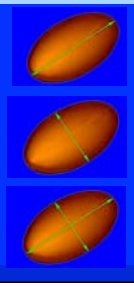








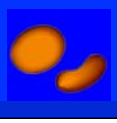
## As an initial assessment, homogeneous nodes that exceed the size criteria are considered pathologic only in Patients with Cancer or Lymphoma



Maximal Longitudinal Diameter
Level I and IIA nodes >15mm
All other nodes >10mm
Retropharyngeal nodes >8mm

Minimal Axial (Short Axis) Diameter
Level I and IIA nodes >11mm
All other nodes >10mm
Retropharyngeal nodes >5mm

Longitudinal/Axial Ratio
<2 suggests metastasis
(round versus lima bean shaped node)



## The Limitations of Size Criteria

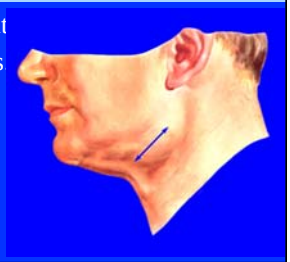
In a patient with cancer or lymphoma who has a homogeneous well delineated cervical lymph node:

If the node is greater than the normal size criteria, there is still about a 15% chance it is a reactive node.

If the node is less than or equal to the normal size criteria, there is about a 15% chance it contains microscopic tumor.

## Communication with Clinicians

In order to have a consistent dialogue with our clinicians I initially use the greatest nodal dimension, as that is what our clinicians are palpating.



## Limitations of Using Nodal Size Criteria

Thus, size criteria is only an initial evaluation for a pathologic node! For reproducibility, one should always use the same plane(s) (axial, coronal, sagittal) for measurements on all serial studies. Note the series and image number in your report.