Source depot and dietary status influence adipocyte oxidative phosphorylation capacity

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Three options to characterize mitochondrial bioenergetics

1. Dissection of white fat depots
2. Isolation of primary mature white adipocytes
3. Respirometry

- 1. Permeabilized adipocytes
  - Oxygraph-2k
  - OROBOROS Instruments

- 2. Intact adipocytes

- 3. Isolated mitochondria
  - Extracellular Flux Analyzer
  - Seahorse Bioscience
Two source depots: subcutaneous vs. intraabdominal

Posterior-subcutaneous

Epididymal
Isolation of mature adipocytes

A Collagenase digestion
B
C
D Centrifugation
E
F
G 3 washing steps
Respirometry of intact vs. permeabilized fat cells

Graph showing oxygen concentration over time for intact and permeabilized adipocytes.
Model: diet induced obesity + decreased glucose tolerance

C57BL/6N mice

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<th>Age [weeks]</th>
<th>HFD</th>
<th>CD</th>
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n = 38
n = 41

Body mass

Blood glucose [mg/dl]

oral glucose tolerance test
Obesity reduces adipocyteOXPHOS capacity adipocytes

inguinal

epididymal
Obesity reduces adipocyte OXPHOS capacity adipocytes
Reduced OXPHOS capacity does not cause glucose intolerance

**inguinal**

**epididymal**
Summary

Bioenergetic profiling on the level of...

- intact adipocytes
- permeab. adipocytes
- isolated mitochondria

...yields complementary data. There is no one optimal level.

Reduced OXPHOS capacity in adipocytes is a hallmark of obesity.

Reduced OXPHOS capacity in adipocytes does not cause glucose intolerance (alone).

Acknowledgements

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