

REVA #6: 3D Tracing of Cadaveric Human Vagus Nerves

Noa Nuzov, Valerie Lam, Nicole Pelot, Andrew Crofton, Andrew Shoffstall

- Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH, USA, 44106;
- Department of Biomedical Engineering, Duke University, Durham, NC, USA, 27708;
- APT Center, Louis Stokes Cleveland Department of Veterans Affairs Medical Center, Cleveland, OH

Cite the associated published protocol and paper if reusing.

Appendix 1

List of all gross anatomical landmarks (Tables 1 and 2) used for 3D nerve tracing; all landmarks can be identified with the cadaver in the supine position unless otherwise specified. See the protocol “REVA #5: Dissecting and Measuring Cadaveric Human Vagus Nerves” (Appendix 1, Table 2) for the list of all anatomical levels on the vagus nerve that are used for 3D nerve tracing.

Table 1: List of skeletal anatomical landmarks used for 3D nerve tracing. All skeletal landmarks are directly on the bone, and all soft tissue superficial to it has been removed, unless noted with an asterisk (*) where the landmark could not be visually identified and was instead palpated.

Name	Modifier (if applicable)	Description
Mental protuberance		The most anterior vertex in the sagittal midline of the mental protuberance on the mandible.
Jugale	Right, left	The most lateral point on the jugale (the angle of the zygomatic bone formed by its frontal and temporal processes).
Infraorbital foramen	Right, left	Inside the infraorbital foramen in the maxilla approximately 1-2 mm deep (posterior).
Acromion process	Right, left	The most anterior edge of the acromion process of the scapula.
Lateral edge of the body of the hyoid bone *	Right, left	The lateral side of the junction between the body and the greater/lesser horn. There may be some tissue (e.g., muscle) superficial to this location.
Greater horn of the hyoid bone *	Right, left	The most superior edge of the tubercles of the greater horns of the hyoid bone from the lateral side. There may be some tissue (e.g., muscle) superficial to this location.
Angle of the mandible	Right, left	The most lateral surface of the vertex of the angle of the mandible (formed by the junction of the body and ramus of the mandible). The mandibles are removed during dissection and are manually held in place for tracing.

Transverse process of C1 *	Right, left	The most lateral edge of the transverse process of the first cervical vertebra. There may be some tissue superficial to this location.
Jugular notch of the manubrium		The most superior edge in the notch formed in the midline of the manubrium. The chest wall is removed during dissection and is laid in place for tracing.
Sternal angle		The most anterior surface in the sagittal midline of the junction between the manubrium and the body of the sternum. The chest wall is removed during dissection and is laid in place for tracing.
Pubic symphysis		The most anterosuperior surface of the sagittal midline of the pubic symphysis.
External occipital protuberance (<i>not used for all cadavers</i>)		The most posterior vertex of the external occipital protuberance of the occipital bone. It can only be identified with the cadaver in the prone position.
Zygomatic process (<i>not used for all cadavers</i>)	Right, left	The most lateral point on the zygomatic process.
Center of the zygomatic arch (<i>not used for all cadavers</i>)	Right, left	The approximate center of the zygomatic arch, on the superolateral surface of the bone.
Mastoid process (<i>not used for all cadavers</i>)	Right, left	The most inferior vertex formed by the mastoid process.
C7 spinous process * (<i>not used for all cadavers</i>)		The most posterior vertex of the C7 spinous process. Cadaver must be in prone position.
Iliac crest * (<i>not used for all cadavers</i>)	Right, left	The most superior point of the iliac crest. Cadaver must be in prone position.
Center of iliac crest * (<i>not used for all cadavers</i>)		The approximate location in the sagittal midline of the cadaver that is between the two most superior points on the right and left iliac crests, located superficial to the spine. Cadaver must be in prone position.

Table 2: List of soft tissue anatomical landmarks used for 3D nerve tracing.

Name	Modifier (if applicable)	Description
Tip of nose		The tip of the vertex of the nose in the sagittal midline of the body, on the skin.
Laryngeal prominence		The most anterior location that is formed by the laryngeal prominence of the thyroid cartilage. There may be some tissue (e.g., muscle) superficial to this location.

Carotid bifurcation	Right, left	The most inferior and lateral point on the “Y” shape formed by the bifurcation of the common carotid artery on the vasculature. The carotid bifurcation is moved significantly during dissection but pinned in its approximate pre-dissection location during tracing.
Tracheal bifurcation		The most anterior surface of the superior edge of the inside of the upside-down “Y” shape formed by the tracheal bifurcation. The trachea is moved significantly during dissection but manually held in its approximate pre-dissection location during tracing.
Apex of the heart		The vertex formed by the apex of the heart that points in the left-anterior direction in most individuals. The heart is moved significantly during dissection but held in its approximate pre-dissection location during tracing.
Ligamentum arteriosum		The most anterolateral surface in the approximate center of the ligament that attaches the aorta to the pulmonary artery. The heart and great vessels are moved significantly during dissection but held in their approximate pre-dissection location during tracing.
Esophageal hiatus		The most anterior margin of the esophageal hiatus. Pin(s) is/are placed in the lateral part of the esophagus to mark the site of the hiatus when the diaphragm is incised during dissection.
Aortic hiatus		The most anterior margin of the aortic hiatus. Pin(s) is/are placed in the aorta to mark the approximate site of the hiatus when the diaphragm is incised during dissection.