# Incorporating Cadaver-Specific CT Images into Anatomical Education

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## INTRODUCTION

- Traditional anatomical models and textbooks may not fully capture the specific variations of individual cadaveric donors. With improvements in technology, cadaveric-specific CT imaging has emerged as a promising tool to enhance anatomical education[1] and provide an appreciation of the individual variation that exists among cadaveric donors as well as living patients.
- Normally, dissections are done without knowledge of pathologies in the cadaveric donor, resulting in a blind approach. This can disrupt a dissection, particularly for less experienced students and can also cause damage to an area of interest.
- **Incorporating cadaver-specific CT imaging provides the dissector with knowledge and guidance about potential pathologies and/or congenital anomalies. This can also be a promising tool in anatomical education to aid student learning and develop their ability to interpret medical images, while highlighting the specificity that exists across individuals.**

## METHODS

- Two cadaveric donors from the NEOMED Body Donation Program were selected for a full body CT scan.
- Prior to scanning, donors were embalmed and then transported to University Hospital Portage Medical Center in Ravenna, OH where they were scanned using standard scanning parameters.
- After exploring the CT scans using Bee DICOM Viewer, regions of interests were determined, and targeted dissections were performed.

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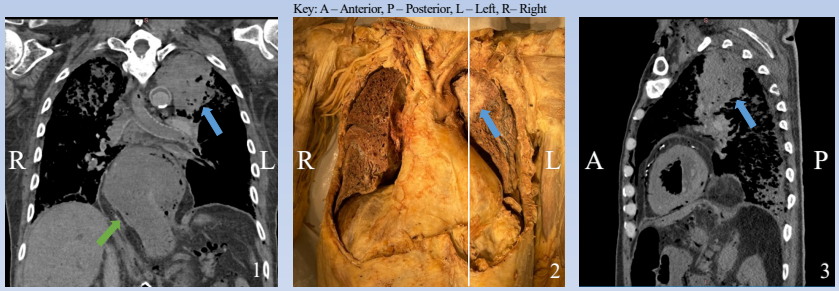
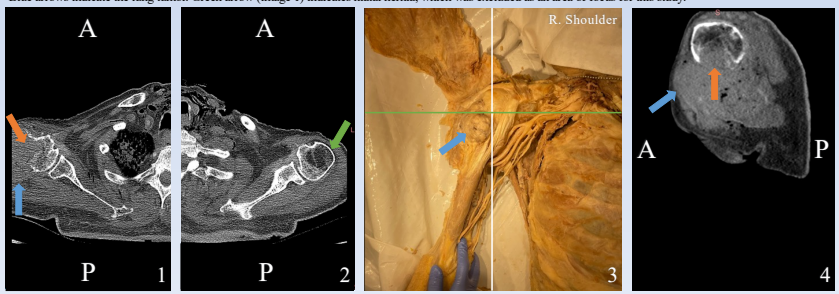
|---|---|
| Sex/Age | • Male<br>• 82 Years |
| Cause of Death | • Metastatic Lung Cancer, COPD, Coronary Artery Disease, Type II Diabetes |
| Regions of Interest | • Lungs, R. Humerus, Brain |
| Sex/Age | • Female<br>• 89 Years |
| Cause of Death | • Unspecified Dementia |
| Regions of Interest | • Inguinal Region, Thorax |

## RESULTS

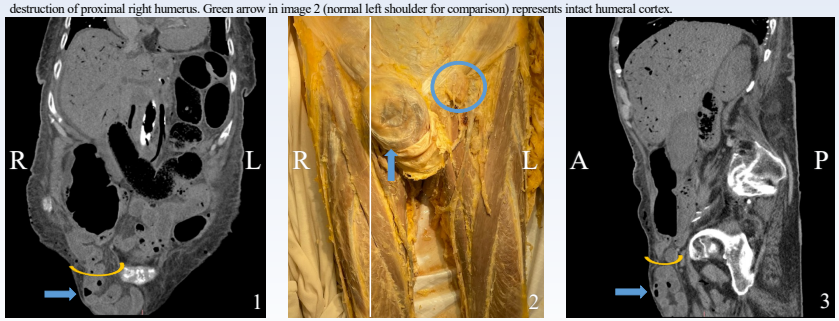
Key: A – Anterior, P – Posterior, L – Left, R– Right




The lungs were accessed by removing the chest plate. Both lungs were removed and sectioned in an oblique coronal plane. The section plane was determined by referring to the CT scan throughout the procedure, which provided guidance and measurements for the section that would provide the best visualization of the lung tumor. Note: Image 1 is a coronal CT slice correlating with cadaveric image (image 2). White line (image 2) represents the plane of sagittal CT slice seen in image 3. Blue arrows indicate the lung tumor. Green arrow (image 1) indicates hiatal hernia, which was excluded as an area of focus for this study.




The proximal right humerus was accessed by reflecting superficial muscles (i.e., pectoralis major and minor and deltoid). The axillary region was also dissected, providing visualization of the neurovascular structures. A large tumor was discovered, demonstrating displacement of surrounding muscles, extensive soft tissue infiltration, and osseous destruction. Note: Green line in image 3 represents the axial plane at mid glenohumeral level of CT slices in images 1 and 2. White line in image 3 represents the sagittal plane of CT slice in image 4. Blue arrows represent soft tissue component of right humeral metastasis. Orange arrows represent osseous destruction of proximal right humerus. Green arrow in image 2 (normal left shoulder for comparison) represents intact humeral cortex.




Dissection of the indirect inguinal hernia was performed by revealing the inguinal region and isolating the indirect hernia. We also revealed the left side of the inguinal region to provide a normal comparison. The fibrous covering was reflected, exposing the herniation. Note: Image 1 is coronal slice of CT image. White line (image 2) represents the plane of sagittal CT slice seen in image 3. Blue arrows indicate herniation. Yellow semi-circle represents herniation through inguinal ring. Blue ring indicates normal inguinal ring.

## DISCUSSION

- This study assessed the utility of cadaver-specific CT scans in planning and conducting targeted dissections based on pathologies and congenital anomalies.
- By referring to CT images in real time, a guided plan can be established if difficulty in dissections arise.
  - This was utilized during removal of the left lung. The tumor in the lung had infiltrated the mediastinum more extensively than originally thought.
  - By consulting the CT images, removal of the lung was successful and unnecessary damage to surrounding structures was prevented.
- The images also provide precise measurements that ensure an accurate sectioning plane, allowing for visualization of internal structures in the targeted areas.
- An unexpected benefit was the ability to consult CT images following a dissection which allowed for 1) a more detailed understanding of the anatomy, and 2) enhanced post-dissection discussion which provided additional student comprehension.
- Medical students frequently use digital platforms as tools for learning anatomy[2]. By archiving cadaveric-specific CT images, a university can work to establish and support a modern learning tool for future students.
- This study provided the opportunity for increased student exposure to CT imaging, thereby increasing their confidence and practice in image interpretation.
- Limitations of the study include partial exclusion of certain regions (i.e., right shoulder) during the CT procedure, inability to re-scan regions that were not sufficiently scanned, and artifacts resulting from the embalming process[4].

## REFERENCES

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