Summer Student Research Program
Project Description

FACULTY SPONSOR'S NAME AND DEGREE:
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PROJECT TITLE (200 Characters max):
Effect of taurine gradient on regulating organ health

HYPOTHESIS:

Taurine levels in different cell type impart differential metabolomic signature

PROJECT DESCRIPTION **(Include design, methodology, data collection, techniques, data analysis to be employed and evaluation and interpretation methodology)**

Taurine abundance declines with age in several species. We recently showed that reversal of taurine deficiency that occurs with age through taurine supplementation makes mice live longer. When we analyzed organ health in taurine-supplemented mice, we saw an improved functioning of several organ systems such as bone, muscle, brain, pancreas, and the immune system. These results show that taurine supplementation helps mice live longer and healthier. At the cellular level taurine regulated several processes classified as hallmarks of aging in mice; Taurine suppressed cellular DNA damage, cell-replication arrest, inflammation and it enhanced protein regulation and energy generation by mitochondria in the cells. Taurine appeared to have influence on all major hallmarks of aging, but the combination of hallmarks imparting health benefits downstream of taurine differed in different organs. This observation given the fact that taurine abundance in different cell types is widely different suggests differential sensitivity of different hallmarks to levels of taurine. We will use mouse genetic and pharmacological models to investigate how cellular metabolism in different tissues with differential taurine levels affect aging hallmarks.

SPONSOR'S MOST RECENT PUBLICATIONS RELEVANT TO THIS RESEARCH:

Taurine deficiency as a driver of aging.
Singh P, Gollapalli K, Mangiola S, Schranner D, Yusuf MA, Chamoli M, Shi SL, Lopes Bastos B, Nair T, Riermeier A, Vayndorf EM, Wu JZ, Nilakhe A, Nguyen CQ, Muir M, Kiflezghi MG, Foulger A, Junker A, Devine J, Sharan K, Chinta SJ, Rajput S, Rane A, Baumert P, Schönfelder M, Iavarone F, di Lorenzo G, Kumari S, Gupta A, Sarkar R, Khyriem C, Chawla AS, Sharma A, Sarper N, Chattopadhyay N, Biswal BK, Settembre C, Nagarajan P, Targoff KL, Picard M, Gupta S, Velagapudi V, Papenfuss AT, Kaya A, Ferreira MG, Kennedy BK, Andersen JK, Lithgow GJ, Ali AM, Mukhopadhyay A, Palotie A, Kastenmüller G, Kaeberlein M, Wackerhage H, Pal B, **Yadav VK.**
Science. 2023 Jun 9;380(6649):eabn9257. doi: 10.1126/science.abn9257.

THIS PROJECT IS: ☐ **Clinical** **X Laboratory** ☐ **Behavioral** ☐ **Other**

THIS PROJECT IS CANCER-RELATED ☐
Please explain Cancer relevance

THIS PROJECT IS HEART, LUNG & BLOOD- RELATED ☐
Please explain Heart, Lung, Blood relevance

THIS PROJECT INVOLVE RADIOISOTOPES? ☐

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THIS PROJECT INVOLVES THE USE OF ANIMALS ☐
PENDING ☐ **APPROVED X** **IACUC PROTOCOL #PROTO202400078**

THIS PROJECT INVOLVES THE USE OF HUMAN SUBJECTS? ☐
PENDING ☐ **APPROVED** ☐ **IRB PROTOCOL # M**

THIS PROJECT IS SUITABLE FOR:

UNDERGRADUATE STUDENTS	☐	ENTERING FRESHMAN	☐
SOPHMORES	☐	ALL STUDENTS	X

THIS PROJECT IS WORK-STUDY: **Yes** ☐ **or** **No** ☐

THIS PROJECT WILL BE POSTED DURING ACADEMIC YEAR FOR INTERESTED VOLUNTEERS: **Yes X** **or** **No** ☐

WHAT WILL THE STUDENT LEARN FROM THIS EXPERIENCE?
How to work in the rapidly evolving field of healthy longevity.