

Expanding Physiology Research Opportunities for Undergraduates: UPRIME and INPUT Programs at the University of Minnesota

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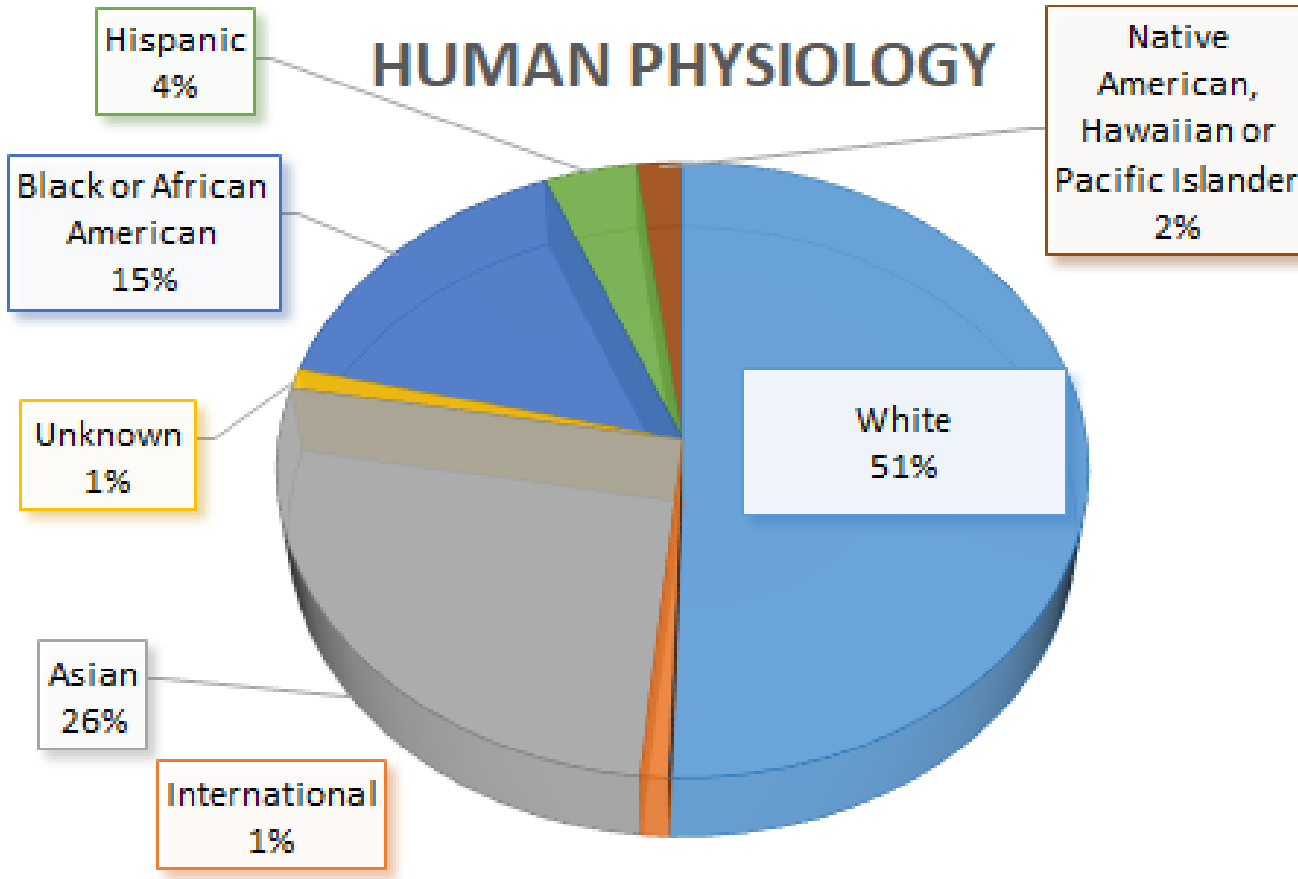
University of Minnesota

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The Human Physiology Major at the University of Minnesota – 2020 statistics

HUMAN PHYSIOLOGY



- Our major is quite diverse compared to our state's population, our university's student body and compared to other biological science majors at our institution.
- This diversity had risen organically based on student interests and "word of mouth", but not via any overt outreach by our department.

Memorial Day 2020 George Floyd was killed



George Floyd's murder had a huge impact on our campus and our city

- What can a Physiology Department do to address Social Inequities?
 - *Potential Solution*: Create a research internship for underrepresented students.
 - A faculty committee was assembled to define the program: Vincent Barnett, Lisa Anderson, Kathryn Kotz, Emilyn Alejandro, Xavier Revelo, Steven Wu
- How do we define underrepresented in science?
 - Solution: Use NIH criteria which include Gender, Ethnicity, Socioeconomic Status, 1st generation to attend college
 - Adjustment made necessary due to recent SCOTUS ruling

Where can we make the most Impact?

- Many of the students who seek out research experiences have academic or professional support systems that point out the value of participation in research on academic and career advancement.
- Underrepresented students are less likely to have family or with knowledge of these potential benefits.
- *Our Solution:* Focus on 1st and 2nd year students with some scientific aptitude but little to no experience.
 - Provide the students with financial support so that work and school are better integrated
 - Provide research and academic support
 - Cultivate critical thinking
 - Build an undergraduate research community

Identifying Barriers

- Financial: Where does the money come from?
- Covid-19, A Public Health barrier – in 2020 and 2021 Most faculty and staff were working remotely and access to research labs was severely limited.
- Student Access– At the University of Minnesota, the Human Physiology major is within the College of Liberal Arts (CLA).
 - CLA students are not required to declare their major until the end of their sophomore year
 - They take supporting science classes, math chemistry, physics, biology but have little to no contact with Physiology faculty.
 - Rely on other CLA programs to help with outreach to the target student demographic

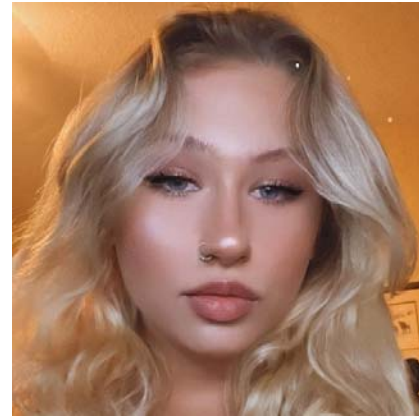
Solutions

- Financial: Sufficient departmental support to initiate the program
- Covid-19: needed to wait for vaccines and herd immunity to allow our labs to reopen sufficiently to welcome in students for training and research
- Student Access: Tapped into existing programs for underrepresented students on our campus.
 - Rev. Dr. Martin Luther King, Jr. Program
 - President's Emerging Scholars Program
 - Deans First Year Research and Creative Scholars



- Solicited applications from incoming freshman, freshman and sophomore students via email, posters, introductory physiology courses and CLA advisors at the University of Minnesota during the summer and fall of 2022.
- Applications contained:
 - Demographic questions (first to attend college, family income, number in household)
 - Personal Statement (an opportunities for the student to describe their personal and scientific interests)
 - Essay on their view of diversity in science.
 - Letters of reference – this is very difficult for students to accomplish
- Application evaluations were performed by at least two faculty members and scored using a rubric that weights the components of the student submissions.
 - All scores were averaged and listed by rank.
 - Applications were discussed by the full evaluation committee before final determinations were made.

Meet the INPUT Scholars



First cohort was a success!

- All students reported a positive experience.
 - 5 of 6 students will return for a second semester in the program
 - The 6th student has reported that she enjoyed the opportunity but would prefer to do chemistry research.
- All faculty members reported positive impressions of the students and their progress over the term.
- Recruitment of a second cohort is ongoing and we will meet soon to choose our next cohort for a start date in January 2024

Another Opportunity

- Because of Covid, we needed a couple of years to get INPUT operational
- In mid 2020, the American Heart Association announced a call for proposals for increasing representation in research focusing on *junior and senior* undergraduates.
- We received a grant to start another research program
- UPRIME

UPRIME, Undergraduate Physiology In Medicine and Education

- American Heart Association Grant, Joseph M Metzger, principle investigator, funded a mentored research program in a physiology lab with identified IBP mentors
- Designed a 12 week summer research program with weekly meetings of the cohort.
- Funded 5 students per year with the grant providing a \$6000.00 stipend plus travel to scientific meetings
- We recruited juniors and seniors with a strong interest in research as a career.
 - Application contained demographic information
 - Personal statement
 - Diversity statement
 - Description of research interest
- We modeled the selection process on the work we had done to develop the INPUT program, the INPUT committee reviewed applications according to a rubric and 5 students were chosen

Weekly Enrichment Developed by Dr. Steven Wu and Dr. Vincent Barnett

- In the summer, our graduate students present their research progress in weekly seminar (with pizza).
- UPRIME scholars are required to attend and complete a worksheet about the seminar
- Student would identify hypotheses, animal models, techniques to the best of their ability
- MOST IMPORTANT – What are things you did not understand? Be honest!
- During the meeting (with snacks) students and faculty would discuss the seminar focusing on things scholars did not understand, joys and challenges in the lab and how to get ready for our local research symposium.

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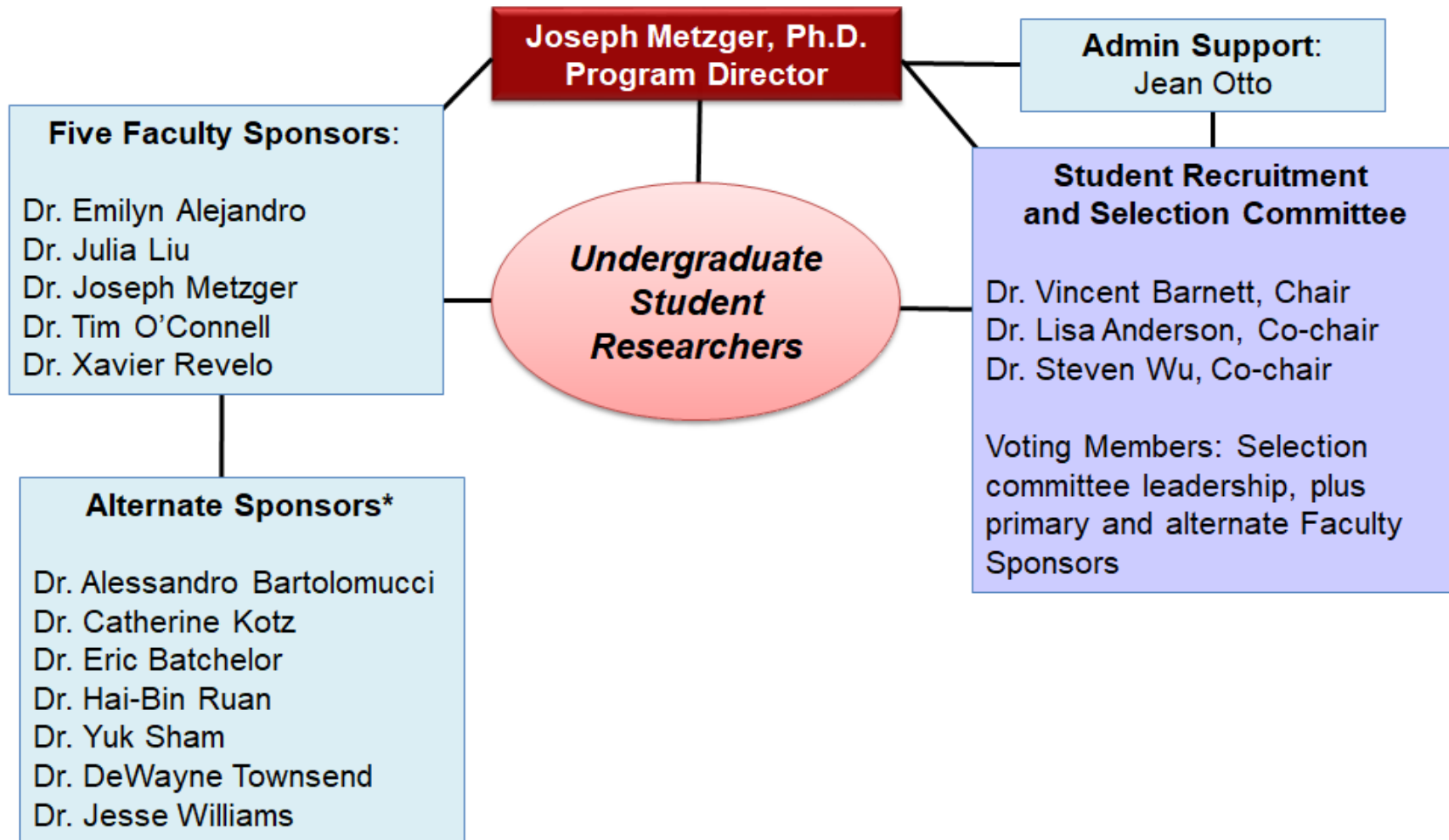
Student present posters at Cardiopalooza!



Three Successful Cohorts

- Recruited, trained and mentored 15 undergraduates in our first three classes, 2021, 2022, 2023
- Inclusive Excellence: identifying, recruiting and providing opportunities to strong students URM/ low socio-economic backgrounds
- GPAs of the 15 AHA scholars matriculated in the program: 3.77/4.00.
- 100% of trainees successfully presented their work in abstract/Poster format.
- Students go on to professional schools after AHA training

Organizational structure:
***University of Minnesota inclusive excellence cardiovascular
research opportunity program for undergraduates***



Thank you!

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- <https://input.umn.edu/>