



**Center for Transformative Research in Metabolism (TRiM)  
Key Personnel Contributions: Grant Submissions, Publications, and Presentations  
in GY02 (6.1.2020 – 10.30.2020)**

**The Center’s Snapshot, GY02**

Grant Applications Submitted	Grants Awarded	Funding Requested	Funding Approved	Manuscripts Submitted	Manuscripts Accepted	Abstracts Submitted	Invited Presentations
12	3	\$6,692,017	\$1,027,608	12	8	3	12

Note: All grant applications and manuscripts reported in GY02 were submitted by TRiM Key Personnel. While the majority of grant requests and manuscript submissions further TRiM’s research goals, please note that not all submissions apply to the Center’s activities. All invited presentations were made by TRiM Key Personnel and relate to TRiM’s research mission.

**Robert Coker, PhD: PI Nutritional strategies for metabolic health in aging (Project 3); Chair, TRiM Translational Advisory Committee; Professor of Biology, Clinical Nutrition and Exercise Physiology, Institute of Arctic Biology, UAF**

Research Support/Grants Submitted

- National Institutes of Health, R01, *Nutrient specific strategies for health and longevity*, \$1,147,435 (Revised and resubmitted August 2020, not discussed).
- NIH Administrative Supplement (NOT-GM-20-013), *Sex-Specific Strategies for Health and Longevity*, \$299,967 (Submitted June 2020, not discussed).
- Murdock Commercialization Award, *Transformative Delivery of Nutrition to Market in Alaska and Beyond*, \$60,000 (Submitted June 2020, not funded).
- *Health Effects Institute, Standardized Monitoring of Wildfire Smoke Impact on Human Health using Nasal Cells*, \$795,000 (Submitted subcontract on August 2020, pending)

Manuscripts

- Rice SA, Ten Have GAM, Reisz JA, Gehrke S, Stefanoni D, D'Alessandro A, Coker RH, Deutz NEP, Drew KL. *Nitrogen recycling buffers ammonia toxicity from skeletal muscle breakdown in hibernation*, *Nature Metabolism*, Accepted.
- Coker MS, Ladd KR, Schutzler SE, Park SY, Williams RH, Deutz NEP, Wolfe RR, Coker RH. *Ingestion of free-range reindeer promotes higher net protein balance compared to commercial beef in humans*. *Int J Circumpolar Health*, Submitted.
- Coker MS, Murphy CJ, Ruby BC, Shriver TC, Schoeller DA, Newcomer BR, Bartlett L, Coker RH. *Alaska backcountry expeditionary hunting promotes rapid improvements in metabolic health in males and females*, *Physiological Reports*, Resubmitted.

## Abstracts

- Melynda S. Coker, Kaylee Ladd, Zeinab Barati, Carl J. Murphy, Kiplin Taber, Robert R. Wolfe, Robert H. Coker, *Essential Amino Acid Meal Replacement Improves Body Composition and Physical Function in the Obese Elderly*, *Obesity Week Conference* hosted by The Obesity Society.
- Brandon Kowalski, Anya Goropashnaya, Vadim Fedorov, Melynda S. Coker, Terry Bateman, Larry Bartlett & Robert H. Coker. *Modulation of Muscle Specific MicroRNA and Growth Genes during Alaska Backcountry Expeditionary Hunting*. *Integrative Physiology of Exercise* meeting hosted by the American Physiological Society.
- Kaylee Ladd, Melynda S. Coker, Zeinab Barati, Robert H. Coker, *Magnetic resonance imaging-derived measurement of muscle mass: evaluation of analytical methods*. *Integrative Physiology of Exercise* meeting hosted by the American Physiological Society.

## Invited Presentations

- "Translational Biomedicine in Alaska", virtual presentation for the Center for Translational Research in Aging and Longevity at Texas A and M University (10.30.2020). This presentation detailed work devoted to clinical nutrition in metabolic disease and discussed metabolic responses to expeditionary field operations and/or ultra-endurance events in Alaska and the Yukon.
- "Entrepreneurship in Biomedicine: A Multi-Faceted Approach," virtual presentation hosted by the Institute of Translational Health Sciences (ITHS, UW) Career Development Series (10.29.2020). This presentation provided an overview of concepts and entrepreneurial tools for researchers who are interested in translating their biomedical innovations from research to successful business models. Resources including the Small Business Innovations in Research/Technology Transfer (SBIR/STTR) competitive funding and NIH I-Corps training were also discussed.
- "MRI and Actigraph Presentation, K-Award Discussion," Journal Club. Robert Coker and Melynda Coker (10.2.2020).
- Hunting Science Podcast, Episode 13: [The Exercise Physiology of Backcountry Hunting](#).

## Professional Service

- Chair, Northwest Participant Clinical Interactions Network, Institute of Translational Health Sciences
- Guest Editor, *Metabolites*, Special Issue "Amino Acid Metabolism and Physiological Resilience"
- Co-Owner and Lead Scientist of Essential Blends, LLC, a company focused on the development of medical nutrition products targeting obesity, sarcopenia, heart failure, and liver disease. The company has also developed a meal replacement formula designed to protect muscle loss during aging that will be tested using a clinical trial as part of the Center's research.
- Regional Director, ITHS Translational Workforce Development Program

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## **Kelly Drew, PhD, Center for TRiM Director and Professor, Institute of Arctic Biology, Department of Chemistry and Biochemistry, UAF**

### Research Support/Grants Submitted:

- MOD 20 INBRE Special Request Opportunity (INBRE's NIH carry forward), *Upgrades for the Center for Transformative Research in Metabolism (TRiM) Health and Metabolism Research (HaMR) Core Instrumentation*, in the amount of \$10,450 on 10.16.2020. Outcome: Funding request was approved by INBRE and will be submitted to NIH for final approval. Proposed funding will be used to purchase

upgraded software licenses for telemetry and purchase supplies for producing 29 loggers for bear implants during MRI scans.

- Requested Administrative Supplement for *Mammalian Hibernation Research: A Path Towards a Center for TRiM*. NIH, National Institute on Aging, \$380,952 to develop targeted therapeutics for treatment of vascular dementia, premised on hibernation mechanisms, and to explore new metabolic paths to improve brain health and functioning. Application submitted on 10.16.2020 (pending).
- *Centers of Biomedical Research Excellence (COBRE) (P20) Mammalian Hibernation Research: A Path Towards a Center for Transformative Research in Metabolism \$11,810,112 (Awarded July 16, 2019)*

#### Papers in Press

- Rice, SA; Ten Have, GAM4; Reisz, JA; Gehrke, S; Stefanoni, D; D'Alessandro, A; Deutz, NEP; Drew, KL. *Metabolic tracing in vivo shows nitrogen recycling and myofibrillar breakdown in hibernation*. Nature Metabolism.
- Rice, SA; Mikes, M, Bibus, D; Berdyshev, Reisz, E, Gehrike, JA, Bronova S, S Bronova, D'Alessandro A, Drew KL, *Omega 3 Fatty Acids Stimulate Thermogenesis During Torpor in the Arctic Ground Squirrel*. Scientific Reports

#### Invited Presentations

- "Circadian Influence on Neuroprotection," Journal Club (7.24.2020).
- "The Science of Suspended Animation in Deep Space," virtual workshop hosted by Translational Research Institute for Space Health (TRiSH). Served on a 7-member panel that explored the potential use of synthetic torpor for long-term human space exploration applications through the examination of four research areas: natural torpor, synthetic torpor, torpor genetics, and metabolic control in space (8.7.2020).
- "Center for Transformative Research in Metabolism," Alaska INBRE Annual Virtual Retreat, Keynote speaker (10.3.2020).
- "Innovators in Action: Case Studies," sponsored by the National Institutes of Health Virtual Regional Seminar (10.30.2020). This panel of four women entrepreneurs discussed their tips, challenges, and experiences in developing their business models from start-up through commercialization.
- "UA Center for Transformative Research in Metabolism: Exploring New Translational Research Frontiers in Hibernation Science & Brain Health" sponsored by Alzheimer's Resource Agency of Alaska. Kelly Drew and Denise Daniello to present this virtual seminar on 11.18.2020.

#### Other

- Founder and Chief Science Officer (CSO) of BeCool Pharmaceuticals, LLC, a small molecule drug development company, focused on creating therapeutics to modulate metabolism and body temperature by mimicking mechanisms used in hibernation to provide emergency care for patients suffering cardiac arrest, neonatal hypoxic ischemic encephalopathy (HIE), spinal cord injury and stroke.

**Vadim Fedorov, PhD, PI, Post transcriptional mechanisms of muscle atrophy prevention in hibernating mammals (Project 1); Research Associate Professor, Institute of Arctic Biology, UAF.**

Research Support/Grants Submitted

- IDeA National Resource for Quantitative Proteomics (R24GM137786), *Service Award* (10.26.2020). Award will be used to access IDeA proteomic facilities to reveal differential expression in genes at the protein level in black bears during hibernation compared to summer active animals.

Manuscripts

- Goropashnaya AV, Barnes BM, Fedorov VB, *Transcriptional changes in muscle of hibernating arctic ground squirrels (Urocitellus parryii)*. Scientific Reports 2020 June 2;10(1):9010, doi: 10.1039/s41598-020-66030-9. PubMed PMID: 32488149; PubMed Central PMCID: PMC7265340.
- Modulation of gene expression and bone mass preservation in hibernating black bears. Manuscript in preparation, in collaboration with New Mexico INBRE. Plan to submit in December 2020.

Invited Presentations

- "Proteomics of Brown Bear," Journal Club (11.6.2020)

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**Khrys Duddleston, PhD, PI Microbial provision of essential amino acids: protein conservation in hibernation (Project 2); Professor and Director of Biological Sciences, UAA.**

Research Support/Grants Submitted

- National Institutes of Health, R01, *Toward microbial intervention for lean mass loss: The role of the gut microbiome in essential amino acid synthesis*, \$2,931,105; Role PI (Revised and resubmitted 7.5.2020, not funded, but plans to resubmit a revised application in February 2021).

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**Carl Murphy, PhD, Health and Metabolism Research Core (HaMR) Lead and Molecular Imaging Facility (MIF) Manager, UAF**

Manuscripts/Publications

- Gagne Kristin R., Ewers Sara C., Murphy Carl J., Daanen Ronald, Walter Katey. *Composition and photo-reactivity of organic matter from permafrost soils and surface waters in interior Alaska*. Royal Society of Chemistry 2020, June 22; 22:1525-1539, doi: [10.1039/DOEM00097C](https://doi.org/10.1039/DOEM00097C).

Invited Presentation

- Upcoming Journal Club presentation, Dr. Carl Murphy and Denise Daniello: *Targeting Signaling Proteins in Mice that Protect Against Muscle and Bone Loss During Space Flight* (Dr. Murphy) & *Social Determinants of Health and Challenges for Clinical Trials in Rural-Based Settings* (D. Daniello).

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**Brandon Briggs, PhD, Advanced Instrumentation for Microbiome Studies (AIMS) Core Lead and Assistant Professor for the Department of Biological Sciences, UAA.**

Research Support/Grant Submissions

- National Science Foundation Polar Programs, *ANT LIA: Collaborative Research: Genetic Underpinnings of Microbial Interactions in Chemically Stratified Antarctic Lakes*, \$1,017,158; 8.1.2020-5.31.2023 funding timeline; Role PI. Awarded.

### Manuscripts/Publications

- Dev Subhabrata, Sachan Ankur, Dehghani Fahimeh, Ghosh Tathagata, Briggs Brandon R., Aggarwal Srijan, *Mechanisms of biological recovery of rare-earth elements from industrial and electronic wastes: A review*. Chemical Engineering Journal, 2020 Oct 1 (397); doi.org/10.1016/j.cej.2020.124596.
- Bishop ME, Dong H, Glasser P, Briggs BR, Pentrak M., Stucki JW., *Microbially mediated iron redox cycling of subsurface sediments from Hanford Site, Washington State, USA*. Chemical Geology, 2020 July 20 (546); doi.org/10.1016/j.chemgeo.2020.119643.
- Srivastava Shreya, Dong Hailiang, Briggs Brandon R., *The Effect of Spring Water Geochemistry on Copper Proteins in Tengchong Hot Springs, China*. American Society for Microbiology, Applied and Environmental Microbiology, 2020 June 17; doi: 10.1128/AEM.00581-20.
- Zhang, Y, Qi X, Wang S., Wu G, Briggs BR, Jiang H, Dong H, Hou W., *Carbon fixation by photosynthetic mats along a temperature gradient in a Tengchong Hot Spring*. JGR Biogeosciences, 2020 June 3; doi.org/10.1029/2020JG005719.

### **Anya Goropashnaya, PhD, Research Scientist, TRiM Project 1 and Admin Core, UAF.**

#### Research Support / Grants Submitted

- Center for Transformative Research in Metabolism Pilot Project Pre-proposal, *Seasonal changes in skeletal muscles of arctic ground squirrels* (October 2020). Pending funding, Dr. Goropashnaya will utilize the immunohistochemistry muscle staining process under development for studying AGS skeletal muscle.
- IDeA National Resource for Quantitative Proteomics (R24GM137786), *Service Award* (10.26.2020). Award will be used to access IDeA proteomic facilities to reveal differential expression in genes at the protein level in black bears during hibernation compared to summer active animals. Dr. Vadim Fedorov received the award. Dr. Goropashnaya participated in the research and writing of the application along with Michelle Johannsen.

### Manuscripts/Publications

- Goropashnaya AV, Barnes BM, Fedorov VB. Transcriptional changes in muscle of hibernating arctic ground squirrels (*Urocitellus parryii*): Implications for attenuation of disuse muscle atrophy. Scientific Reports 2020 June 2;10(1):9010. PubMed PMID: 32488149; PubMed Central PMCID: PMC7265340.

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### **Øivind Tøien, PhD, Manager of Animal Instrumentation, HaMR Core, UAF**

#### Research Support / Grants Submitted

- Center for Transformative Research in Metabolism Pilot Project Pre-proposal, "Data mining: Role of Sleep and Cardiac Rhythms in a Large Hibernator" (October 2020).
- MOD 20 INBRE Special Request Opportunity (INBRE's carry forward), *Upgrades in Equipment and Supplies for the bioinstrumentation area in the HaMR Core* in the amount of \$10,450 on 10.16.2020. Outcome: Funding request was approved by INBRE and will be submitted to NIH for final approval. (Funding to be used to purchase upgraded software licenses for telemetry and to purchase supplies for producing 29 loggers for bear implants during MRI scans.) Dr. Kelly Drew is the PI for this project and received support from Dr. Tøien in preparation of the application.

**Bahareh Barati, PhD, Biostatistician, Admin Core, UAF**

Research Support / Grants Submitted

- Institute of Translational Health Sciences, Collaboration Innovation Award, "*Feasibility of using optical imaging for objective assessment of pain in a sample of chronic pain patients*," \$49,950, Dr. Barati and Dr. Kelly Drew are Co-PIs for this project (Submitted August 2020, pending)

Invited Presentation

- *Using a multimodal near-infrared spectroscopy and MRI to quantify gray matter metabolic rate for oxygen: A hypothermia validation study.* Journal Club, 9.11.2020

Other

- Founder and CEO of Barati Medical, LLC, a company specializing in developing neuroimaging technology for small lab animals to enhance preclinical neuroscience research.