The Hibernation Science Workshop
A Unique Educational Opportunity at the University of Alaska Fairbanks (UAF)

The Center for Transformative Research in Metabolism (TRiM), in partnership with the Institute of Arctic Biology (IAB) and Toolik Field Station, hosted a residential Hibernation Science Workshop (HSW) on August 6-18, 2023 at the UAF campus. Twenty-nine scientists, including early-stage investigators, post docs, and graduate students from across the U.S. and around the globe, gathered for seven days of classroom presentations and hands-on activities in addition to a 4-day field trip at the Toolik Field Station in the Brooks Range. Dormitory housing and communal meals on campus were provided to create a residential experience, promoting depth and breadth of interaction among established investigators and early-stage investigators.

From left to right: Kelly Drew, Matt Andrews, Anya Goropashnaya, Brian Barnes, Domenico Tupone, Yue Gao, Mallory Ballinger, Ming-Liang Lee, Neeraj Lal, Ching Pu Chang, Adam Olichwier, Jing Lei, Bong Soo Seok, Natalia Machado, Vy Nguyen (front), Takuto Suito, Reo Otsuka, Denise Daniello (front), Mira Kato-Suzuki, Cody Fitzgerald, Yuko Okamatsu, Adam Myers, Raechel Sherrick, Aurora Lavin-Peter, Øivind Tøien, Adrian Martinez, Sarah Rice, Bernard Laughlin. Missing-Don Larson, Slav Bagriantsev, Elena Gracheva, Vince Kunze, Inigo Yoldi Bergua, Haoran Cho. *Photo credit Oivind Toien, PhD, UAF*

Building on the 60+ year legacy in hibernation research by UA investigators, TRiM faculty and invited instructors challenged HSW participants to be curious about the extreme physiology of hibernating Alaskan mammals that allows them to remain *comfortably cold* even during the harshest days of Alaskan winters – without food, water, or movement – while still maintaining their muscle mass and ability to arouse in the spring "fit and trim." What could we learn from hibernators that could be applied to humans and benefit treatment of disease and emergency medicine?

Workshop faculty presented on topics ranging from the basic science of hibernation such as defining hibernation and its fundamental elements; the life cycles of arctic ground squirrels and black bears; regulation processes that control the hibernator's on/off switch; and metabolomic processes underlying circadian rhythms to achieve extreme metabolic depression (torpor) and then trigger arousal in the spring while avoiding ischemic/reperfusion shock injuries and disuse muscle atrophy. Biomedical applications of hibernation research were highlighted throughout the workshop along with strategies

and case examples for bringing a hibernation-based therapy to the marketplace. Funding opportunities and strategies to support hibernation research, translation, and commercialization were also discussed.

Hands-on activities were an essential component of the workshop. UAF Assistant Professor Don Larson, PhD, led an ice-breaker asking participants to design a human-animal hybrid with hibernating capabilities. This science and art exercise gave rise to interesting models created by the participants and got folks up and talking, allowing their creative energies to flow. (Please see photo on left). Other activities included Journal club discussions on special topics including applying state of the art neuroscience techniques in hibernating species and case examples of funding hibernation research. There were also tours to complement lecture topics such as the UAF Biological Research and Diagnostics Facility to view arctic ground squirrels in captivity, the bear facility on UAF campus, the CRREL Permafrost Tunnel Research Facility, and the UAF Large Animal Research Station. (Please see above photo on right.)

HSW IceBreaker, designing a "Human-Animal Hybrid Hibernator," fired up imaginations and lively converations.
Photo credit Esther Dupont-Versteegden, PhD, UKY

Tour of the Permafrost Tunnel Research Facility led by Larry Hinzman, PhD, Assistant Director of Polar Sciences, White House Office of Science and Technology Policy; Executive Director, Interagency Arctic Research Policy Committee (IARPC), and former UAF Vice Chancellor for Research.
Photo credit Denise Daniello, UAF

The workshop concluded with an unforgettable trip to the Toolik Field Station featuring a tour of the research station and its infrastructure for laboratory work on Arctic mammals; the opportunity to see arctic ground squirrels in their natural habitat; and observing the effects of climate change on arctic hibernators and other life forms. Hiking the Atigun River gorge to a nearby waterfall, round trip 5 miles, was a memorable experience for all to observe the arctic tundra up close and personal.

On the bus to Toolik Field Station. *Photo credit Domenico Tupone, PhD, Oregon Health and Science University*

Participants take a photo break while hiking to the Antigun River gorge, on their way to the scenic waterfall. *Photo credit Domenico Tupone, PhD, Oregon Health and Science University*

Domenico Tupone, Brian Barnes, Kelly Drew and other HSW participants get a ride to one of the Toolik Field Station's long-term monitoring sites for Arctic Ground Squirrels. *Photo credit Domenico Tupone, PhD, Oregon Health and Science University*

Alaska EdX staff took part in the workshop and plan to develop a series of online courses based on the workshop that will be launched in Spring 2024.

KUAC Science Friday featured a story about the Hibernation Science Workshop. Please click here to access the news piece.

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