STEMBoost Newsletter

Issue V Dec 2020

Upcoming STEMBoost Invitational

Ryan Li

On Saturday, January 23, 2021, STEMBoost will be hosting its second annual Science Olympiad Invitational. However, since the COVID-19 pandemic has picked up its pace within the state, the invitational will occur in an online format on Scilympiad. This year's events include all of those listed within the 2021 National Science Olympiad tournament in Mini-Science Olympiad Division B, minus Ping Pong Parachute. Also, the event Helicopter will replace Glider, while CodeBuster and Virology will be present as trial events. We are expecting this year's invitational team count to be close to 60, double the size from last year.

The STEMBoost officers and past National SO medalists have been busy this holiday break creating the tests, figuring out the schedule for the invitational, and assigning proctors, test scorers, and crisis center managers for the day of invitational. In addition, there is also a team of volunteers who are helping to double check the tests to ensure accuracy and consistency. STEMBoost is excited to host this tournament and looking forward to seeing everybody virtually.

Additionally, the Presidential Volunteer Service Awards have been delivered to the 18 STEMBoost volunteers. This award was created by the President's Council on Service and Civic Participation in 2003 to recognize the importance volunteers had on American society. From 2019-2020, the STEMBoost volunteers amassed over 2,000 volunteer hours in total, and all three award tiers were earned across them. Congratulations Flora Huang and Eshani Patel for earning the bronze award; Grace Kuo, Aseem Rajopadhye, Ryan Li, and Varun Kumaravelu for achieving the silver award; and David Smith, Saarang Kashyap, Deetshana Parthipan, Dylan Yang, Edwin Xie, Leela Srinivas, Rose Yang, Amol Rama, Angela Zhang, Arthur Perng, Iona Xia, Joseph Lee for attaining the gold award. Regardless of the award level, we would still like to once again thank everyone within STEMBoost for using their time to help make the invitationals and spring/summer workshops possible.

Editor in Chief: David Smith
Editor in Charge: Ryan Li
Editor: Joseph Lee

Fun Fact

What living animal has the heaviest brain?

(See answer in the back)

Editorial – Bioethics in the Face of COVID-19

Joseph Lee

Bioethics is a field involving the ethical implications of biological advances, especially as they relate to medicine and medical policies. Before and during the 1960s, the concept of bioethics had not been popularized, and the topic of morality in biological research was rarely discussed by few physicians in the US. It became more of an established field after the 1970s, during which scientists developed new medical breakthroughs and more controversies about how these breakthroughs should be applied were brought up. Some of these topics included genome editing, organ transplants, environmental preservation, euthanization, etc. Since the start of the COVID-19 pandemic near the beginning of 2020, people have begun to face new bioethics controversies. Three major

issues have been about which patients are prioritized in emergencies, the ethics of vaccine testing in humans, and the use of embryonic cell lines in vaccines.

One major issue that has come up due to the pandemic is the shortage of beds, medical workers, and medical equipment to treat every patient that comes seeking medical help. As a result, doctors must choose which people are treated and also which patients are able to be put on a ventilator. In an article in the New England Journal of Medicine, Researchers from Harvard and Boston Children's Hospitals wrote that "the angst that clinicians experience when asked to withdraw ventilators for reasons not related to the welfare of their patients, should not be underestimated -- it may lead to debilitating and disabling distress for some clinicians," (Truog et al. 2020). In some hotspots such as Italy, they have typically chosen to treat younger and healthier people, who are more likely to benefit from treatment and have more possibilities in the future. Older and more fragile patients are often less likely to tolerate certain treatments compared to healthier patients. The high pressure of having to choose which lives they are able to save causes tremendous stress in many doctors. Doctors will often feel guilty about the people they cannot choose, especially if these patients end up passing away. As a result, some have suggested that a committee be formed to help make these kinds of decisions and avoid placing too much emotional burden on individuals.

Vaccine testing in humans is another controversial bioethics issue. Typically, voluntary human testing offers the most accurate results possible about the effectiveness of a vaccine in the shortest period of time compared to other types of studies. There are already thousands of viable volunteers (they must meet certain criteria to reduce risks) in several countries willing to be exposed to COVID-19 for the sake of vaccine development. However, whether or not this should be allowed still remains an important ethical question. First and foremost, those who volunteer to be exposed have a chance of dying. Even if the probability is not very high among young and healthy individuals, safety is not guaranteed. Although similar vaccine trials have been done in the past with other dangerous diseases such as malaria and cholera, safe and reliable drugs had already been developed for these diseases that could be used if needed. On the other hand, no drugs have yet been approved for use in treating COVID-19. Without a sort of failsafe, there is more of a risk for these volunteers. Second, not much is known about the long-term health impacts of COVID-19, leading some to argue that it is not yet possible for these volunteers to truly give informed consent. Various studies have shown that those who have been infected may experience lifelong damage to the lungs, kidneys, heart, or brain. There is a chance that a survivor of the virus could be permanently disabled. Due to safety concerns and how little we know about COVID-19 as of yet, this continues to be a topic that is up for question.

The use of cell lines of aborted fetuses in vaccine testing has also raised bioethical concerns for a select group of people. Since the 1960s, cell lines derived from abortions have been used to test and/or produce vaccines and drugs in the preliminary stages. One prominent example of one of these cell lines is HEK 293, or human embryonic kidney 293 cells. HEK 293 is a cell line derived from embryonic kidney cells taken from an aborted female fetus and grown in tissue culture. One recent vaccine from Oxford and AstraZeneca that has recently been approved in the UK has used these cells in development, production, and testing. For the recently developed Pfizer and Moderna vaccines, no fetal cells are present in their injections, nor are they used to produce the vaccines. Instead, fetal cells have been used to test their effectiveness. Because of the origin of these products (specifically the Oxford/AstraZeneca vaccine), some have been opposed to their use, as the use of aborted cell lines in medicine has often been a significant and sensitive topic in communities of faith (often in Catholic communities). However, opposition to vaccination could pose a significant public health risk, which is why this is a concern to many people. In response, the Pfizer and Moderna vaccines were approved for use by two Catholic bishops as the most moral options given the current situation.

In general, bioethics focuses on making decisions about preserving dignity and respect for human life. Under COVID-19, new situations have arisen that have forced many to make difficult decisions relating to bioethics. Many involve the sacrifice of one thing for another purpose, whether it is one's own life or their well

being. In order to reduce these burdens, it is important to devise new techniques and methods that can be used to avoid controversial situations.

Works Cited:

- Brookshire, Bethany. “How Making a COVID-19 Vaccine Confronts Thorny Ethical Issues.” Science News, Society for Science & the Public, 6 July 2020, www.sciencenews.org/article/coronavirus-covid19-vaccine-ethical-issues.
- Brown, Jennifer. “Colorado Bishops Warn Catholics about Morality of COVID-19 Vaccines, Citing Fetal Cells.” The Colorado Sun, 16 Dec. 2020, coloradosun.com/2020/12/16/covid-19-vaccine-aborted-fetal-cells/.
- McDaniel, Liz. “What Is Bioethics?” What Is Bioethics?, Michigan State University, 2020, bioethics.msu.edu/what-is-bioethics.
- Privitera, Greta. “Italian Doctors on Coronavirus Frontline Face Tough Calls on Whom to Save.” - - POLITICO, POLITICO, 11 Mar. 2020, www.politico.eu/article/coronavirus-italy-doctors-tough-calls-survival/.
- Wadman, Meredith, et al. “Abortion Opponents Protest COVID-19 Vaccines' Use of Fetal Cells.” Science Mag, AAAS, 9 June 2020, www.sciencemag.org/news/2020/06/abortion-opponents-protest-covid-19-vaccines-use-fetal-cells.

Answer: Sperm Whales have the heaviest brain of any living animal, weighing more than 20 pounds on average (4 times heavier than the average human brain).