# The Role of the University of Colorado Human Cardiac Tissue Bank (UC-HCTB) in the Transomics for Precision Medicine (TOPMed) Program

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NHLBI Trans-Omics for Precision Medicine

## Background

- Human cardiac tissue banks (HCTBs) are valuable yet high-cost undertakings restricted to a handful of academic medical centers.
- The University of Colorado Health Sciences Center Heart Tissue Bank has been maintained since 1984 and collects heart tissue and serum from patients receiving an orthotopic heart transplant or undergoing implantation of a left ventricular assist device (LVAD).
- In 1993, the National Institutes of Health (NIH) Revitalization Act was passed and signed into law, mandating that federally-funded clinical research prioritize the inclusion of women and minorities and requiring that researchers disclose the characteristics of their study populations when reporting results.
- In the event these populations are underrepresented in study cohorts in the areas of heart failure and transplant, we run the risk of further excluding an already-marginalized group from the benefits of scientific progress.
- Many publications describe the approach for establishing HCTBs, including optimal ways to harvest and store tissue, but very little has been published describing the demographic and clinical characteristics of HCTBs.

## Objectives

- The goal of this project is to describe the demographics and diagnoses of the University of Colorado HCTB (UC-HCTB).
- We hope to contribute to the literature some insight into the study population available for translational cardiac research in hopes that other banks will follow suit to expand our understanding of the contents of HCTBs.
- We also compare the demographic characteristics of the samples in our bank to Colorado transplant statistics in order to identify potential gaps in our study population relative to the patient population affected by heart failure.
- We compare the gender distribution of samples within the tissue bank with those transplant data both in Colorado and in the U.S. since 1988 in 5 year intervals.
- Analyze and interpret data in collaboration with TOPMed

## Methods

- Demographic and clinical phenotype data were extracted from the UC-HCTB and data were analyzed using R 3.5.1 and RStudio 1.1.456.
- Colorado transplant data was downloaded from the Organ Procurement and Transplantation Network website for comparative analysis.

## Results

**Table 1:** *Demographics of samples in the UC-HCTB*

| | Failing N = 591 | | Non-Failing N = 269 | |
|---|---|---|---|---|
| | **N** | **%** | **N** | **%** |
| **Age** | | | | |
| *18-34* | 79 | 13.37% | 45 | 16.73% |
| *35-49* | 123 | 20.81% | 84 | 31.23% |
| *50-64* | 314 | 53.13% | 103 | 38.29% |
| *65+* | 75 | 12.69% | 37 | 13.75% |
| **Sex** | | | | |
| *Female* | 128 | 21.66% | 142 | 52.79% |
| *Male* | 463 | 78.34% | 127 | 47.21% |
| **Race** | | | | |
| *White* | 458 | 77.50% | 234 | 86.99% |
| *Black* | 57 | 9.64% | 5 | 1.86% |
| *Hispanic* | 54 | 9.14% | 26 | 9.67% |
| *Asian* | 14 | 2.37% | 2 | 0.74% |
| *Other* | 8 | 1.35% | 2 | 0.74% |

**Table 2:** *Diagnoses among samples in the UC-HCTB*

| **Diagnosis** | **N** | **%** |
|---|---|---|
| *Ischemic Cardiomyopathy* | 230 | 26.74% |
| *Idiopathic Dilated Cardiomyopathy* | 195 | 22.67% |
| *Familial Cardiomyopathy* | 37 | 4.30% |
| *Retransplant* | 33 | 3.84% |
| *Other* | 23 | 2.67% |
| *Valvular Cardiomyopathy* | 23 | 2.67% |
| *Hypertrophic Cardiomyopathy* | 13 | 1.51% |
| *Adult Congenital Heart Disease* | 11 | 1.28% |
| *Chemotherapy-Related Cardiomyopathy* | 11 | 1.28% |
| *Myocarditis* | 5 | 0.58% |
| *Peripartum Cardiomyopathy* | 5 | 0.58% |
| *Restrictive Cardiomyopathy* | 5 | 0.58% |
| *Nonfailing* | 269 | 31.28% |

**Figure 1:** *Comparison of tissue samples to Colorado transplants by gender*

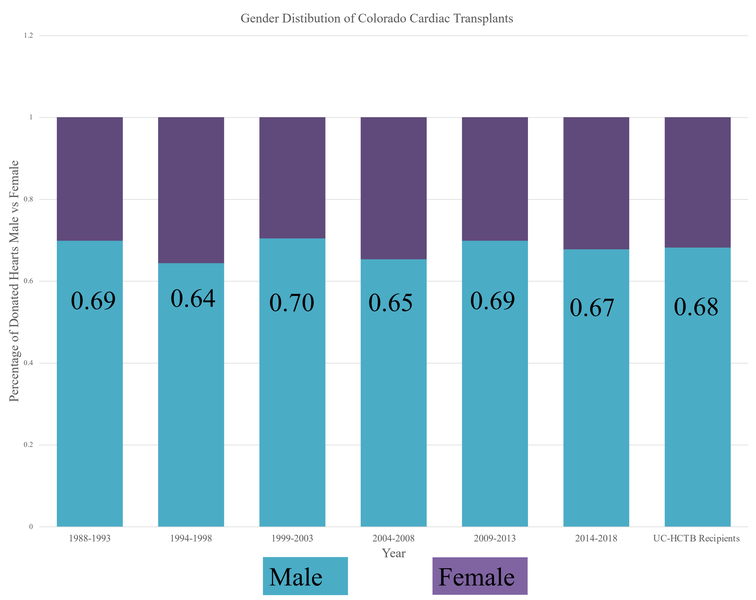
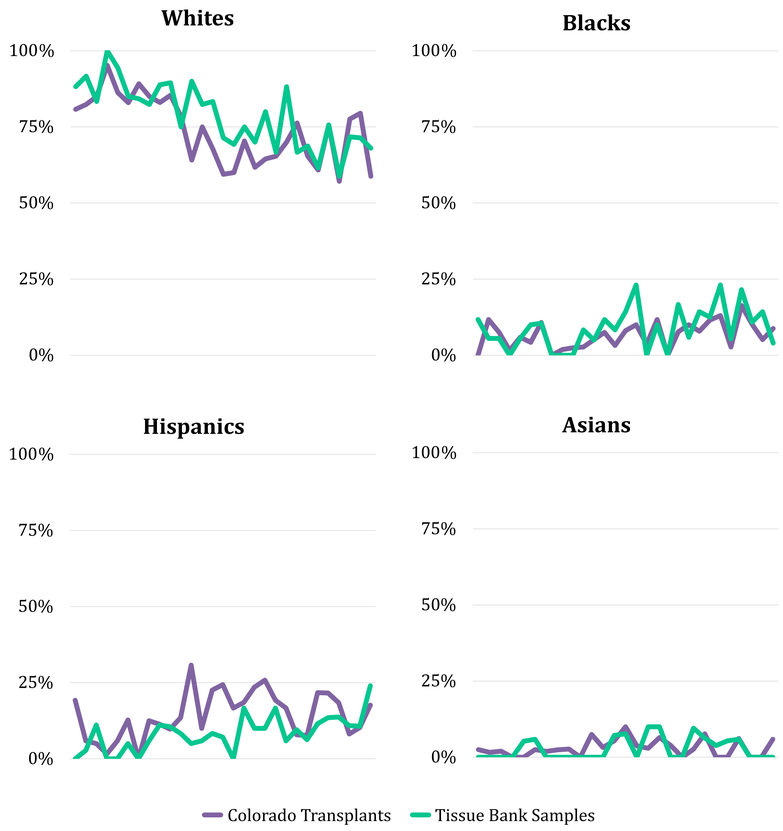



**Figure 2:** *Comparison of tissue samples to Colorado transplants by race*




## Conclusions

- These data provide insight into the demographic makeup of the UC-HCTB and distribution of diagnoses available for study.
- When compared to cumulative OPTN Colorado transplant data since 1988, females are consistently less represented than are males in Colorado. The UC-HCTB reflects this trend with 67% Colorado Transplant data being male and 68% UC-HCTB being male.
- Black samples and Hispanic samples were more and less frequent in the UC-HCTB, respectively (Black 9.6% vs. 6.1%, Hispanic 9.1% vs. 13.3%).
- Transparent reporting by banks collecting similar tissue will reveal whether mismatches between demographics of transplanted patients and enrolled and banked tissues are present elsewhere, suggesting that under recruitment of women and minorities is a problem endemic in the field.

## References

1. US Congress. National Institutes of Health Revitalization Act of 1993: Act to Amend the Public Health Service Act to Revise and Extend the Programs of the National Institutes of Health, and for Other Purposes Public Law Washington, DC; 1993. pp. 103–143.
2. OPTN data used in analyses is based on data current as of July 20, 2018 and is available at https://optn.transplant.hrsa.gov/.