

# Bodies for Anatomy Education in Medical Schools: An Overview of the Sources of Cadavers Worldwide

Juri L. Habicht, Claudia Kiessling, MD, and Andreas Winkelmann, MD

## Abstract

The International Federation of Associations of Anatomists (IFAA) recommended in 2012 that only donated bodies be used for anatomy teaching and research. However, in many countries around the world, anatomists still depend on bodies that do not stem from voluntary donations by the deceased but, rather, are “unclaimed.” A broad search of the literature was conducted to produce a baseline overview of the sources of cadavers used for anatomy teaching in undergraduate medical curricula on a global scale.

Information from the literature search was supplemented with data from a 2016–2017 survey of selected senior local anatomists. Of 165 countries with medical schools, information was gathered for 71. In 22 (32%) of the 68 countries that use cadavers for anatomy teaching, body donation is the exclusive source of bodies. However, in most other countries, unclaimed bodies remain the main ( $n = 18$ ; 26%) or exclusive ( $n = 21$ ; 31%) source. Some countries import cadavers from abroad, mainly from the United States or India. In one country, bodies of

executed persons are given to anatomy departments. The heterogeneous geographical distribution of body sources cannot easily be accounted for, but religion, culture, and folk beliefs about what should happen to bodies after death seem to play a role. Implementation of the IFAA recommendations still has a long way to go, but it is encouraging that functioning body donation programs exist on all continents and that there are examples of recent rises in donations and of anatomists initiating new donation programs.

The regular use of human bodies for medical training purposes began in Europe in the Late Middle Ages and spread during the 18th and 19th centuries.<sup>1</sup>

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Historically, anatomists have depended on the gallows, jails, or poorhouses as sources of bodies, but the 1960s and 1970s saw the rise of a viable alternative: body donation, or informed consent of the deceased during his or her lifetime.<sup>2</sup> Today, anatomical dissection for teaching purposes is common at medical schools all over the world. Even as 3D prints, virtual simulations, and other modern representations of the human body are increasingly used in anatomy education, and despite an ongoing debate, fueled by this development, on the value of dissection for teaching purposes,<sup>3,4</sup> it seems that anatomists who use preserved human bodies for teaching medical students outnumber those who do not and will do so for the foreseeable future.<sup>5</sup> In addition, there is increasing use of cadavers in postgraduate medical education. There is, therefore, a continued global need for cadavers at anatomical sciences departments.

## Where Do the Bodies Come From?

The sources of human tissue used for medical education and research depend on local legislation, the awareness and willingness of the population to contribute to anatomy education, cultural and religious customs, and socioeconomic factors. Today, the most common sources are body donation

programs and “unclaimed” bodies—that is, bodies of individuals who die without relatives or friends to claim them for burial or without the means to afford burial. In some countries with a shortage of available bodies, anatomists import cadavers from other countries.<sup>6</sup>

In 2012, the International Federation of Associations of Anatomists (IFAA) published recommendations concerning the donation and study of human bodies that clearly call for willed body donation and for an end to other, ethically controversial practices<sup>7,8</sup> such as the use of the bodies of executed persons<sup>9</sup> and unclaimed bodies. The latter practice has been criticized for using bodies without consent of the deceased and for discriminating against certain minority groups, including individuals with mental illness or who are poor, whose cadavers have frequently been used for anatomical purposes.<sup>10</sup>

The IFAA issued its recommendations<sup>7</sup> with the hope that they will be implemented worldwide. However, there is currently insufficient information about global body sourcing practices to track future changes. Although some regional overviews have been published,<sup>11–13</sup> only two articles have gathered information from more than one continent: Biasutto et al<sup>5</sup> included individual reports by anatomists from 13 countries, and

Riederer<sup>14</sup> included brief information from the literature for 35 countries.

In this article, we aim to provide an initial overview of current practices regarding sources of bodies used at anatomical sciences departments worldwide. We compiled this information from a broad search of the literature and a survey we sent to selected anatomists. While bodies are also used for postgraduate medical training and for research,<sup>15</sup> we decided to focus on the use for anatomy teaching in undergraduate medical curricula.

### Reviewing Current Practices

Collecting these data on a global scale is a challenge given the unsystematic and unstandardized nature of existing research. Relevant information regarding the sources of bodies can be found in both quantitative studies (e.g., regional surveys) and qualitative studies (e.g., interviews with anatomists) and sometimes is just mentioned as an aside in texts on anatomy education.

Therefore, to get an overview of the current practices concerning the sources of bodies used in undergraduate medical curricula on all continents (excluding Antarctica), we conducted a very broad search of the literature. In June 2016 (with an update in June 2017), we searched the online platforms PubMed and ResearchGate using key terms such as *body* or *cadaver* combined with *donation*, *unclaimed*, or *dissection*. We also included literature from reference lists, identified via ancestry or “snowball” searching. We included articles published from 2002 onward. This period of 15 years was a compromise between up-to-date information and coverage of as many countries as possible. Also, our first searches showed that relevant literature was published infrequently before 2002.

We organized the available information from the literature into an Excel spreadsheet (Microsoft Excel 2016, Version 15.30, Microsoft Corporation, Redmond, Washington), categorizing and sorting the data for each country by the type of source of bodies and the amount of bodies obtained from the respective sources.

As a compromise between an overview and a detailed analysis, we decided to make the sovereign states of the world the

smallest geographical unit of analysis, even if this meant that we did not differentiate any further (e.g., the states within India, Germany, or the United States). From an original list of 194 countries (193 United Nations member states plus Taiwan), we eliminated all smaller states without medical schools (based on information from an online directory of medical schools<sup>16</sup>). We also eliminated Micronesia and smaller Caribbean states and territories (see details below). We were left with a list of 165 countries. In the case of conflicting evidence for a country, we decided in favor of the more recent publication and/or the information based on a more comprehensive description of the situation.

As authors rarely gave specific percentages for the share of respective sources in the overall availability of bodies, it proved impossible to sort the data based on numeric values. As bodies other than donated or unclaimed bodies were rarely used, we created categories based on the mix of these two sources and classified countries using the following broadly defined groups:

- exclusively body donation;
- mostly body donation (and, less often, unclaimed bodies);
- mostly unclaimed bodies (and, less often, body donation);
- exclusively unclaimed bodies; and
- other sources (e.g., import of cadavers from abroad), either exclusively or in addition to another category.

It must be added that we defined “donation” in this analysis as a bequest by the deceased person during his or her lifetime. It is possible that some authors also included donation by family members in this category; however, this form of donation was not explicitly mentioned in the analyzed literature. Some authors even used “donation” to describe “donations by institutions” to anatomy departments,<sup>17</sup> but we categorized such “donations” under unclaimed bodies.

As our literature search only provided sufficient information for 54 countries, we decided to supplement the collected data through a survey. To gather information for countries where information from the literature was

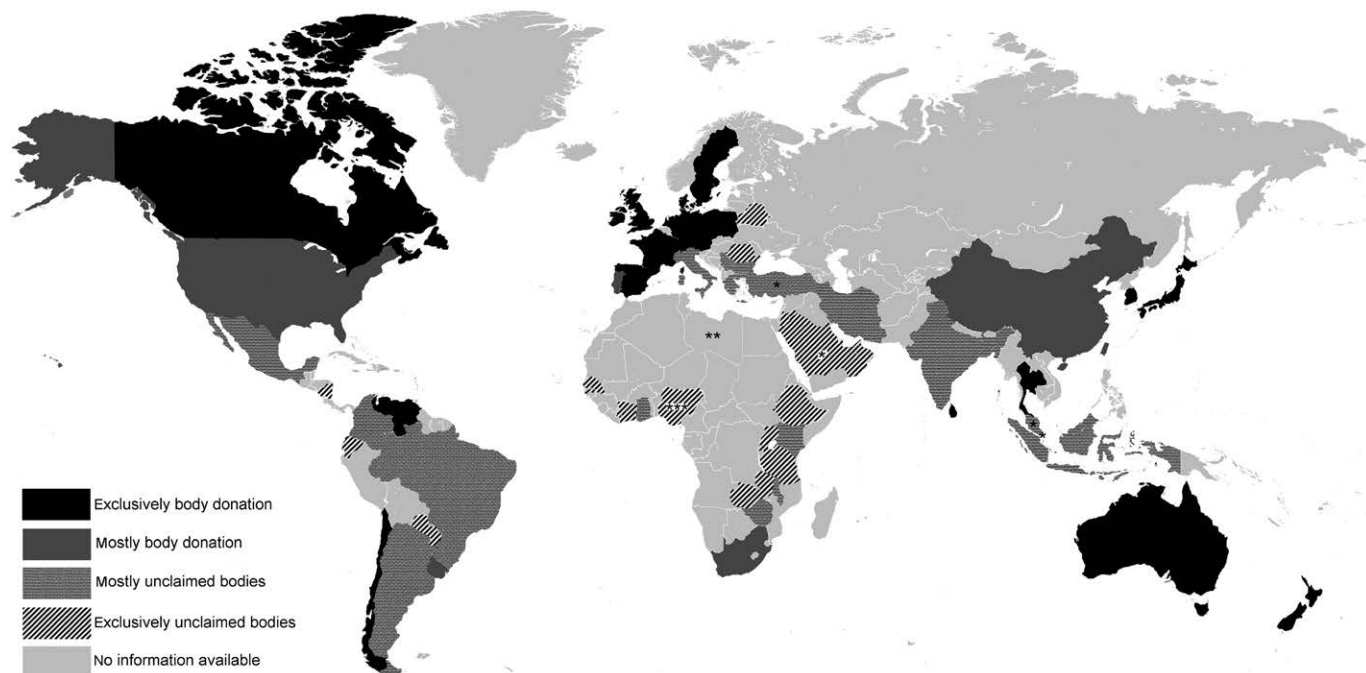
lacking or ambiguous, we created a short survey instrument that included questions with response options consistent with the above-mentioned categories of body sources in anatomy departments (see Supplemental Digital Appendix 1 at <http://links.lww.com/ACADMED/A540>). We then tried to identify senior anatomists who could inform us about the situation in their countries. These anatomists were identified by Internet research or through personal contacts via the IFAA. Between August 2016 and February 2017, we sent the English-language survey to 42 anatomists and asked for a response via e-mail. We sent a translated version to Spanish-speaking anatomists; we also offered correspondence in French, which, however, was not requested.

We did not have access to IRB review at the time of the survey (see ethical approval disclosure), but we took measures to protect respondents. All anatomists invited to participate in the survey were entirely free to respond, were reminded only once, and were thus not put under any pressure. We explicitly asked whether respondents would agree to be quoted as the source of the information they provided. Only 1 of the 17 respondents who supplied sufficient additional information for their country declined to be quoted. We decided nevertheless to analyze and report all survey data anonymously. To this effect, these data were separated from the names of the respondents and integrated anonymously into the above-mentioned spreadsheet.

### Findings on Current Practices

Through our literature search and our survey, we obtained information for 71 (43%) of the 165 countries with medical schools (see Figure 1 and Table 1). Information about these countries’ sources of bodies is provided in Table 2. Information is still lacking for many countries, particularly in Africa, Eastern and Southeastern Europe, the Middle East, and Central Asia.

According to survey responses, medical schools in three countries in Oceania (Fiji, Samoa, and Solomon Islands) do not use anatomical dissection at all. (These countries, therefore, are not listed in Table 2.) Whether the same is true for other countries could not be confirmed. As mentioned above, we



**Figure 1** Sources of cadavers used for anatomy teaching purposes in undergraduate medical curricula in 68 sovereign countries of the world. Information is based on the available literature or responses to a survey sent to selected senior anatomists in 2016–2017. See Table 2 for a list of individual countries' body sources. In this figure, the category "No information available" includes countries with medical schools for which no information was available, countries with medical schools excluded from the analysis (see Method section), and countries without medical schools. The three small countries in Oceania with medical schools that do not use bodies (Fiji, Samoa, Solomon Islands) have not been marked separately. All countries using "other sources" of bodies, exclusively or in addition to another category, are indicated as follows: \* including import of cadavers; \*\* only import of cadavers; \*\*\* including executed individuals.

did not include Micronesia and smaller sovereign states and European territories from the Caribbean, which only have offshore medical schools that mainly cater to U.S. medical students. According to survey responses, they usually use either unclaimed bodies or bodies imported

from the United States, and thus reflect the mode of body acquisition of the United States rather than a mode of their own.

Among the remaining 68 countries, 22 (32%) exclusively use donated bodies, while 21 (31%) exclusively use unclaimed

bodies. Most of the other countries procure a mix of unclaimed and donated bodies, with the majority using more unclaimed than donated bodies (see Table 1). Overall, in 45 countries (66%), unclaimed bodies are procured for anatomy education.

Table 1

**Sources of Cadavers Used for Anatomy Teaching Purposes in Undergraduate Medical Curricula: An Overview of Countries With Medical Schools, by Continent<sup>a</sup>**

Characteristic	Africa	Asia	Australia/ Oceania	Europe	North America	South America	Total
<b>Countries with medical school(s), no.</b>	48	43	7	39	16	12	165
<b>Countries with available information, no. (%)</b>	14 (29)	20 (47)	5 (71)	20 (51)	4 (25)	8 (67)	71 (43)
Cadaver-based teaching, no.	14	20	2	20	4	8	68
Cadaver source, no.							
<i>Exclusively body donation</i>	0	4	2	13	1	2	22
<i>Mostly body donation<sup>b</sup></i>	1	2	0	1	1	1	6
<i>Mostly unclaimed bodies<sup>c</sup></i>	4	6	0	4	1	3	18
<i>Exclusively unclaimed bodies</i>	8	8	0	2	1	2	21
<i>Other sources<sup>d</sup></i>	1 <sup>d</sup>	0	0	0	0	0	1

<sup>a</sup>This analysis did not include Micronesia and smaller Caribbean states and territories, with offshore medical schools that mainly cater to U.S. medical students.

<sup>b</sup>Mostly body donation (and, less often, unclaimed bodies).

<sup>c</sup>Mostly unclaimed bodies (and, less often, body donation).

<sup>d</sup>Information on whether countries *supplement* body donations and/or unclaimed bodies with other sources (mostly import of cadavers) is given in Table 2. Only one country, Libya, uses other sources exclusively.

As for “other sources,” in four countries in Asia (Malaysia, Saudi Arabia, Singapore, and Turkey)—as in the Caribbean—the local supply of unclaimed or donated cadavers is not sufficient and is therefore supplemented by import of bodies from abroad (see Table 2 for references). In Africa, Libya is unique; Gangata et al<sup>13</sup> report that import from India is the only source of bodies. However, given the unstable political situation in Libya, this information, which was published in 2010, may not represent the current situation anymore. In Nigeria, body donation does not exist,<sup>5,18</sup> but according to some sources, a relevant proportion of bodies are not just unclaimed but, in fact, stem from “killed” criminals handed over to the anatomists by the police,<sup>13,19,20</sup> although this is not explicitly mentioned by other sources.<sup>5</sup> Anyanwu and coauthors<sup>19,20</sup> write of “executed criminals” in this context, but it remains unclear how many are judicially convicted criminals versus “suspects that were shot during pursuit and arrest.”<sup>19</sup> For no other country did we find reports in the analyzed literature of a recent use of bodies of executed individuals. Finally, we came across reports of anatomical research that used tissues or organs acquired during forensic autopsy.<sup>21</sup> We found no evidence, however, that this source was ever used for educational purposes.

## Discussion

In this analysis, we looked at sources of human bodies used in anatomy departments with a focus on their use in anatomy teaching in undergraduate medical curricula. We were able to gather information for 71 countries around the world through our broad literature search and survey. Our findings demonstrate that body donation programs are well established as the exclusive or major source of bodies in most parts of Europe and North America; in Australia and New Zealand; and in some parts of Asia and South America. Our findings also demonstrate, however, that in the majority of examined countries worldwide, anatomists still depend on unclaimed bodies. In a substantial number of countries, anatomists also depend on importing preserved bodies from abroad. To our knowledge, such imported bodies mostly stem from the United States (usually donated bodies); from India (usually unclaimed bodies);

Table 2

### Sources of Cadavers for Anatomy Teaching Purposes in Undergraduate Medical Curricula in 68 Countries, by Continent<sup>a</sup>

Country	Sources of cadavers <sup>b</sup>	Information source <sup>c</sup>
<b>Africa</b>		
Ethiopia	Exclusively unclaimed bodies	Gangata et al, 2010 <sup>13</sup>
Ghana	Mostly unclaimed bodies	Gangata et al, 2010 <sup>13</sup>
Ivory Coast	Exclusively unclaimed bodies	Gangata et al, 2010 <sup>13</sup>
Kenya	Mostly unclaimed bodies	Mwachaka et al, 2016 <sup>26</sup>
Libya	Import only*	Gangata et al, 2010 <sup>13</sup>
Malawi	Mostly unclaimed bodies	Gangata et al, 2010 <sup>13</sup>
Nigeria	Exclusively unclaimed bodies / bodies of executed individuals*	Biasutto et al, 2014 <sup>5</sup> ; EwonuBari et al, 2012 <sup>18</sup> ; Anyanwu et al, 2014 <sup>19</sup>
Rwanda	Exclusively unclaimed bodies	Riederer, 2016 <sup>14</sup>
Senegal	Exclusively unclaimed bodies	Manyacka Ma Nyemb et al, 2014 <sup>47</sup>
South Africa	Mostly body donation	Satyapal, 2012 <sup>17</sup> ; Kramer & Hutchinson, 2015 <sup>31</sup>
Tanzania	Exclusively unclaimed bodies	Mazyala et al, 2014 <sup>24</sup>
Uganda	Exclusively unclaimed bodies	Riederer, 2016 <sup>14</sup> ; Ihunwo, 2014 <sup>38</sup>
Zambia	Exclusively unclaimed bodies	Gangata et al, 2010 <sup>13</sup>
Zimbabwe	Mostly unclaimed bodies	Gangata et al, 2010 <sup>13</sup>
<b>Asia</b>		
Bahrain	Exclusively unclaimed bodies	Habbal, 2009 <sup>39</sup>
Bangladesh	Mostly unclaimed bodies	Nurunnabi et al, 2011 <sup>40</sup>
China	Mostly body donation	Sui, 2014 <sup>41</sup> ; Hsu et al, 2014 <sup>42</sup> ; Zhang & Ding, 2017 <sup>43</sup>
India	Mostly unclaimed bodies	Biasutto et al, 2014 <sup>5</sup> ; Bhatia, 2015 <sup>44</sup>
Indonesia	Mostly unclaimed bodies	Atmadja & Untoro, 2012 <sup>45</sup>
Iran	Mostly unclaimed bodies	Abbasi Asl et al, 2017 <sup>46</sup>
Japan	Exclusively body donation	Sakai, 2008 <sup>47</sup>
Jordan	Exclusively unclaimed bodies	Survey response, 2016–2017
Korea (South)	Exclusively body donation	Won et al, 2016 <sup>48</sup> ; Park et al, 2011 <sup>49</sup>
Kuwait	Exclusively unclaimed bodies	Habbal, 2009 <sup>39</sup>
Malaysia	Mostly unclaimed bodies / import*	Biasutto et al, 2014 <sup>5</sup>
Oman	Exclusively unclaimed bodies	Habbal, 2009 <sup>39</sup>
Qatar	Exclusively unclaimed bodies	Habbal, 2009 <sup>39</sup>
Saudi Arabia	Exclusively unclaimed bodies / import*	Habbal, 2009 <sup>39</sup> ; Yaqinuddin et al, 2016 <sup>50</sup>
Singapore	Exclusively unclaimed bodies / import*	Ang et al, 2012 <sup>51</sup>
Sri Lanka	Exclusively body donation	Subasinghe & Jones, 2015 <sup>52</sup>
Taiwan	Mostly body donation	Lin et al, 2009 <sup>37</sup> ; Survey response, 2016–2017
Thailand	Exclusively body donation	Winkelmann & Güldner, 2004 <sup>33</sup> ; Agthong & Wiwanitkit, 2002 <sup>54</sup>
Turkey	Mostly unclaimed bodies / import*	Gürses et al, 2018 <sup>55,d</sup>
United Arab Emirates	Exclusively unclaimed bodies	Habbal, 2009 <sup>39</sup>
<b>Australia/Oceania</b>		
Australia	Exclusively body donation	Alexander et al, 2014 <sup>56</sup>
New Zealand	Exclusively body donation	Biasutto et al, 2014 <sup>5</sup> ; Cornwall et al, 2012 <sup>57</sup>
<b>Europe</b>		
Austria	Exclusively body donation	Biasutto et al, 2014 <sup>5</sup>
Belarus	Exclusively unclaimed bodies	Survey response, 2016–2017
Bulgaria	Mostly unclaimed bodies	Survey response, 2016–2017

(Table continues)



Table 2

(Continued)

Country	Sources of cadavers <sup>b</sup>	Information source <sup>c</sup>
Czech Republic	Exclusively body donation	Survey response, 2016–2017
Denmark	Exclusively body donation	Olejaz & Hoeyer, 2016 <sup>58</sup>
France	Exclusively body donation	McHanwell et al, 2008 <sup>11</sup> ; Riederer et al, 2012 <sup>12</sup>
Germany	Exclusively body donation	McHanwell et al, 2008 <sup>11</sup>
Greece	Mostly unclaimed bodies	Halou et al, 2013 <sup>59</sup>
Ireland	Exclusively body donation	Medical Council of Ireland, 2015 <sup>60</sup> ; Cornwall & Stringer, 2009 <sup>61</sup>
Italy	Mostly unclaimed bodies	McHanwell et al, 2008 <sup>11</sup> ; Porzionato et al, 2012 <sup>62</sup>
Malta	Exclusively body donation	Riederer et al, 2012 <sup>12</sup>
Netherlands	Exclusively body donation	McHanwell et al, 2008 <sup>11</sup> ; Riederer et al, 2012 <sup>12</sup>
Poland	Exclusively body donation	Bajor et al, 2015 <sup>63</sup>
Portugal	Mostly body donation	McHanwell et al, 2008 <sup>11</sup> ; Riederer et al, 2012 <sup>12</sup>
Romania	Exclusively unclaimed bodies	McHanwell et al, 2008 <sup>11</sup> ; Riederer et al, 2012 <sup>12</sup>
Serbia	Mostly unclaimed bodies	McHanwell et al, 2008 <sup>11</sup>
Spain	Exclusively body donation	Biasutto et al, 2014 <sup>5</sup> ; McHanwell et al, 2008 <sup>11</sup>
Sweden	Exclusively body donation	Grant, 2008 <sup>64</sup>
Switzerland	Exclusively body donation	McHanwell et al, 2008 <sup>11</sup> ; Riederer et al, 2012 <sup>12</sup>
United Kingdom	Exclusively body donation	McHanwell et al, 2008 <sup>11</sup> ; Riederer et al, 2012 <sup>12</sup>
<b>North America</b>		
Canada	Exclusively body donation	Survey response, 2016–2017
Mexico	Mostly unclaimed bodies	Survey response, 2016–2017
Nicaragua	Exclusively unclaimed bodies	Survey response, 2016–2017
United States	Mostly body donation	Champney, 2016 <sup>22</sup> ; Kahn et al, 2017 <sup>65</sup>
<b>South America</b>		
Argentina	Mostly unclaimed bodies	Biasutto et al, 2014 <sup>5</sup>
Brazil	Mostly unclaimed bodies	Biasutto et al, 2014 <sup>5</sup> ; da Rocha et al, 2013 <sup>35</sup>
Chile	Exclusively body donation	Gatica-Araneda & Alfaro-Tolozza, 2014 <sup>66</sup> ; Survey response, 2016–2017
Colombia	Mostly unclaimed bodies	Survey response, 2016–2017
Ecuador	Exclusively unclaimed bodies	Survey response, 2016–2017
Paraguay	Exclusively unclaimed bodies	Survey response, 2016–2017
Uruguay	Mostly body donation	Biasutto et al, 2014 <sup>5</sup> ; Survey response, 2016–2017
Venezuela	Exclusively body donation	Survey response, 2016–2017

<sup>a</sup>Countries covering two continents are classified by the location of the capital.

<sup>b</sup>Countries indicated with an asterisk (\*) use “other sources” as reported in this table, either exclusively (in the case of Libya) or in combination with another category.

<sup>c</sup>The list of information sources is not comprehensive, but gives the most recent and/or most relevant source(s) of information for each country. Information sources include publications identified in a broad search of the literature conducted in June 2016 (updated in June 2017) and a survey of selected senior anatomists conducted in 2016–2017.

<sup>d</sup>Published online ahead of print in June 2017.

or, in the case of Malaysia, from the Philippines (source of bodies unclear).<sup>5</sup> This practice raises concerns regarding an

international “trade” of dead bodies with an often-dubious ethical foundation.<sup>22</sup> In addition, in at least one country, the

bodies of executed individuals are still handed over to anatomists,<sup>19</sup> which raises the issue of whether this ethically disturbing practice<sup>9</sup> is ongoing but unreported in other places.

Given the IFAA’s recommendation<sup>7</sup> to make body donation the gold standard of body acquisition in anatomy departments, the question arises as to why anatomists in so many countries have not yet been able to establish functioning body donation programs but, rather, continue to rely on unclaimed bodies. An answer should account for the unequal geographical distribution of the use of donated and unclaimed bodies (see Figure 1). Initially, economic reasons might be assumed, as body donation prevails in higher-income countries, while anatomists in poorer countries seem to depend more on unclaimed bodies and other sources. However, the economically well-off Arab Gulf States have no body donation programs.

This suggests that religion may play a more important role. No Muslim-majority countries, including the Arab Gulf States, have high body donation rates. Buddhist-majority countries (Sri Lanka, Thailand, Japan), on the other hand, rely exclusively on body donation. In India, bodies donated for anatomical purposes mainly stem from people of Hindu religious background,<sup>5</sup> again supporting the idea that religion has a strong influence. In Christian-majority countries, the situation seems more heterogeneous.

Elamrani et al<sup>23</sup> argue that, from a theological point of view, Islam does not preclude dissection or body donation, and they conclude that “the problem is actually cultural, societal and legislative and not religious.” As for legislation, the lack of appropriate legal structures is often quoted as a reason for deficiencies in body donation.<sup>24,25</sup> We suggest, however, that these factors are related: Legislation regarding the treatment of dead bodies usually follows local religion and custom. As for religion, people’s beliefs may not always concur with theologians’ views, as Elamrani et al<sup>23</sup> implicitly suggest, and may be informed by local culture *and* religion—if these two can be separated at all.

Religion, folk beliefs, culture, and local history all have an influence on what people think should happen to the body after death

and on the ritual and spiritual importance of an “intact” body (at least for a certain time after death). This seems crucial in our context because anatomical use obviously interferes with these ritual protocols.<sup>10,26,27</sup> In the West, changes in these perceptions during the 20th century led to rising cremation rates and apparently also to a greater willingness for body donation.<sup>2</sup> It is conceivable that accepting cremation may correspond with accepting dissection as another form of postmortem “destruction.” It is tempting to correlate body donation rates with cremation rates: For example, most European countries with low donation rates in our analysis (e.g., Italy, Romania, Serbia) also have comparably low cremation rates.<sup>28</sup> However, this does not account for all differences.

This development in the West may also be part of a process of increasing secularization, which may be leading some individuals to consider burial a useless ritual and dissection a more beneficial use of physical remains. The example of Buddhist-majority societies, however, shows that acceptance of body donation is not only possible in a secularized context. At least one aspect of body donation, the altruistic act of donation, is supported by most if not all major religions.<sup>29</sup>

Finally, donation programs depend on the trust of the local communities, which may be influenced by local history.<sup>30</sup> For example, Kramer and Hutchinson<sup>31</sup> report that in South Africa, black Africans are more unwilling than other ethnic groups to donate their bodies, which according to these authors is not only related to “cultural beliefs” among this group but also to the country’s “political history”—a history in which the bodies of the black African population were exploited for the education of white students.<sup>32</sup> Similar reasons may be behind the reservations of African Americans toward body donation in the United States.<sup>33</sup>

Our findings are preliminary, and it remains difficult to draw even tentative conclusions to explain the global diversity in body sources for anatomy teaching purposes, as the sources are determined by various local factors. Future research should produce a more detailed comparison of these different legal, religious, social, cultural, and historical contexts on a global scale.

Our findings are also limited by the lack of information for many countries around the world and by potential changes in the countries for which only older publications were available. Our findings may also reflect our language limitations and the restricted coverage of the personal and institutional networks we made use of in our survey. Moreover, as the relevant information was not reported in any standardized way, our categorization of countries depended on a possibly subjective interpretation of the given information, sometimes from a single source, which had to be accepted in our attempt to cover most regions of the world.

Nevertheless, our findings can serve as a basis for the collection of further information. We intend to keep a list of body sources by country on the IFAA website,<sup>34</sup> which we will regularly update by scanning emerging publications and inviting readers to provide further information to increase the number of included countries and to eliminate possible errors in our interpretation of the available information. The preliminary data we have gathered and reported here are also meant to be baseline data that can serve as a historical comparison to appreciate long-term changes in this field.

The existence of functioning donation programs on every continent and in very different cultural contexts provides encouragement for the future. Although our data are not sufficient to prove a global trend over the past 15 years, we found several examples of a shift toward using fewer unclaimed and more donated bodies. To name just two of them: In Porto Alegre in Brazil, body donation rates rose dramatically after local anatomists started a public awareness campaign, which enabled the anatomists to shift the main source of bodies for their department from unclaimed to donated bodies within 5 years.<sup>35</sup> In Taiwan, a traditional belief that cadavers should not be disturbed after death hampered body donation for a long time. However, by integrating potential donors as well as medical students in a new, culturally meaningful approach to donation and dissection, embedded in Buddhist traditions, it has been possible to overcome these reservations and establish a well-functioning donation program.<sup>36,37</sup>

We hope that future changes in this field will generally go in the direction of increasing reliance on body donation following the IFAA’s recommendations.<sup>7</sup> It is not our aim to denounce anatomists in other parts of the world—in Europe it took centuries to go from the first anatomical dissections to today’s body donation programs. It may therefore also be too early to consider making body donation programs an international accreditation standard for medical schools. However, we would like to encourage all anatomists who use unclaimed or imported bodies to try to install local body donation programs and thus to adhere to the ethical standard of the IFAA recommendations.

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## Cover Art

### Artist’s Statement: Butterfly Wings

During my pediatrics in-service rotation on the oncology service, I met a young girl with acute lymphoblastic leukemia. At the young age of seven, her experiences consisted of white hospital walls and “get well soon” balloons by her bedside table. Never really cognizant of her medical condition, my patient seemingly longed to escape her hospital bed. Her parents stayed by her side, never leaving her alone or unguarded. The girl’s frail body was wrapped in a quilted blanket her grandmother had made, featuring a cross-stitched butterfly in vibrant green, blue, and purple. As the days passed and her condition worsened, the butterfly appeared more and more vibrant to me. To see my patient cocooned in her blanket for so many weeks, I couldn’t help but wonder when she would learn to fly.

Three weeks after being admitted to the hospital for leukemia, my patient flapped her metaphorical wings and flew away forever. Although I was



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not able to save the girl’s life, I will always remember her courage and grace, beautiful like a butterfly. That was my first experience with mortality in medicine, and it gave me the opportunity to encounter the human experience of dying in a way no medical textbook could ever explain.

My inspiration for drawing *Butterfly Wings*, on the cover of this issue, stems from the little girl’s spirited personality—despite her declining medical condition—and the butterfly on her quilt. The image had been etched in my mind for months following her death. I harbored bold, yet soothing feelings towards my patient’s passing, which is why I chose to use hues of purple, pink, blue, green, and yellow. I felt all shades on the spectrum of emotions—none of which are discrete. I wanted the hues to blend effortlessly, so I chose colored pencils as my main medium, outlining the silhouette of the butterfly in bold charcoal. My drawing *Butterfly Wings* aims to visually represent what it feels like to lose a young patient to cancer.

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