NORMAL HEAD AND NECK LYMPH NODES TOPOGRAPHY BASED ON THE DATASET OF THE VISIBLE HUMAN

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Background:

The current nodal classifications are based on sources that contain limited, perturbed or uncertain anatomical information.

Purpose:

To present data on the location of neck lymph nodes based on an undisturbed anatomy.

To present the location, number and size of the normal sized lymph nodes of the head and neck region of the investigated female and male "Visible Human" Dataset (VHDS).

Methods and Materials:

The high lateral resolution of the images investigated was 28 pixels/cm and the rather high axial resolution (1mm) of the dataset provided quality and continuity of data that is superior to any other conventional medical imaging modality. Special attention was devoted to the 3-Dimentional topography as well as the number and size of lymph nodes.

Results:

New data on the location of normal size lymph nodes in anatomical optical microtome sections were acquired.

"Invisible" nodes were identified, i.e., normal size head and neck lymph nodes with diameters of less than 3 mm diameter which remain "invisible" for imaging methods such as CT or MRI. The identified nodes were classified conform to the CT-based nodal classification of Som et al. (1999).
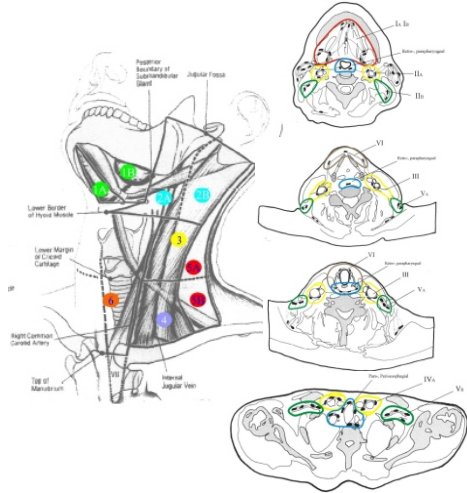
The levels of the neck nodes as proposed by Som et al. 1999.

Table I. *The boundaries of the level of the neck lymphatic sand the imaging based nodal levels classification proposed by Som et al.(1999)].*

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I	Above hyoid bone Below mylohyoid muscle Anterior to back of submandibular gland Previously classified as submental and submandibular nodes
IA	Between medial margins of anterior bellies of digastric nodes Previously classified as submental nodes
IB	Posterolateral to level IA nodes Previously classified as submandibular nodes
II	From the scull base to level of lower body of hyoid bone Posterior to back of submandibular gland Anterior to back of *sternocleidomastoid muscle* (SCM) Previously classified as upper jugular nodes
IIA	Anterior, lateral, medial, or posterior to internal jugular vein Inseparable from internal jugular vein (if psoterior to vein) Previously classified as upper jugular nodes
IIB	Posterior to internal jugular vein with fat plane separating nodes and vein Previously classified as upper spinal accessory nodes
III	From level of lower body of hyoid bone to level of lower cricoid cartilage arch Anterior to back of *sternocleidomastoid muscle* Previously classified as mid jugular nodes
IV	From level of lower margin of cricoid cartilage arch to level of clavicle Anterior to line connecting back of SCM muscle and posterolateral margin of anterior scalene muscle Previously known as low jugular nodes
V	Posterior to back of SCM muscle from skull base to level of lower cricoid arch From level of lower cricoid arch to level of clavicle as seen on each axial scan Posterior line connecting back of SCM muscle and posterolateral margin of anterior scalene muscle Anterior to anterior edge of trapezius muscle
VA	From skull base to level of bottom of cricoid cartilage arch Posterior to back of SCM muscle Previously known as upper level V nodes
VB	From level of lower cricoid arch to level of clavicle as seen on each axial scan Posterior to line connecting back of SCM muscle and posterolateral margin of anterior scalene muscle Previously known as lower level V nodes
VI	Between carotid arteries from level of lower body of hyoid bone to level superior to top of manubrium Previously known as visceral nodes
VII	Between carotid arteries below level of top of manubrium Caudal to level of innominate vein
Supraclavicular	At or caudal to level of clavicle as seen on axial scan Lateral to carotid artery on each side of neck Above and medial to ribs
Retropharyngeal	Within 2 cm of skull base and medial to internal carotid arteries

Note.-For levels I – V, the nodes are classified for each side of the neck. The parotid nodes and other superficial nodes are referred to by their anatomic names.
Abbreviations: SCM = sternocleidomastoid muscle; Vessel bundle = internal carotid artery and internal jugular vein.

Conclusions:

New data on the location, number and size of head and neck lymph nodes based on the VHDS were acquired. A 3D representation of the head and neck lymph nodes was performed. These data are of importance for the target volume delineation in radiation oncology (2-4).

References:

1. Som et al. Arch Otolaryng Head & Neck Surg 125: 388-396, 1999.
2. Kiricuta IC. First Int. Symp. on Target Volume Definition in Radiation Oncology, Limburg 2001.
3. Kiricuta IC. Third Int. Symp. on Target Volume Definition in Radiation Oncology based on the Sentinel Node Procedure, Limburg 2003.
4. Kiricuta IC. Forth Int. Symp. The Lymphatic System-New Developments in Oncology and IMRT, Limburg 2004.
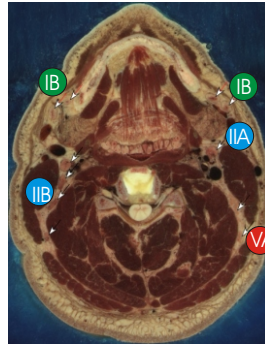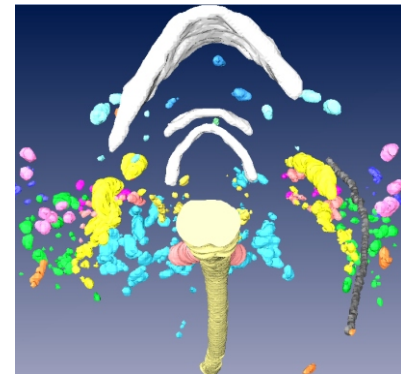
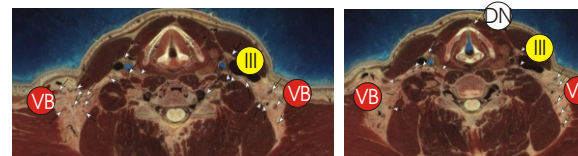Level IB, IIA, IIB and VA lymph nodes in the male VHDS.
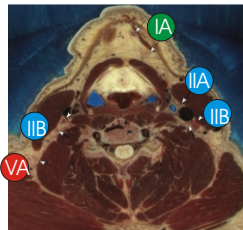
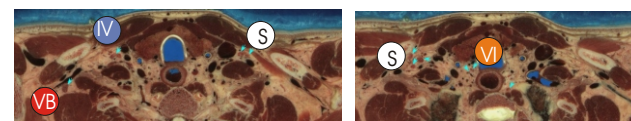Level IA, IIA, IIB and VA lymph nodes in the male VHDS.
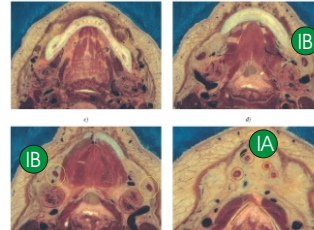
The buccinator lymph nodes (a), the level IB (b) and c)), and the level IA (d) lymph nodes in the female VHDS.
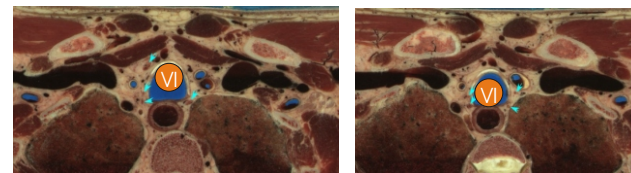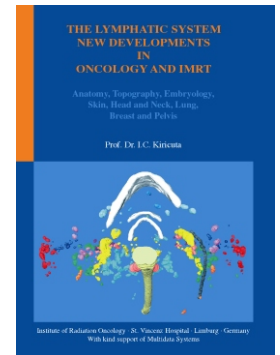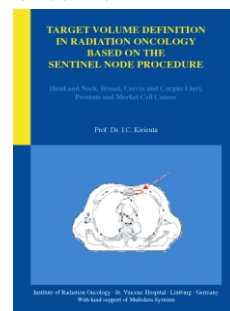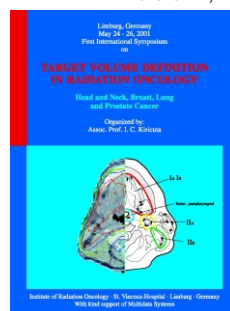

The Delphian node (DN) and Level III and VB lymph nodes in the male VHDS.

Supraclavicular (S), level IV and level VIB lymph nodes.

Supraclavicular (S) and level VI lymph nodes.

The level VI lymph nodes in the male VHDS.

3D reconstruction of the neck and mediastinal lymph nodes in the male VHDS.

3D reconstruction of the neck lymph nodes in the male VHDS.

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