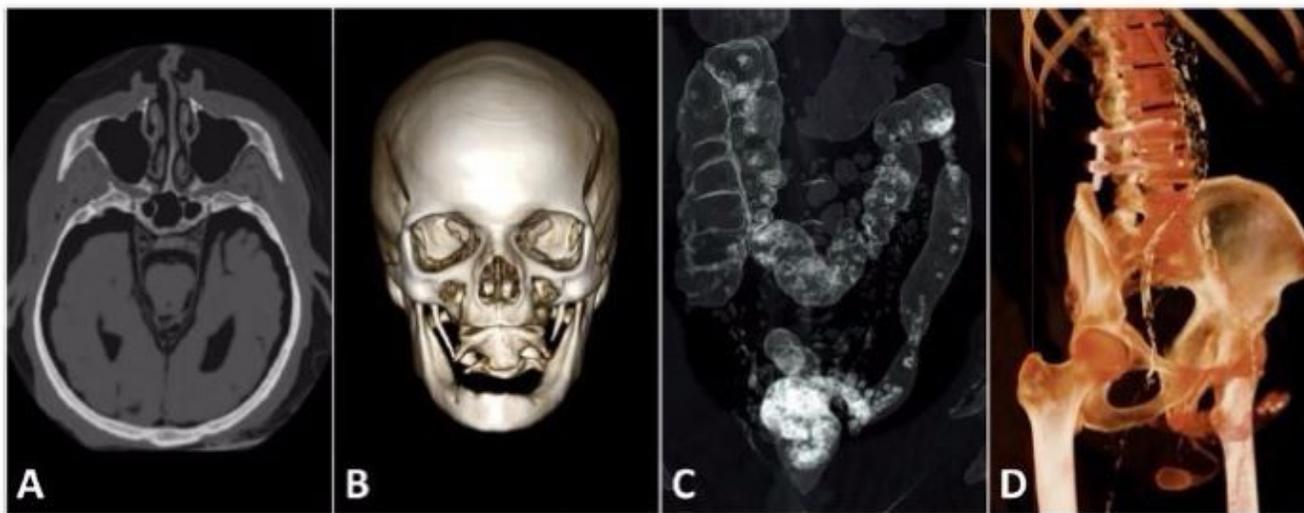


## CT-Based Virtual Dissection Improves Student Performance In Gross Anatomy Courses

### Measuring Learning Success In First-Year Gross Anatomy

Researchers at the University of Heidelberg Medical School recently published an article focusing on the impact of the Anatomage Table. The German Cancer Research Center and Karlsruhe Institute of Technology investigated the impact of virtual dissection tables and cadaver CT scans on student learning of anatomy. Imaging technologies such as computed tomography (CT) and magnetic resonance imaging (MRI) are becoming key in teaching gross anatomy at many medical schools. The main learning goal of introducing cadaver-specific scans is to improve students' 3D spatial understanding of general gross anatomy. In 2013, Heidelberg integrated three Tables into their curriculum to be used in anatomy courses. The purpose of the study was to identify if CT scans and virtual dissection directly affected learning success. It was designed to measure the qualitative and quantitative success of radiologic imaging and 3D visualization in first-year gross anatomy classes.



### Evaluation Of Virtual Technology In Courses

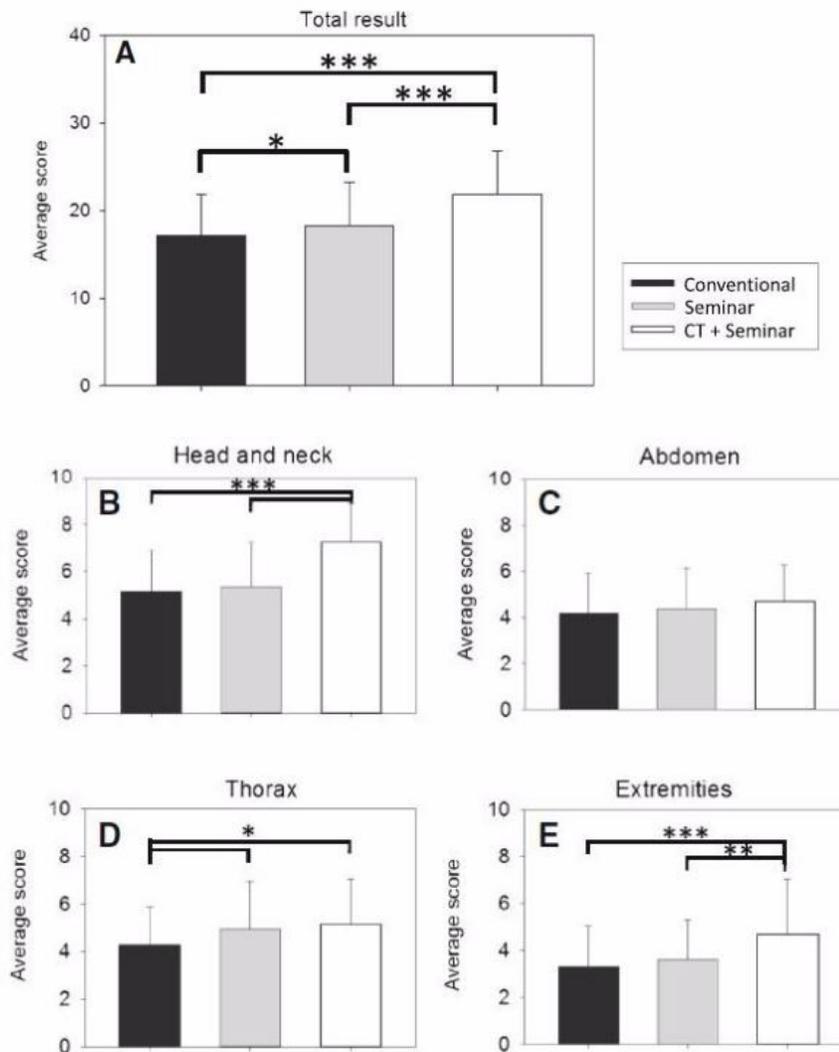
Two specific courses were focused on during the study, the Heidelberg Curriculum (HeiCuMed) of gross anatomy and another radiologic anatomy (RA) seminar. The HeiCuMed course is a more conventional anatomy course while the RA seminar used radiologic imaging to teach gross anatomy. The seminar specifically focused on integrating CT scans and X-rays into medical training. The students were evaluated quantitatively through a multiple choice anatomy examination. The questions were derived from the most difficult 10% of questions from the National Medical Board Examinations between 2005 and 2010. The exam did not include image-based questions and was specifically compiled to test general anatomy.

The examination was evaluated between three specific cohorts of students. All groups spent the same amount of overall time in the classroom. One group had access to CT workstations, the Table, and extra training in the RA seminar (CT + seminar group). Another group had additional training in the RA seminar course while the last group was only in the conventional anatomy course.

### Quantitative & Qualitative Findings Of Cohort Analysis

Statistical analyses were applied to all results and the level of significance was set at  $p < 0.05$ . Overall, the CT + seminar group achieved much higher scores compared to the conventional anatomy and RA seminar group of students. Significant improvements were also seen when comparing the CT + seminar group to the other two groups with knowledge of the head and neck and extremities. This might be explained by the fact that intra- and extracranial anatomical structures are more complex in

structure. Viewing these structures through virtual dissection may have resulted in more complete knowledge retention. Having access to CT cross-sections and virtual dissection tools may have also impacted students' knowledge of extremities and distal structures in the body. The CT + seminar group also had a significantly higher average score in the thorax category when compared to the conventional anatomy group.



The students from the CT + seminar group were also asked to complete a survey about their experience with the the Anatomage Table. The questions focused on the incorporation of radiologic anatomy into preclinical gross anatomy courses. Most students agreed that having access to imaging data and virtual resources positively affected their understanding of gross anatomy.

### Accurate 3D Understanding With Virtual Tools

The interactive nature of including radiological imaging training with cadaver dissection was found to be a powerful tool. The images reveal structures that cannot always be easily seen. The results indicated that learning gross anatomy can be significantly impacted with virtual anatomy. Providing students with the opportunity to have early contact with clinically relevant imaging prepares them for the transition into clinical work. Using virtual dissection alongside medical training curriculum will allow for students to develop an accurate 3D understanding of gross anatomy.

### **Works Cited**

Paech, D., Giesel, F., Unterhinninghofen, R., Schlemmer, H., Kuner, T., & Doll, S. (2016). *Cadaver-specific CT scans visualized at the dissection table combined with virtual dissection tables improve learning performance in general gross anatomy*. [Abstract]. *European Radiology*, 25(9). doi:10.1007/s00330-016-4554-5.