Penn Medicine
Perelman School of Medicine
University of Pennsylvania Health System

Penn Diabetes Research Center
Rodent Metabolic Phenotyping Core
Director: Joseph Baur, Ph.D.
Technical Director: Jennifer Rojas, Ph.D.

***In Vivo* Mouse Metabolic Services Request Form For Academic Investigators**

Researcher's note: Penn Diabetes Research Center Rodent Metabolic Phenotyping Core users should arrange for the transfer of their animals to the RMPC protocol #804474, using the ULAR transfer form. RMPC users will be billed for per diem costs. Please contact the Technical Director, Jennifer Rojas at Jennifer.Rojas@pennmedicine.upenn.edu.

Lab/PI:	**Requestor:**
Phone:	**Request Date:**
Email:	**Account Number:**

Please consider your experimental design before submitting your request—if you require a certain test to be done within a specific time frame, please notify us in advance.

Energy Homeostasis:			
Assays for mice	Sample number	Cost per mouse	Total
NMR (Body fat, lean mass, body water); *Performed on live, un-anesthetized animals		$40	
NMR (performed by investigator)		$25*	
*Requires training on use of NMR system		$50 one-time fee	
DEXA (Body fat, lean mass, bone mass); *Performed on anesthetized animals		$50	
Columbus Instruments Comprehensive Lab Animal Monitoring System (CLAMS): 20 cage thermal cabinet system with center feeder presenting powdered food and automated watering system.			
Standard Service: 1 day acclimation + 2 days of metabolic measurements: VCO2, VO2, energy expenditure (heat), substrate utilization (RQ), food and water intake, ambulatory and locomotor activity. Includes NMR body composition measurement. Raw data CSV files and Calr data report provided.		$150	
Treadmill exercise + metabolic measurements: VCO2, VO2, heat, RQ		$75	
Metabolic measurements following adrenergic agonist stimulation (NE or CL)		$75	
Sable System Promethion Multiplex System: Acclimation cages and 16 cage thermal cabinet system with home cage environment, which includes water bottles and food hoppers.			
Standard Service: 1 day acclimation + 5 days of metabolic measurements: VCO2, VO2, energy expenditure (heat), substrate utilization (RQ), food and water intake, pedestrian activity, water loss and ethoscan automated behavior analysis (monitoring of animal activity and interactions with cage sensors). Includes NMR body composition measurement. Full report provided as a one-click macro 5 min bin analysis.		$200	

If one or all three optional services included in the standard service: 1) **Promethion running wheel module:** Incorporates a stainless-steel wheel into the cage for monitoring of voluntary wheel revolutions. Designed to integrate with calorimetry, the wheel count data can easily be synchronized with other metabolic parameters. 2) **Promethion Metabolic Screening Body Weight Module:** In-cage enrichment device attached to a Promethion universal MM-1 load cell. The body weight monitor allows the real time recording of body weight when the animal interacts with the device. 3) **Promethion FAC-1 Access Control Module:** Provides computer-controlled, automated access to food hopper in order to restrict feeding at designated time intervals during calorimetry run.		$250	
Stable Isotope Gas Analyzer: Measures the oxidation of both exogenous and endogenous nutrients by allowing simultaneous measurement of stable isotope tracers ($^{13}CO_2$ and $C^{18}O_2$) synchronously with the Promethion data stream.		Please inquire	
		Total $	

Metabolic Measurements:			
Assays for mice	Sample number	Cost per mouse	Total
DSI Implantable Telemetry Monitoring: Service includes probe implantation surgery, probe removal, data acquisition, and a DSI probe refurbishment fee (the cost will be deducted for investigators who provide their own probes).			
HD-XG: Continuous measurements of blood glucose, temperature and activity monitoring for 1 week. Minimum weight for probe implantation: IP device placement is 25 g; SC device placement is 19 g.		$900	
HD-X11: Continuous measurements of blood pressure, ECG, heart rate, temperature and activity monitoring for 1 week. Please inquire further regarding option for ECG analysis/interpretation. Minimum weight for probe implantation: IP device placement is 25 g; SC device placement is 19 g.		$900	
			Total$

Temperature Monitoring:			
Assays for mice	Sample number	Cost per mouse	Total
Cold tolerance test (22ºC vs. 4ºC) combined with core body temperature or BAT temperature measurements		$50	
Continuous core body temperature measurements via Anipill capsule peritoneal implants for 2 weeks		$200	
BAT temperature measurements via subcutaneous implants		$5/day	
FLIR Thermal Imaging (22ºC vs. 4ºC)		$50	
Blood Pressure Measurements:			
Non-invasive blood pressure and heart rate (tail cuff method)		$50	
Lipid Metabolism:			
In vivo fatty acid uptake assay (R-2-Bromopalmitic acid [9,10-3H])		Please inquire	
In vivo triglyceride production rate		$250	
Other:			
Manual measurement of body weight, food intake and/or supply of special diet/water		$2/day	
Grip strength testing		$40	
Retro-orbital injection		$50	
Oral gavage		$5	
Per Diem Cage Cost		$0.99/day	
		Total $	

Glucose Metabolism:			
Assays for mice	Sample number	Cost per mouse	Total
Glucose tolerance test (intraperitoneal)		$30	
Insulin tolerance test (intraperitoneal)		$30	
Pyruvate tolerance test (intraperitoneal) (Gluconeogenesis)		$40	
In vivo insulin signaling (Bolus IV insulin injection + tissue harvesting)		$50	
Costs for individual surgical services: Users are only charged for successful surgeries (animals healthy and functional, patent catheters):			
Arterial or jugular catheterization		$100	
Arterial and jugular catheterization		$175	
Clamp procedures in the conscious, un-restrained rodent (includes surgery, analysis and hormones):			
Stable isotope infusions		$250	

Hyperinsulinemic-euglycemic clamp: *This procedure will allow investigators to assess whole-body insulin action via the glucose infusion rate (GIR).*		$250	
Hyperinsulinemic-euglycemic clamp with [3-^{3}H]: *This procedure will allow investigators to assess whole-body insulin action (GIR) and to distinguish between insulin's effect on endogenous glucose production (EndoRa) and glucose utilization (Rd).*		$500	
Hyperinsulinemic-euglycemic clamp with [3-^{3}H] and [^{14}C] deoxyglucose: *This procedure will allow investigators to assess whole-body insulin action (GIR) and to distinguish between insulin's effect on endogenous glucose production (EndoRa), glucose utilization (Rd) and to examine insulin's effect on specific tissues (Rg; muscle, fat, heart, brain).*		$625	
Hyperglycemic clamp: *This procedure will allow investigators to test the secretory capacity of pancreatic β-cells by monitoring insulin and C-peptide levels.*		$250	
			Total $

*Please carefully consider your sample size for the glucose clamp studies based on power calculations. For example: A power calculation (α=0.05, power 80%) performed with published data from clamp studies in germ-line altered mice (mean difference: 25; SD: 15) suggests that an n of 6 will detect a 25% change in hepatic glucose production. Therefore, 8 animals per group will typically be studied to account for potential catheter failures. We will ensure equal representation of the various groups on individual study days.

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Please consider the following guidelines when determining whether co-authorship is warranted for core personnel: https://abrf.org/authorship-guidelines.