



# Dissection Course in Anatomy as Stimulus to Independent Research and to a Real Step into Medicine

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## Abstract

**Objectives** In the recent years, many strategies in anatomy education have appeared. However, these innovations reduce the time students can spend on cadaver-based classes, which are considered to be an effective method of learning anatomy. The aim of the present research was to observe the advantages and features of dissection sessions in medical universities.

**Materials and Methods** The comparative analysis of the academic performance of dissector ( $n = 30$ ) and nondissector ( $n = 105$ ) students and a survey questionnaire were conducted. The data was collected through the work of the Dissection Mastery School (DMS) of the Sechenov University, Moscow, Russia, between 2016 and 2018.

**Results** The data analysis showed significant higher examination results in the dissectors cohort ( $p < 0.001$ ) and a strong opinion about dissection as a good tool to improve anatomy knowledge (95% of responders). Apart from that, prosection is proven to have advantages in comparison with alternative learning approaches, according to researches performed by colleagues.

**Conclusion** These data show that dissection still remains one of the most effective and beneficial methods of teaching anatomy in medical universities, and that it should be further integrated into the medical curriculum.

## Keywords

- anatomy
- cross-sectional anatomy
- dissection
- medical education
- methodology

## Introduction

Anatomy is a basic medical science that provides necessary knowledge and forms a solid foundation for future doctors. Since the ancient times, the structure of the human body has been a topic of great interest.<sup>1</sup> However, during the following centuries, dissection has faced criticism and oppression by religion and society.<sup>2</sup> But the will of researchers to understand the human body has managed to overcome these difficulties to enrich anatomy knowledge. Thus, all the anatomy we learn and study today is the result of great enthusiasm.

Through the ages, anatomy did not lose its importance and still remains one of the first disciplines taught in the medical

universities, as it provides the learning of further subjects.<sup>3</sup> Obviously, there cannot be a qualified physician without knowledge of anatomy. Today, the process of teaching anatomy is being constantly improved and integrated with new technologies.<sup>4</sup> As a result of this rapid development of the anatomical sciences, more requirements relating to future doctors are imposed.

In addition to that, there is a tendency of reducing the curriculum of long-lasting disciplines, such as human anatomy.<sup>5</sup> Often, the time allocated to the teaching of anatomy is only enough for a theoretical introduction to the subject and for a short visual overview into the human body.<sup>6</sup> That is why, in spite of the large amount of available corpses, a significant shortage of time for cadaver prosection can be noticed. Under

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these circumstances, the necessity of practical classes with natural materials strongly increases, as anatomy is considered to be a classical morphological science.

The most detailed and comprehensive notion of the human body a future physician can get is only by being in contact with it.<sup>7</sup> Dissection sessions provide important illustrative materials and proper learning of the structure of the human body.<sup>8</sup> Therefore, today, cadaver dissection still remains an important aspect of teaching anatomy. Therefore, the aim of the present research was to value the role of practical dissection classes in learning anatomy by analyzing the academic performance of the students and summarizing their opinion regarding these classes.

## Materials and Methods

In March 2016, the Dissection Mastery School (DMS) of the Sechenov University, Moscow, Russia, was launched. Any student was able to attend the School and learn the basics of dissection under the supervision of the human anatomy department professors. Two-hour length practical classes with cadavers were held twice a week in the evenings. During the classes, the students had an opportunity to work with cadavers individually or in groups.

### Recruitment

Participation in the study was voluntary. During the 2017–2018 academic year, 135 first- and second-year students were selected for the research and divided into 2 groups, with 30 and 105 students, respectively. Members of the first group ( $n = 30$ ) had been participating in current dissection schedule (dissectors). The second group of students ( $n = 105$ ) did not attend the DMS classes (nondissectors). The academic performance in human anatomy of both groups was compared, according to the results of the diagnostic tests (DT), of the final exam (FE), and of the final test (FT). There was no bias for gender, for age, or for previous experience in anatomy. Informed consent was obtained from all of the participants.

### Examinations Structure

The DT contained 20 questions of different types: multiple-choice, true/false, and matching. The FT included 30 questions of different types: multiple-choice, true/false, matching, and ordering. To observe the DT and FT results, a percentage of correct answers was calculated. The FE held in the end of the academic year included identifying anatomical structures, solving situational tasks, and an oral theoretical examination. After the interview with an independent examiner, the student was given a mark (excellent, average, or failure).

### Statistical Analysis

To observe the efficiency of the dissection sessions and their impact on learning anatomy, the academic performance of the students on the FE was statistically analyzed. All of the data were collated and entered into Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and exported into STATA 13 software (StataCorp., College Station, TX, USA). To investigate the correlation, the chi-squared distribution ( $\chi^2$ ) was used. A value of  $p \leq 0.005$  was considered statistically significant.

## Subjective Data Collection

The survey was administered over a 3-day period at the conclusion of the course of DMS classes among students of the dissectors group ( $n = 35$ ). All of the 35 students were asked to complete a questionnaire and share their opinion on dissection practice, measuring statements approval. To summarize the preferences and year of study distribution of the students, the review of two years of DMS work was composed. The results were compiled using Microsoft Excel.

## Results

The results of the FE showed a significant difference between the 2 groups, with a higher performance in the 1<sup>st</sup> group ( $n = 30$ ) (► **Table 1**). The DMS students demonstrated more comprehensive and confident knowledge and were given better marks overall.

The overall pooled distribution of the FE marks showed a strongly significant correlation between attending practical classes with cadavers and higher academic performance on the FE ( $\chi^2 = 27.991$ ;  $df = 3$ ;  $p < 0.0001$ ).

The data analysis of the DT results (► **Table 2**) also showed that the DMS participants demonstrated more comprehensive knowledge about subject units such as musculoskeletal, angiology, and peripheral nerves anatomy. Obviously, this fact was due to the opportunity to dissect and see those structures naturally at the DMS.

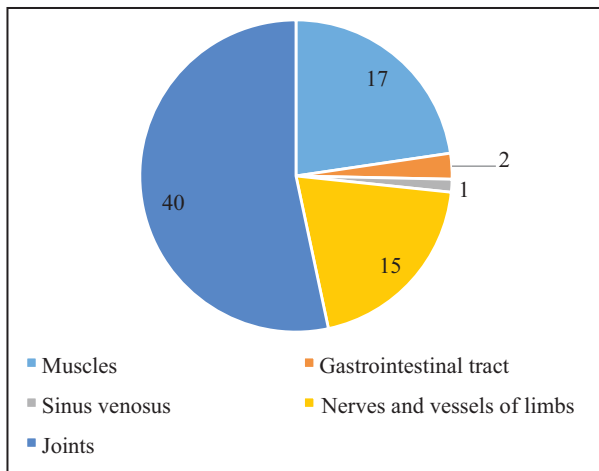
The average FT result was 88% in the DMS participants group and 74% in the control group. This significant difference indicates the efficiency of practical classes with cadavers in learning anatomy and correlates with the mentioned data.

**Table 1** The final exam results

Final exam result	Number of students	
	Dissectors	Nondissectors
Failure	0	1
Average	1	29
Excellent	29	75

**Table 2** Academic performance of students according to diagnostic tests

Curriculum unit	Attended DMS classes	Average result, %
Musculoskeletal	+	87
	-	76
Splanchnology	+	82
	-	74
Neurology	+	86
	-	72
Angiology	+	85
	-	71

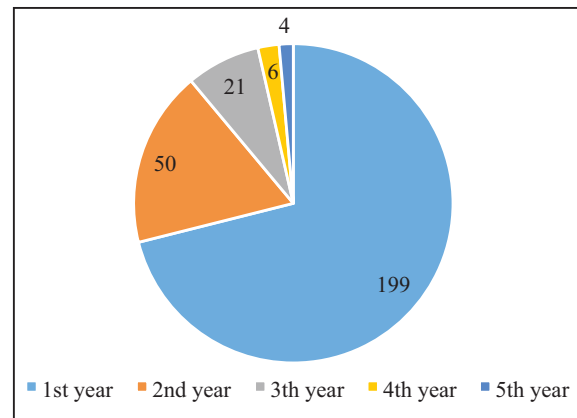


**Fig. 1** The most preferred objects the students dissected.

According to the data of DMS work for 2 years, the most preferred objects for students to dissect were joints (total of 40 preparations). In addition to that, much attention was given to muscles, blood vessels and nerves (17 muscular and 15 preparations of blood vessels and nerves of limbs) (► **Fig. 1**).

The survey questionnaire results (summarized in ► **Table 3**) showed that the students described the dissection practice in positive terms. Most of the responders confirmed the benefits and the efficiency of practical classes with cadavers in understanding gross anatomy and its necessity for every medical student. A small number of students (2 out of 30) were indifferent to dissection sessions and did not consider them as an effective method for learning anatomy. Almost one third of the responders (9 out of 30) did not agree that dissection classes have any impact on memorizing anatomical terms. A total of 95% of the responders agreed that dissection was a useful approach to learning anatomy.

The increased interest in dissection classes was proven according to the number of students who attended at the DMS. In the 2017–2018 academic year, there were 280 students in comparison to 113 in 2016–2017. The distribution of students in 2017–2018 is symbolic: most of the contingent comprised first- and second-year students. However, the analysis showed several more adult students who attended the DMS classes (► **Fig. 2**).



**Fig. 2** Number of students who attended the DMS (year of study distribution).

## Discussion

Dissection has a very long history, dating back to the first attempts to understand the structure of the human body.<sup>9</sup> Despite the new technologies and innovations integrated to the educational process, prosection still remains an effective method in teaching anatomy.<sup>10</sup> Data collected in the DMS show that dissection sessions improves academic performance and enriches the knowledge of human anatomy.

This point of view was also mentioned in other researches. Entwistle et al found that dissection classes helped students to combine their theoretical and practical skills to form the most comprehensive notion of the subject.<sup>11</sup>

The necessity of practical classes was also mentioned in the work of Pandey et al.<sup>12</sup> They suggested that students encounter some difficulties in learning anatomy using only one method. According to the research, a combination of memorizing, theoretical revision, and practical dissection sessions resulted in the best achievements of students. Findings similar to ours were made by Yeager.<sup>13</sup> That study included 4 examinations with 4 units in each, in which dissectors scored higher than nondissectors in 13 cases.

Despite the positive impact on the academic performance of the students, dissection classes have less obvious advantages, according to Crisp et al.<sup>14</sup> The researchers concluded that prosection in the dissecting room develops teamwork

**Table 3** Survey questionnaire results

Statement about cadaveric dissection	Frequency, %				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
A useful method of learning anatomy	69	26	5	—	—
Helped to better understand gross anatomy	57	34	9	—	—
Helped to memorize anatomical terms	14	23	34	20	9
Helped to develop manual skills	32	54	14	—	—
Is only necessary for future surgeons	—	—	5	9	86
Would recommend dissection to classmates	37	28	26	9	—

and cooperation among students. These skills might be useful for practice in hospitals and in future jobs.

To observe the psychological aspect of dissection practice in medical universities, Bertman et al studied how classes with cadavers adapt students to accepting death.<sup>15</sup> Researches stated that this experience would be useful in making an autopsy and dealing with terminal patients. Indeed, there are few medical specialties that do not face death during practice. Therefore, accepting death is an important stage of becoming a doctor, according to Marks et al.<sup>16</sup>

Another interesting finding that correlates with our results was made by Ellis.<sup>17</sup> The scientist noticed that the hours spent by the students with cadavers had a positive impact on their manual skills, as well as on their knowledge about gross anatomy. This aspect of dissection practice might be useful for students who choose the path of a surgeon. This opinion was also confirmed by Sheikh et al, who used a survey questionnaire among 80 practicing surgeons of different specialties.<sup>18</sup> Responders chose dissection as the most preferred method of learning human anatomy.

In the recent years, an impressive number of alternative methods of learning anatomy approach. Sometimes, dissection is being totally replaced by the use of new technologies, or changes in the medical curriculum leave a short amount of time for dissection, according to Bouwer et al and to Whelan et al.<sup>19,20</sup> Every method has its unique features and advantages, mostly because of opportunities of vital study, visual quality, and ethical aspects. However, according to Estai et al, who composed a comparative analysis of all teaching and learning techniques that are used in medical universities nowadays, these methods have serious disadvantages in comparison to dissection.<sup>21</sup> New technologies achieve high accuracy visualization, but still cannot replace the experience of tactile contact with the human body and of obtaining a correct notion of its texture, according to Van Wyk et al and to Burgess et al.<sup>22,23</sup>

## Conclusion

Our study suggests that medical students consider dissection to have a positive impact on their knowledge and manual skills. According to the research results and data collected at the DMS of the Sechenov University, practical classes with cadavers provide students with an opportunity to improve academic performance and effectively learn human anatomy. Moreover, classical dissection demonstrates serious advantages in comparison to other methods used in the modern curriculum. The knowledge and skills obtained by the students from dissection can be useful for physicians of any specialty and qualification.

### Conflicts of Interests

The authors have no conflicts of interests to declare.

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