MoTrPAC Data Hub: Multi-omic, Multi-tissue Collection of Exercise Molecular Responses in Young Adult Rats

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The Molecular Transducers of Physical Activity Consortium (MoTrPAC) aims to map the molecular response to exercise, enhancing understanding of its role in health and disease prevention. The consortium's first study offers an temporal map of the dynamic multi-omic response to endurance exercise training across various tissues from young adult rats. The MoTrPAC data hub (https://motrpac-data.org), provides extensive multi-omic data with advanced tools for exploration and analysis. This hub comprises 211 datasets across 19 tissues, including transcriptomics, epigenomics, proteomics, and metabolomics, covering 25 molecular assays and five time points—one control and four training—in young male and female animals.

The data hub also includes physiological parameters through training, including body composition, VO2 data, tissue fiber distribution, etc. These data could provide insight into molecular and physiological relationships at different levels of regulation, offering access to researchers across various fields of study. This dataset presents a perspective on the relationship between different metabolic parameters and provide researchers with the resources to investigate and compare their experimental results to this existing data. For investigators interested in researching physiology independent of exercise, the control group offers a baseline for comparison in a diverse range of potential projects.

The hub includes the complete workflow, source code for data processing, quality control, specialized pipelines for multi-omics analysis, and sophisticated visualization tools, enabling comprehensive examination and interrogation of the molecular effects of endurance exercise. To facilitate access, the hub includes a range of video and text tutorials, making it easy for researchers, regardless of their background, to dive into the data, uncover overarching trends, and explore points of interest.

Whether investigating molecular mechanisms, exploring physiological adaptations, or studying disease prevention, the MoTrPAC Data Hub offers the tools and data necessary to drive new discoveries and advance our understanding of the complex interplay between exercise and health.