What happens when you donate your body to science?

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When I was assigned my topic for this paper I did what I think most Questers tend to do. I made a silent scream. Dead silent as it were. How would I ever write on THIS topic? How could I, this has major ick potential. I recovered quickly and my mind started racing. What did I already know? Or think I know?

Well, as we all have probably experienced - once the initial adjustment is made it's not unusual to think you've got a really great topic. This was no exception. So I want to thank Susan Mendenhall for both topic and suggestion for what really has to be one of the more unusual books I've read. Stiff. (Roach, 2003) It was funny, informative, and had the added benefit of clearing seats on planes when people would see what I was reading.

There are some thanks to be made. First, to the 70 Questers responding to a survey I sent out last November. I appreciate your taking the time and there are occasional references to some of the results. I also want to thank my husband Brian who has, for months endured what some people might consider inappropriate dinner conversation. Jeannie Lewis, as always, helped provide guardrails when rabbit holes were too alluring. And thanks to the many, present and not, who graciously gave of their time to attempt to educate me! All mistakes are mine.

Before I begin I have two final points to make. First - This paper covers body donation. It is not about organ donation. Organ donation concerns providing transplant into living bodies. Important, but not the topic of this paper! Second, this can be a sensitive and dark subject. There are some jarring pictures. Any humor used is intended to alleviate not to be disrespectful. So let's begin.

What happens when you donate your body to science? As usual in a Quest paper this raised a whole lot of questions. When did this start? Where did the bodies come from? What did they do with them? Is it worth it and how do I sign up? Let's start a few thousand years ago.

How Long Has This Been Going on? A long time. The use probably most of us think about for bodies donated to science is for learning anatomy in medical

schools. This is done by dissection. In ancient times moral, religious and cultural taboos essentially banned the practice. Animal dissection was used as a substitute and findings were applied to humans - not always accurately. Unexpectedly, in the third century BC, there was a brief moment when human dissection was allowed. Two Greek anatomists at the time shattered taboos and practiced it on executed criminals. We're not sure why, but after 40 years dissection shut down. To our knowledge it basically disappeared for the next thousand years. (O'Neill, 2022)

The rise of European Universities in the 11th and 12th centuries led to an increased focus on learning which in turn led to the return of cadaveric dissection in medical schools. It's commonly believed that the Christian church officially prohibited it but scholars differ on this. (O'Neill, 2022) The decree in 1231 by Roman Emperor, Frederick II, that required dissection of a human body once every five years helped legitimize the work. Students and physicians were required to attend. (Ghosh, 2015, p. 154) This was a huge step in the realization of the importance of dissection as a tool for teaching anatomy. In the 14th century the church provided guidelines and in 1315 the first public systematic human dissection was performed in Bologna Italy. Again on an executed criminal. (Ghosh, 2015, p. 154) To be followed a few years later by the first recorded case of body snatching. ("Body snatching around the world | History detectives | PBS," n.d.) Gradually dissection became a requirement of many medical schools across Europe.

Artists, too, frequently practiced dissection - including Leonardo da Vinci and Michelangelo. Gaining such intimate knowledge of the human body was instrumental in helping them produce the stunningly lifelike human portrayals we see in their work. In fact much of the anatomy texts of the time were illustrated by artists. ("Anatomy: Art and science," 2019)

By the late 16th century dissection had gone public in a big way. ("History of anatomy," 2018) People would pay to attend demonstrations. To accommodate crowds beautiful anatomical theaters were built - the University of Bologna being one. ("The star is the corpse," n.d.) Often the high born and influential attended. These would take place during the cooler time of year since there was no embalming

The practice had a phenomenal increase on knowledge of the body. For example, it was instrumental in allowing physician William Harvey to reach his findings about circulation of the blood. Students, doctors, artists - with all this dissecting

there wasn't enough executed criminals to go around. The go to solution was cemeteries. Bodies were stolen from graves - "snatched" - for use.

Body snatching. You were waiting for this. Initially snatching was done by the afore-mentioned students and artists. But, as so often happens, profit potential was sensed and a new industry arose. Body-snatchers, or Resurrectionists as they preferred to be called, found ways to meet the constant demand. For money. Their primary targets were mass graves of the poor. ("Body snatching around the world | History detectives | PBS," n.d.)
Although popular, graves were not always the source. In 1828 two enterprising Scotsmen, Burke and Hare, found a way to streamline the process and eliminate the shovel. An application of excessive alcohol followed by smothering led to the murder and then sale of 16 people. Ironically, once caught, Hare turned state's witness leading to Burke's hanging followed by, you guessed it, dissection. (Ghosh, 2015, p. 160)

By the 17th and 18th century snatching reached what has been termed "epic proportions" around the world. So what to do? There were a variety of measures to try to address this. Laws banning it were deemed ineffective because they left no way to fill what was considered an important need - sufficient bodies for physician training. In Britain a solution was found in 1832. The Anatomy Act was passed ending use of executed criminals and instead allowing use of unclaimed bodies from charity hospitals and workhouses. This eliminated much of the snatching but it also meant the criteria for dissection now was poverty.

Similar stories played out in America - although the time frame was later. Increasing numbers of medical schools in the 18th and 19th centuries led to same supply problems. Again cemeteries of the poor and disadvantaged were considered the solution. Students and Resurrectionists headed to the graveyards. By the late 18th century African Americans had become a primary source. America had the extra twist with the additional right for slave owners to sell those they enslaved to medical schools. This, because slaves were considered property. (Savitt, 2002) ("The poor, the Black, and the marginalized as the source of cadavers in United States anatomical education," n.d) (Victor, 1940).
Public resistance arose. In addition to an abhorrence of dissection for cultural and religious reasons, there were also well founded concerns about lack of respect for

those they had stolen. Indeed, there are credible reports of students playing catch with body parts, and photographic evidence that those subjects were not treated with the utmost respect.

There is no doubt that dissection was instrumental in the training of students and improvement of medical treatments. But physicians and students of the time also seemed to feel they were entitled to the corpses. It was called a "necessary evil" and "for the greater good". Resistance was deemed by medical professionals as stemming from ignorance and the irrational beliefs and practices from the lower classes. (Sappol, 2018, p. 18) ("Body snatching around the world | History detectives | PBS," n.d) ("October 2020 – The Indiana history blog," n.d.)

Throughout the 1800's in the US, body snatching remained a problem. Those who could afford it would use various ways to deter Resurrectionists stealing their loved one, including fences, stone buildings, even sabotaging the coffin by inventions such as the patented 1878 "Coffin-Torpedo", by Phillip Clover. Secured inside the coffin, the torpedo would fire lead balls when a lid was pried open. ("Victorian 'Coffin torpedoes' blasted would-be body snatchers," 2017) Perhaps winning an award for the most jarring combination of beauty and pragmatism in prose, the advertisement for his invention read:

"Sleep well sweet angel, let no fears of ghouls disturb thy rest,
for above thy shrouded form lies a torpedo,
ready to make minced meat of anyone who attempts to convey you to the pickling vat"

Those persons of higher status and means were not completely immune. In 1878 the body of John Scot Harrison, onetime Ohio Congressman and son of President William Henry Harrison, was stolen, later to be found hanging on a hook in the Ohio Medical college of Cincinnati. (Powell, 2020)

In the same year the Huntington Democrat reported the snatching of the corpse from a grave in the Roanoke Indiana Cemetery. Taken to the Fort Wayne Medical College, he was recognized by a student. Word got back to the police. A Roanoke Doctor was charged, found guilty, fined, and then disappeared ("Gobbling a Ghoul," 1878)

Events such as these made it clear that stopping snatching would require new sources for bodies. The solution found was similar to that in Britain. In 1879

Indiana passed their own anatomy law allowing bodies of any person dying in public institutions, such as asylums or jails, to be subjects for anatomical dissection if unclaimed after 24 hours. By 1913 most states had similar laws. The disadvantaged were once again the targets. Certainly the poor, but African American's in particular. In the early 1900's while their population in Indiana was only 5%, 40% of the cadavers in IU's medical school were African American.

And Now? Things have changed. Successful promotion of organ donation in the 20th century was been followed by increasing willingness to donate one's whole body. Today in the US bodies used for science are mostly donated. But not all. Unclaimed bodies are still subject in many states to become "Donors by Circumstance". Some things seem to stay the same.

OK - that's a lot of very fast and condensed history but what about today? What happens when you donate your body to science now? How are they used and who uses them? Let's start with the most obvious use - learning anatomy. Anatomy class - dissection - remains a rite of passage. But what students do this and what happens? Medical students, of course, but some of the types might surprise you such as biomedical, dental, and physical therapy. I'll describe the process at IU Medical schools for future physicians. Keep in mind many more benefit.

A first year student entering a room with bodies on steel tables meets the person who is often called their first patient. A more apt description might be their first teacher. Covers don't conceal different sizes - providing a reality check that these are indeed humans in their infinite variety.

Groups of 6 students are assigned to specific donors. They gather around tables and introductory remarks are made. Quester Bill Argus recalls during his experience a prayer being said. The anatomy professor at IU Fort Wayne said she concludes her remarks with "They wanted you to do this. Learn as much as possible. It honors their wishes." (Personal Interview, Hoffman, 2022)

Curiosity, confidentiality and respect are expected - rather a change from the history we've heard. The term donor is used instead of cadaver. Some managers ask students not to name their donor. Others don't mind but draw the line at those signifying a relationship that belonged to someone else, such as Grandma.

Class begins. A first year med student described her experience this way. "I was really nervous - the idea of dead bodies - I've seen them at funerals but yeah, it

grosses me out". She was thankful not to become lightheaded. (Personal Interview, Student, 2022)
During each class a part of the body is dissected. One anatomy professor said she likes to begin with the back - for two reasons. It is the least personal and it involves large muscle groups so can't do too much damage in that area if your scalpel slips. (Hoffman, 2022)
Students prepare for each class by pre-labs, videos and texts. In class a demonstration is given and students begin. The same process follows over the semester as they examine every part of the donor's body.

So what's it like? Back to our student who said "Donors are cold and very stiff. We constantly had to flip them over and they're heavy. Formaldehyde is a horrible smell. I was showering twice a day. My hair would smell." She continued "Each of us had things we didn't want to do - we did really crazy things like cut them in three pieces and sawing their face in half. But at that point it didn't feel like a big deal. When you're in there you're just doing the job."
There are moments that break the needed detachment. For our student it was holding the lungs - "knowing I'm holding the things the woman breathed with her whole life." For others it's seeing fingernail polish and knowing that it was not that long ago that is was applied.

The semester's done - what's next? In most Universities - donors are then cremated and either returned to the families, per their request, or buried in a cemetery. For the IU program it is at Crown Hill Cemetery in Indianapolis. In spring, services of Gratitude are held. Families of donors are invited and faculty and students speak their thanks. ("Body donation, Indiana University of Medicine")
Most surveyed Questers planning or considering donating their body said they were fine with it being used for teaching anatomy.

Is dissection the best way to learn anatomy? Cadaver use is expensive, and has health and safety risks. Quester Mike Arata recalls the class took a tremendous amount of time, and most doctors forget what they learned because there was no need to apply it.
There are several alternatives such as models or use of holograms. Some appreciate that these help demonstrate things that can't be seen. The Anatomy

professor at Case Western feels holograms are a more efficient and effective approach.
Others like Quester Bill Argus feels dissection serves to give some basic techniques and generates more respect for the human body. The manager at the IU donor program put it this way "I hope models and holograms stay supplements. Dissection is the humanistic art of their formation as healers". (Personal Interview, Byers. 2022) It will probably be around for awhile.

Got it. Anatomy but what are some of the other uses?

Surgical practice is a big one as most of you knew. As Quester Jeannie Lewis puts it - I want someone cutting on me to have had practice! Those of you Questers thinking about donation are fine this use.
Who does it? Among them were the obvious - surgeons of all sorts. Not so obvious were dentists, paramedics and Physical Therapists. All coming to sharpen skills where consequences aren't high and patient complaints are low. (Loudin, 2022)
Most frequently the donor is divided into the relevant sections for the practice. Quester Mike Arata recalled during his career frequent use of cadaver parts in orthopedic workshops and noted they were great teaching aid for shoulder surgery, hip replacement, or back surgery. Another Quester, ophthalmologist Bill Argus also valued the work with another part of the body - the eyes
Practice works. Probably the most famous outcome of practice on cadavers would be the first successful heart transplant in 1967. (MedCure, 2019)
Medical Research - another use but you also knew that. What Questers didn't know about was medication testing, and most potential donors are fine with both of those uses. Medical research on cadavers allows development of medical devices, like artificial joints or implantable drug delivery systems. (MedCure, 2019) Some of the more striking outcomes include the treatment of rotator cuff tears, identifying contributors to cancer and learning how Alzheimer's progresses.
Automobile safety. This next topic might be surprising to you - one that that almost all of us Questers didn't think was a use is actually a very important one: Automobile safety development and crash testing.
This has a major ick factor. In fact for most of you planning or thinking about donating this was not ok with you. It warrants some attention.

In early days of automobiles serious crashes were not felt to be survivable, so there was little emphasis on safety. This view shifted in the 1950's when researchers at Wayne State University began investigating the effects of blunt force and rapid deceleration on humans. Initially they used themselves to test. Eventually someone there woke up noting it was painful and they shifted to cadavers. Wayne State legend has it the first cadaver use there was to test human skull strength by flinging a body down an elevator shaft. They've gotten more sophisticated since then.

By the mid sixties cadavers were used about once a month. Today, although much less often they are still used to assess when only a human will do. Generally it is to gauge impact on internal organs - which crash dummies do not do as well.

Controversy? This sounds controversial. Is it? Yes. Yes it is. In 1993 Germans were outraged when they learned there had been crash testing on 200 adult and child cadavers. Permission had been given by the children's parents with the hope that the data would help save other children's lives. Regardless, use of children's bodies is now illegal. ("Cadavers in car safety research," 2018)

We owe a lot to those donors. There's a long list of great outcomes. Safety belts, laminated and tempered glass, safer steering columns, stronger doors most recently inflatable safety belts as well as improved and more realistic crash test dummies. In 2012 the death rate from motor vehicles was deemed to be about 2/5's of what it had been in the 70's. (Laskow, 2014) Any more surprises?

The Military Yes - there are more instances of using cadavers for crash testing. But substitute explosive for crash. The Military, for example, occasionally use cadavers to test safety equipment for soldiers. For example, in 1999, corpses in full battle uniform were hung above simulated minefields to test which footwear would be best for minesweepers. Sandals and Standard combat boots were equally effective, but a specially designed boot won. (Palmer, n.d.) More recently they were used to test ability of military vehicles and seating systems to protect soldiers from injury in under-body blasts such as those from IEDs and mines. (Rupp et al., 2021) Remember this one - it will come up later. While these uses may be jarring, they contribute to the safety of the troops we put in danger.

Let's take a breath - time for a less dramatic use - one in which nothing unnatural happens. On to a peaceful patch of ground - a part of the University of Tennessee. Just don't look too closely or you may see one of over 40 bodies - all of them donated for the furtherance of forensic science. This is the site of the first human

decomposition facility established in 1981. Most of us know them as "Body Farms" thanks to Patricia Cornwell's 1994 book.

The Farm began with a single body-sized plot of land - but now it is 2 1/2 acres. Forty bodies are studied there at any one time. Once a donor is brought to the Farm they are positioned in one of a variety of ways - in shallow graves, the back seat or a trunk. Or they're rolled in a carpet, covered or not, above ground or not, nude, or not. Basically, in any way that mimics situations in which people might be found. (*Forensic Anthropology Center* |, 2016) Why?

Scientists and agencies such as the FBI examine these donors as to learn how to identify potential graves, make positive id of remains in various states of decomposition and locations and estimate time of death. Did you know being wrapped in carpet can accelerate decomposition? They also learn how to collect evidence in a way that is defensible in court. Once remains are skeletal - which takes about two years, they are picked up, cleaned and placed in the University Collection (UT Forensic Anthropology website) There they are used for further research and training. This is a never ending donation - nothing is returned to families. Currently there are 10 Body Farms in the world. Closest to us is Southern Illinois University but don't plan on a tour - these are limited to researchers to maintain respect for the donors. ("Force for good," 2018) All of these farms offer training for students, researchers, and critical members of law enforcement including...

Dogs - Yep - this rabbit hole had a dog in it. Cadaver dogs are used to, well, find cadavers. Or cremains - bodies destroyed by fire. Dog's noses are amazing - a doggy superpower. Once he's learned an odor, "he's unlikely to forget it". (Leon Valley Veterinary Hospital, 2019)

Several Body Farms hold multiple sessions a year working with dogs to train them on cadaver scent and develop a solid alert for a found body. Closer to home the Indiana Department of Homeland Security also conducts such training. ("Become a cadaver dog trainer with dog trainer course in Indiana," 2023)

What do they train on? Cadavers. Or their scent. A leader in Indiana's K9 Search & Recovery Unit said "When you are alive, everybody has a different scent. But immediately when you start dying, everybody smells the same. It is all decomposing human material." Body Farms have whole cadavers to use for training, but search groups, frequently volunteers, often cannot afford to attend. They must use other scent aids such as donated human placenta - which has all 27

odors of the human body. ("How cadaver dogs are trained to help authorities locate human remains," 2019)
Any other aids? There is a whole industry specializing in these odors. One company, Sigma-Aldrich, carries a Pseudo Corpse Scent coming in 3 kinds:

1. Recently dead,
2. decomposed,
3. And drowned. (It's pretty expensive though.)

Most volunteer groups try to find alternatives. One dog handler, asked where she got her training aids said while the placentas were a favorite, they use whatever they can find - "teeth, blood, fresh, old, doesn't matter". When asked about using other body parts she said she'd ordered bones at one time (from China, go figure) but went on to say "We don't particularly want arms and legs, they won't fit in this little freezer we have anyway." (Personal correspondence 2022)
These dogs do good work. A 1999 study found cadaver dogs had a find rate that ranged between 57 percent and 100 percent, they're truly amazing. ("Use of cadaver dogs in locating scattered scavenged human remains: Preliminary Field test results," n.d.) Good Dog.

Sign Me Up Or Not. Six percent of Questers surveyed are already enrolled! And 20% were considering it. And maybe now there are US Universities have the largest and best known donor programs with over 100 in the US. The other two types are called Non-Transplant Tissue Banks. They are either Not for Profit or For Profit. ("Why there is a shortage of cadavers," 2014)
All of these share some similarities. Generally all can obtain donors who pre-register. It is very easy to pre-register - almost too easy. While researching this paper I got concerned I might have signed up for multiple programs. Additionally many accept bodies that their survivors donate after a family member's death. All have donor agreements that describe to varying degrees what use the body will be put to - a kind of informed consent. All have an initial screen and a screening at death to determine final eligibility. Each program has their own list of conditions that will cause them to decline a body such as height or weight or BMI. Bodies are not to be accepted if they have infectious diseases such as HIV or COVID. Donors must be at least 18 but there is no upper age limit. If final screening is passed the body is transported from a funeral home to a University or a Tissue

Bank. They will often handle the paperwork, such as filing death certificates. There are no costs to the families, and no compensation for the bodies.
Finally, all (but Body Farms) offer free cremation of all or at least some of the body and upon request will return some or all of the ashes. Many hold annual memorial services.
So far very similar.
So what are the differences? To a great degree it's money and marketing. Universities do not make money from body donations and there is limited marketing. Many donors learn about the program through word-of-mouth. While the IU Body Donation program keeps bodies whole and distributes them to the medical schools, some other schools also distribute parts of the body for research such as automotive or military.
The not for profit Non-transplant Anatomical banks - do make money. However, by law they are to charge only enough to sustain their operations. They do advertise and visit hospices and funeral homes to enlist donors. Most of these groups will ship bodies, or parts when needed. Often they were started to support states with no donor programs.
The For Profit Non-transplant Anatomical Banks warrant a closer look. Most commonly they are called Body Brokers, as I will refer to them. They operate as a business. There are no limits to what they can charge. Just as the nonprofit group does, they will ship donor's bodies or parts wherever needed. Let's look more closely at how they work.
Body Brokers use intense advertising on their websites and make visits to hospices, hospitals and funeral homes to enlist donors. Frequently funeral homes who refer donors receive a fee. (Reuters, 2017) Donors may pre-register or after death, the family may make the decision to donate their loved one's body. Their marketing emphasizes two things. Contribution to Science and No-Cost Cremation targeting the altruistic and the poor. Their websites are often attractive, easy to navigate, and offer testimonials to both the value of donation and to the donors who have helped science. Registering as a donor takes minutes.
What do they do? Once a Body Broker gets raw materials - which are bodies, they are prepared in some way. Often they are cut into 6 pieces. Remember these bodies are free. Orders come from customers, such as organizers of medical seminars or researchers Prices are then quoted and the requested tissue (which means any part of the human body) is then shipped out. Sometimes the body or

parts are only rented and the customer will return them for the next client. Their clients are in the US and as many as 45 other countries and the bodies are used in various ways. (Reuters, 2017)
Make no mistake. This is a business. And it can be a big business. The oldest and perhaps most well run and respected Body Broker is Science Care who do offer services in Indiana. In 2017 they had 27 Million in annual sales. This also includes medical training seminars they held. They do not disclose their profits since they are a privately held company. (Reuters, 2017) Again, keep in mind they get the bodies for free.

So how much do Body Brokers charge? There is preparation that takes place. The charges they make to clients are referred to as processing fees. A cost list from another broker, now out of business, Biological Resource Center, shows a full body valued at $5,000. Since this list was from 2018 presumably inflation would hit it. Remember the Army testing footwear? One broker sold bodies to the US army for that. The price, excuse me, processing fee was reported up to $30,000. (Santa Clara University, n.d.)

Wait - you can sell bodies? What are the laws about this? It is a law that you can't sell body parts, like your organs that would go into a living body. That is well defined and well regulated. But when it comes to laws regarding donated cadavers the legal landscape is confusing. Most frequently described as a patchwork quilt, states often have different laws. As a result the legality of selling parts is not particularly clear.
When I asked an anatomy professor at Northeast College she emailed me "There are NO federal regulations in the US regarding the sale or trade of human remains with one exception" She went on to say federal regulations prohibit the sale of indigenous North American, Alaskan, and Hawaiian peoples. (Email, Dr. Robyn Wakefield - Murphy) Others I read and contacted agreed with her.
But other sources, such as the BBC - usually quite reliable said buying and selling bodies is a felony. (A body donated to science - but used to test bombs - BBC News.) And again, others I read or contacted agreed with this.
I would conclude that for the most part it seems to be legal as long as it is for medical or scientific purposes. Again, states may differ. Body Brokers usually avoid this question completely by indicating that they don't sell parts, but charge fees for reasonable costs of service.

Are there any laws at all? Yes, but primarily concerning health and safety. The Uniform Anatomical Gift Act provides guidelines on preservation, storage, or processing and transport. These are recommendations and states adopt, adapt and execute them differently. As of 2019 this Act did not address consent disclosures.

Any action at the Federal level? In 2019 the Consensual Donation and Research Integrity Act was introduced to congress. It would establish requirements - again primarily on acquisition or transfer of human bodies or parts. It alludes to the issue of Informed Consent with the words "knowingly consented" for transfer for scientific purposes. This act is still sitting in congress.

Body Brokers can seek accreditation from the American Association of Tissue Banks that has clear guidelines on all aspects of body donation including informed consent, but this is not required by law. Other professional organizations also make recommendations. There are Brokers, such as Science Care, who have been accredited.

Anything else I should know?

Almost all Questers felt strongly they have the right to decide what is done with their body after death. To make that decision you need a clear and complete informed consent to agree to or not. These agreements can be problematic. Many are broad or use legalese or terms such that they are misunderstood and a person may not realize what they might have signed up for. For example, many include provisions that allow portions of tissue to be provided to practitioners or third party organizations around the country. Many people don't realize that tissue refers to the body or body parts. Several Professional Anatomy Associations have made recommendations for content of informed agreements but as of 2022 there were no laws pertaining to this.

It should be noted - Informed consent is tricky - it must strike a balance between the level of information wanted and needed for the consent. Often families don't want to know - or are not in an emotional state to know. How should adequate information be made available and respect this balance? It's a challenge.

Lightly regulated, marginal oversight, confusing laws, inconsistency across the country. So what can possibly go wrong? Turns out quite a bit.

Imagine you've just experienced the death of a loved one. You're distraught. Cost of cremation would be a huge strain - currently in the US about $2,200. (Martin, 2022) The Funeral home recommended you consider donating your loved one to a Body Broker. It will help science, they said, which you like. They offer cost-free cremation which would really help you. They will return some of the cremains which relieve you. Consents need to be signed. You don't quite understand them. You see they may provide tissues to other organizations. You think tissue means skin samples. That's ok with you. You might be able to say that you don't want something, like military testing. You check that and then you sign.

Months later, you find out some horrifying news.

Such as that reported in a 2017 Reuters series, when the Saunders in Tennessee found out Restore Life, the Body Broker they donated their 19 year old son's body to, had sold his spine. You didn't know that parts of him could be sold. You thought tissue meant skin. You can't sleep nights now.

Or, remember the Army under seat explosives testing? The Stauffer family who, after donating her body to Biosocial Resource Center, taught their grandmother Doris had been used for this - despite the family disallowing military use on the consent form. (Reuters, 2017)

Or how about the family of 98 year old David Saunders, a WW2 vet. His wife donated his body to Med Ed Labs to further science - knowing he would like that. Only to find out that in October 2021 his body was publically autopsied in Oregon. The event, organized by a company called Death Science with a second company called Oddities & Curiosities Expo, sold tickets for up to $500. ("Nytimes.com," 2021) Said the widow, understandably furious, “I have all this paperwork that says his body would be used for science — nothing about this commercialization of his death.” ("Nytimes.com," 2021)

Where was the law? Despite attempts to prevent the event, law enforcement in Oregon found there were no criminal laws that pertained to this. To compound this Mr. Saunders died of COVID which means it should have prevented donation in the first place. Since then the county Board of Commissioners voted to ban for-profit display of human. Another patch in our national quilt.

There are numerous other egregious instances, many having to do with mishandling, mis-storing, and neglectful handling of human remains. The laws, and enforcement, are a problem.

Whole body donation is extremely important and valuable. An estimated 20,000 people in US donate annually. Donors have enabled advancement in science, safety, and medical practice. Donor organizations such as Universities and Body Brokers perform a critical service. Current processes and practices however, generate questions that need answers.

- Is it acceptable to sell bodies or body parts?
- Brokers get bodies for free. Should the family receive compensation for the body? What is the difference?
- Should there be enforceable requirements for transparency and plain language in donor agreements?
- Brokers provide an important service, they should be paid. But should there be limits to what they can charge or should the market reign?
- What uses for bodies are ok? If a person agrees is any use ok?
- Unclaimed bodies are still being used. Is this ethical? What if it's against their religion? Does this violate their rights? Do the dead even have rights?
- Are public dissections education or entertainment? Should entertainment be disallowed?
- Should Federal laws govern the practice?
- People without directives are treated as making "implicit" consent and subject to their heir's actions. Is this ok?

We benefit from scientific advancements made possible from the donors and we owe them honor. There should be a national conversation about the practice. Federal guidelines should follow that ensure the gifts are handled ethically, safely and in a way the donors know what they are signing up for -both before and after death.

As said by Warren P. Knowles (Inside the Business of Body Brokering in the United States - Pacific Standard (psmag.com)

Our tissue may be scattered. Our laws ought not to be.

Finally,

If you intend to donate - select the group carefully, look for the appropriate accreditation, talk with your family, and thank you.

Body Donation - Survey Results
70 Quest Members Responses
November, 2022

1. Have you registered for whole body donation? (Whole body donation is the process whereby an individual donates his or her body for scientific use after death.) Choose one.	
Yes, I am registered for whole body donation.	6%
No, I am not registered for whole body donation.	74%
I am not currently registered for whole body donation but am interested.	20%
2. If you're not currently registered, what are your reasons for not registering for whole body donation? Select all that apply.	
I do not know how to register	32%
I do not know what donated bodies are used for	21%
I'm uncomfortable with the concept of donating body	21%
It conflicts with my religious beliefs	3%
I'd prefer to be buried	22%
Other (please specify)	40%
3. Should hospitalized patients be informed about body donation programs?	
Yes.	84%
No	16%
4. Do you agree or disagree? Whole body donors will not be given good care in a hospital if they become seriously ill or injured.	
I agree. I don't think donors will be given good care in a hospital if they become seriously ill or injured.	3%
I disagree. I DO think donors will be given good care in a hospital if they become seriously ill or injured.	89%
Other (please specify)	8%

5. How strongly do you feel you have the right to decide what is done with your body after death?	
Absolutely	68%
Very strongly	20%
Strongly	3%
Somewhat strongly	4%
Marginally strong	3%
Not at all	1%

6. Do you think medical schools treat bodies with respect and dignity?	
Yes	57%
No	6%
Other (please specify)	38%

7. Which of these do you think are used for bodies donated to science? Select all that apply.	
Teaching anatomy	89%
Surgical practice	73%
Medical research	86%
Medication testing	20%
Automobile safety development/crash testing	6%
I don't know	13%

8. If you plan to or are considering donating your body, which of these uses would you NOT want it used for? Select all that apply.	
Teaching anatomy	12%
Surgical practice	12%
Medical research	8%
Medication Testing	15%
Automobile safety development/crash testing	88%

9. What do you think the best use for a donated body would be?

Teaching anatomy	60%
Surgical practice	8%
Medical research	19%
Medication testing	1%
Automobile safety development/crash testing	0
Other (please specify)	10%
10. Once utilized completely, a body's remains are....	
Cremated and returned to the family.	70%
Discarded	12%
Buried in an unmarked grave	1%
Retained in the medical school/laboratory	4%
Other	13%

Comments

Have you registered/considering registration?

- I just haven't decided
- I think I did register many years ago but am not certain and don't know how to learn if the registration is still valid.
- As to your next question in the survey, I think it's okay to ask people if they'd like information on the topic, but I'd think most people in the hospital are looking to be discharged with all their body parts. Just sayin'...
- If there are uncertainties regarding cause of death, and family survivors believe it would be important with their own future health risks.
- Not sure. Maybe fear or uncertainty.
- Haven't thought about it
- I am a fairly unhealthy person, I have qualms about exposing others
- Want to learn more and discuss with family
- I'm fine with donating organs but wish remainder of body to be cremated.

- Not interested; but perhaps your paper will change my thoughts on the subject.
- I'm too old for organ donation. 2. I prefer to be cremated as soon as possible.
- can I be cremated afterwards and will my family have possession of my remains?
- prefer to be cremated
- I understand that receiving organizations can reject a body if it doesn't meet certain criteria. I would not want my family to have to make last minute arrangements. I wish there was the guarantee of removal and cremation, even if the body is rejected.
- Am a registered organ donor however. Let them take the parts that work, bury the rest.
- Just haven't gotten around to it.
- My organs can be used, but I want something left to be cremated and interred at my church.
- Haven’t begun planning for end of life.
- Haven't thought about it
- I am a registered organ donor
- Don’t know. Probably varies based on the person, the doctor, the family, the illness/injury.

Do you agree or disagree? Whole body donors will not be given good care in a hospital if they become seriously ill or injured.

- I think it depends on the caregiver....and age of the prospective donor.
- Discussion should take place away from current problems.
- I’m sure it’s a case by case basis.

- Why does it matter you are dead

- This probably varies from case to case. I expect that med schools have a vested interest in treating bodies carefully so that they provide the best experience for their students. I doubt that respect comes into it much.
- Have no idea
- No basis for answering
- I would think mostly, but unsure how supervised it is.
- Again, I just don't know.
- Don't know. Have researched 19th century body snatching to provide cadavers -- Ha!

Do you think medical schools treat bodies with respect and dignity?

C

- mostly
- Don’t know
- Don't know
- I don't know
- Don’t know. Haven’t been in a med school anatomy class so don’t know what’s said or done.
- Probably most do, but there are always outliers
- no idea
- I know there is respect for the bodies, but medical students also play pranks occasionally to relieve their immature stress.
- I would think mostly, but unsure how supervised it is.
- Again, I just don't know.
- Unknown
- Don't know. I have heard bad stories
- unknown
- Honestly, I don't care. I'll be dead.
- With care, but not necessarily with respect and dignity.
- Unsure whether all do.
- In general they do. There are always exceptions.
- I do not know

- mostly
- Don’t know. Haven’t been in a med school anatomy class so don’t know what’s said or done.

Which of these do you think are used for bodies donated to science?

- With computerization and simulation labs bodies are not needed as much anymore for teaching
- I am a retired MD…wonderful gift to medical training
- Military testing and training

If you plan to or are considering donating your body, which of these uses would you NOT want it used for?

- Organs sold for profit
- Would not care about use
- I never really thought about it...
- I would not care. If my body organs cannot be used, I would not care what happens to my corpse.
- All are fine - don't care how it's used as long as it supports science and or medicine.
- Not certain- would have to think about it and discuss with family
- If I do donate, I would not place limits on how it is used.
- No preference
- I say take the whole thing - I don't need it where I am going! :)
- If I donated my body, not sure I

What do you think the best use for a donated body would be?

- All but auto safety training.
- all of the above
- All of the above

- Don't know enough to choose.
- Don’t know.
- Forensic research
- Don't know

References and Resources

(2021, January 4). Anatomy Gifts Registry. https://www.anatomygifts.org/

Anatomy: Art and science. (2019, July 10). Science Museum. https://www.sciencemuseum.org.uk/objects-and-stories/medicine/anatomy-art-and-science

History. https://www.pastmedicalhistory.co.uk/claudius-galen/

BBC News. A body donated to science - but used to test bombs - BBC News.

Become a cadaver dog trainer with dog trainer course in Indiana. (2023, January 27). Dog Trainer College. https://www.dogtrainercollege.us/dog-trainer-course/cadaver-detection/

Body donation. (n.d.). Indiana University School of Medicine. https://medicine.iu.edu/give/gift-types/body-donation

Body snatching around the world | History detectives | PBS. (n.d.). PBS: Public Broadcasting Service. https://www.pbs.org/opb/historydetectives/feature/body-snatching-around-the-world/

A brief history of medical advancements derived from cadaveric study. (n.d.). MultiBriefs - Your source for industry-specific News Briefs. https://www.multibriefs.com/briefs/cb-medcure/a-brief-history-of-medical-advancements-derived-from-cadaveric-study.html#:~:text=A%20Brief%20History%20of%20Medical%20Advancements%20From%20Cadaveric,Tears%20...%205%20Better%20Understanding%20of%20Cancer%20

Cadavers in car safety research. (2018, July 30). Ethics Unwrapped. https://ethicsunwrapped.utexas.edu/case-study/cadavers-car-safety-research

Forensic Anthropology Center - University of Tennessee Forensic Anthropology Center | (utk.edu)

A force for good. (2018, June 22). The Pathologist. https://thepathologist.com/outside-the-lab/a-force-for-good

(2016, January 26). Forensic Anthropology Center |. https://fac.utk.edu/

Ghosh, S. K. (2015). Human cadaveric dissection: A historical account from Ancient Greece to the modern era. *Anatomy & Cell Biology*, *48*(3), 153. https://doi.org/10.5115/acb.2015.48.3.153

Gobbling a Ghoul. (1878, November 21). *Huntington Democrat*.

History of Anatomical Dissection. (n.d.). Home. https://www.agaillinois.org/history.html

History of anatomy. (2018, December 19). Körperwelten. https://bodyworlds.com/about/history-of-anatomy/#:~:text=3rd%20century%20B.C.&text=The%20first%20documented%20scientific%20dissections,animals%2C%20primarily%20pigs%20and%20monkeys

How cadaver dogs are trained to help authorities locate human remains. (2019, May 15). Chicago Tribune. https://www.chicagotribune.com/suburbs/post-tribune/ct-ptb-cadaver-dog-training-st-0515-story.html

Is it legal to sell human bodies? FAQ on @Reuters 'Body trade' series. (2017, October 24). Reuters. https://www.reuters.com/investigates/special-report/usa-bodies-qanda/

Kaiser, S. (2013). Tradition or change? Sources of body procurement for the anatomical Institute of the University of Cologne in the Third Reich. *Journal of Anatomy*, *223*(4), 410-418. https://doi.org/10.1111/joa.12084

Laskow, S. (2014, December 1). *The earliest crash test dummies were cadavers*. The Atlantic. https://www.theatlantic.com/technology/archive/2014/11/the-earliest-crash-test-dummies-were-cadavers/383235/

Leon Valley Veterinary Hospital. (2019, June 26). *The amazing canine nose: Dog nose slits explained*. https://www.leonvalleyvet.com/blog/the-amazing-canine-nose-dog-nose-slits-explained/

Loudin, A. (2022, March 25). *Donating bodies to science carries risks and benefits*. WebMD. https://www.webmd.com/a-to-z-guides/news/20220325/donating-bodies-carries-risks-and-benefits

Loughlin, K. (2019). Harvard Medical School and the body snatchers. *Hektoen International*, *11*(3).

Martin, A. (2022, November 30). *Average cremation costs in all 50 states (2023 breakdown)*. Choice Mutual. https://choicemutual.com/cremation-cost/

MedCure. (2019, 22). *Human cadavers shape the past and future of medical science*. https://medcure.org/human-cadavers-shape-the-past-and-future-of-medical-science/

National Research Council. Committee on Medicolegal Problems, & Weinmann, G. H. (1929). *A survey of the law concerning dead human bodies*.

Nytimes.com. (2021, November 5). The New York Times - Breaking News, US News, World News and Videos. https://www.nytimes.com/2021/11/05/us/man-dissected-autopsy-consent.html)

October 2020 – The Indiana history blog. (n.d.). The Indiana History Blog. https://blog.history.in.gov/2020/10/

Ohlheiser, A. (2022, October 12). *What happens when you donate your body to science*. MIT Technology Review. https://www.technologyreview.com/2022/10/12/1060924/donating-your-body-science-body-farm/

O'Neill, T. (2022, October 8). *The Church and dissection*. History for Atheists. https://historyforatheists.com/2022/10/the-church-and-dissection/

Palmer, B. (n.d.). *How many uses are there for a dead body?* Slate Magazine. https://slate.com/news-and-politics/2010/09/how-many-uses-are-there-for-a-dead-body.html

Pesta, D. /. (2017, March 15). *Dissection in the Ancient World* [Video]. YouTube. https://www.youtube.com/watch?v=RvlnpCMREVk

Pesta, D. (2017, March 16). *Dissection in the Middle Ages* [Video]. YouTube. https://www.youtube.com/watch?v=XtJ-X0S8e2E

Pesta, D. (2017, March 17). *History of Human Dissection Park IV* [Video]. YouTube. https://www.youtube.com/watch?v=6F8EPQR_qiA

Pesta, D. (2017, March 16). *History of Human Dissection- Superstition, Science, Soul* [Video]. YouTube. https://www.youtube.com/watch?v=gs5BoHG-jA8

Piscitello, A. (2020). CADAVERS IN COMMERCE: REGULATING UNDER A FEDERAL BODY OF LAWS. *Hofstra Law Review*, *48*(4). https://scholarlycommons.law.hofstra.edu/hlr/vol48/iss4/

The poor, the Black, and the marginalized as the source of cadavers in United States anatomical education. (n.d.). PubMed.

Powell, L. (2020, October 12). *Local author unearths Ohio's history of body snatching*. dayton. https://www.dayton.com/what-to-love/dayton-history/local-author-unearths-ohios-history-of-body-snatching/3WF6HUNBIFAQLII7MH7QTLSX6I/

Roach, M. (2003) Stiff: The Curious Lives of Human Cadavers.

Roberts, M. (2018, August 30). *Human body parts price list and other reasons for new Colorado law*. Westword. https://www.westword.com/news/human-body-parts-price-list-and-other-reasons-for-new-colorado-law-10643548

Rupp, J. D., Zaseck, L., Miller, C. S., Bonifas, A. C., Reed, M. P., Sherman, D., Cavanaugh, J. M., Ott, K., & Demetropoulos, C. K. (2021). Correction to: Whole body PMHS response in injurious experimental accelerative loading events. *Annals of Biomedical Engineering*, *49*(12), 3211-3211. https://doi.org/10.1007/s10439-021-02886-w

Ruthberg, J. S., Tingle, G., Tan, L., Ulrey, L., Simonson-Shick, S., Enterline, R., Eastman, H., Mlakar, J., Gotschall, R., Henninger, E., Griswold, M. A., & Wish-Baratz, S. (2020). Mixed reality as a time-efficient alternative to cadaveric dissection. *Medical Teacher*, *42*(8), 896-901. https://doi.org/10.1080/0142159x.2020.1762032

Santa Clara University. (n.d.). *Gruesome tests on cadavers betray donors*. https://www.scu.edu/ethics/focus-areas/bioethics/resources/gruesome-tests-on-cadavers-betray-donors/#:~:text=It%20apparently%20was%20also%20a%20surprise,to%20protect%20soldiers%20from%20land%20mines.&text=It%20apparently%20was%20also,soldiers%20from%20land%20mines.&text=was%20also%20a%20surprise,to%20protect%20soldiers%20from

Sappol, M. (2018). *A traffic of dead bodies: Anatomy and embodied social identity in nineteenth-century America*. Princeton University Press.
Savitt, T. L. (2002). *Medicine and slavery: The diseases and health care of blacks in Antebellum Virginia*. University of Illinois Press.
The secret lives of cadavers. (2016, July 29). National Geographic. https://www.nationalgeographic.com/science/article/body-donation-cadavers-anatomy-medical-education
The star is the corpse. (n.d.). History Today | The World's Leading Serious History Magazine. https://www.historytoday.com/star-corpse
Use of cadaver dogs in locating scattered scavenged human remains: Preliminary Field test results. (n.d.). Office of Justice Programs. https://www.ojp.gov/ncjrs/virtual-library/abstracts/use-cadaver-dogs-locating-scattered-scavenged-human-remains
Verheijde, J. L., Rady, M. Y., & McGregor, J. L. (2007). The United States revised uniform anatomical gift act (2006): New challenges to balancing patient rights and physician responsibilities. *Philosophy, Ethics, and Humanities in Medicine*, *2*(1). https://doi.org/10.1186/1747-5341-2-19
Victor, R. G. (1940). An indictment for grave robbing at the time of the''doctor's riot". *Ann Med Hist*, (2), 366-370.
Victorian 'Coffin torpedoes' blasted would-be body snatchers. (2017, April 4). Atlas Obscura. https://www.atlasobscura.com/articles/coffin-torpedos
Why there is a shortage of cadavers. (2014, January 19). The Economist. https://www.economist.com/the-economist-explains/2014/01/19/why-there-is-a-shortage-of-cadavers

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