



The Need For More Organ Donation

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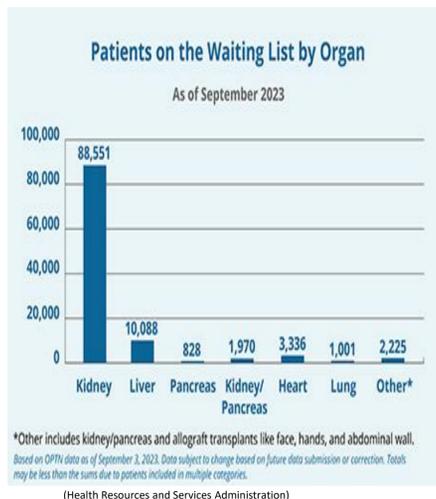
BMS 515 Public Health and the US Healthcare System

Organ Transplantation

- **What is it?**
 - Organ transplantation is a surgical procedure in which a failing organ is replaced by a healthy organ
 - The healthy organ can come from a deceased or living donation
- **Who needs organ transplants?**
 - Patients with diseases that lead to organ failure often require organ transplantation
 - Such diseases are End-Stage Renal Disease, heart failure, cirrhosis, cancers, hepatitis, and more (Grinyo)
- **What kinds of donations are there?**
 - Donations after life from deceased donors
 - Living donations
 - Different organs such as heart, kidney, liver, pancreas, eyes, lung, and more (Health Resources and Services Administration, 2023)

Why is There a Need for More Organs?

- As of September 2023, there were approximately 108,000 people on the organ wait list and only 27,000 transplants were performed (Health Resources and Services Administration, 2023)
- Every 10 minutes another person is added to the organ wait list
- 17 people on the wait list die every day
- 90% of U.S adults support donation but only 60% are signed up to be donors (Health Resources and Services Administration, 2021)



Why Aren't Many Organs Donated?

- Only 3 in 1000 donors end up donating
- Donated organs must be matched with recipients based on certain criteria (Health Resources and Services Administration)
 - Blood Type
 - Body Size
 - Location
- Organs only last for an average of 9 hours outside of the body. If a good recipient is not found by then, the organ can not be donated

Possible Options

- Educate the public on the benefits of organ donation (Health Resources and Services Administration)
 - Potential to save up to 8 lives
 - Many people can donate: any age, sex, and ethnicity
- Improve organ preservation methods
 - Allows for donation across larger distances
 - Human organs can only be preserved for an average of nine hours (National Institutes of Health)
- Which option is better?
 - Of the two options above, improving organ preservation methods is the better option
 - Even if every person in the United States was a donor, only 6 out of every 1000 donors would donate
 - Improving organ preservation allows for less wasting of healthy organs

Interspecies Blastocyst Complementation (IBC)

- Blastocyst complementation is when induced pluripotent stem cells (iPSCs) are delivered into a host as a blastocyst (Wu)
 - Gene knockouts are used to disable lineage progenitors in the host where tissue and organ generation can be disabled, leaving an empty niche
 - Delivering donor cells to the host at the blastocyst stage would allow the donor's cells to grow inside the host and generate an organ that is primarily donor cells (Wu)
- A study done in 2013 has shown that entire pancreatic epithelium can be grown and chimeric pigs grow into adulthood. However, successful interspecies complementation has only been successful in rat-mouse (Wu)

How IBC Could Solve the Demand for More Organ Donation

- Pigs closely resemble humans in anatomy, organ size, cell cycle characteristics, and genomic similarity, as well as reach maturity in 6 months, which makes them the best option to use as a host species other than humans (Wu).
- Using IBC to generate human organs using stem cells from the individual on the organ wait list eliminates problems with organ-recipient matching such as blood type.
- Paired with better organ preservation, IBC could allow for a healthy organ to be donated within 6 months to the individual in need which could prevent wait list deaths
- Problems with IBC organ generation are public opinion, financial cost, and the actual success of generation

Literature Cited

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