

Services Offered

- 1) **Skeletal Muscle - Isolate mitochondria**
Liver – Isolate mitochondria
- 2) **Integrated Mitochondrial Function - Oxidative Phosphorylation**
Skeletal Muscle / Liver Mitochondria
- 3) **Analysis of the Electron Transport Chain (ETC)**
Skeletal Muscle (fresh or frozen), Liver (fresh or frozen), Heart (frozen), and Brain (frozen)

OXIDATIVE PHOSPHORYLATION: DISEASES UNCOVERED

- Complex I Deficiency
- Complex II Deficiency
- Complex IV Deficiency
- Complex III or Complex IV Deficiency
 - * OXPPOS defect BUT velocity of ETC in the control range
- Substrate Utilization
 - * Pyruvate oxidation selective defect
 - ◆ PDH activity
 - ◆ Pyruvate transporter
- TCA cycle defect
- Defect in fatty acid oxidation
 - * Long-Chain / Medium-Chain
- Phosphorylation system—
 - * Adenine Nucleotide Tranlocase
 - * Phosphate Transporter
 - * Complex V—ATPase

Team Members

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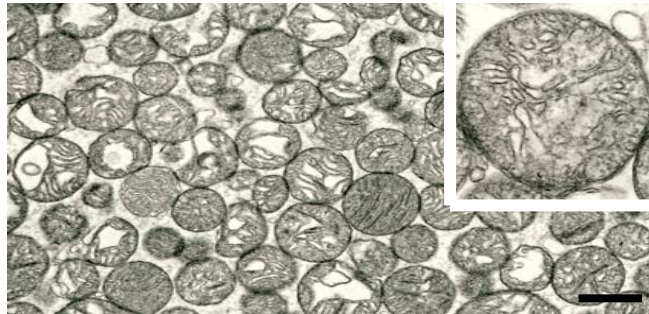
Center for Inherited Disorder of Energy Metabolism (CIDEM)

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Normal Isolated Human Skeletal Muscle Mitochondria



Center for Mitochondrial Diseases

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Among the nation's leading academic medical centers, University Hospitals Case Medical Center is the primary affiliate of Case Western Reserve University School of Medicine, a nationally recognized leader in medical research and education.



CIDEM

Center for Inherited
Disorders of Energy
Metabolism

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Mitochondrial Diseases Skeletal Muscle



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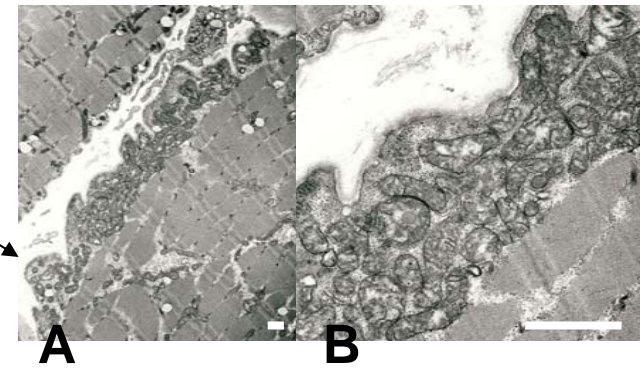
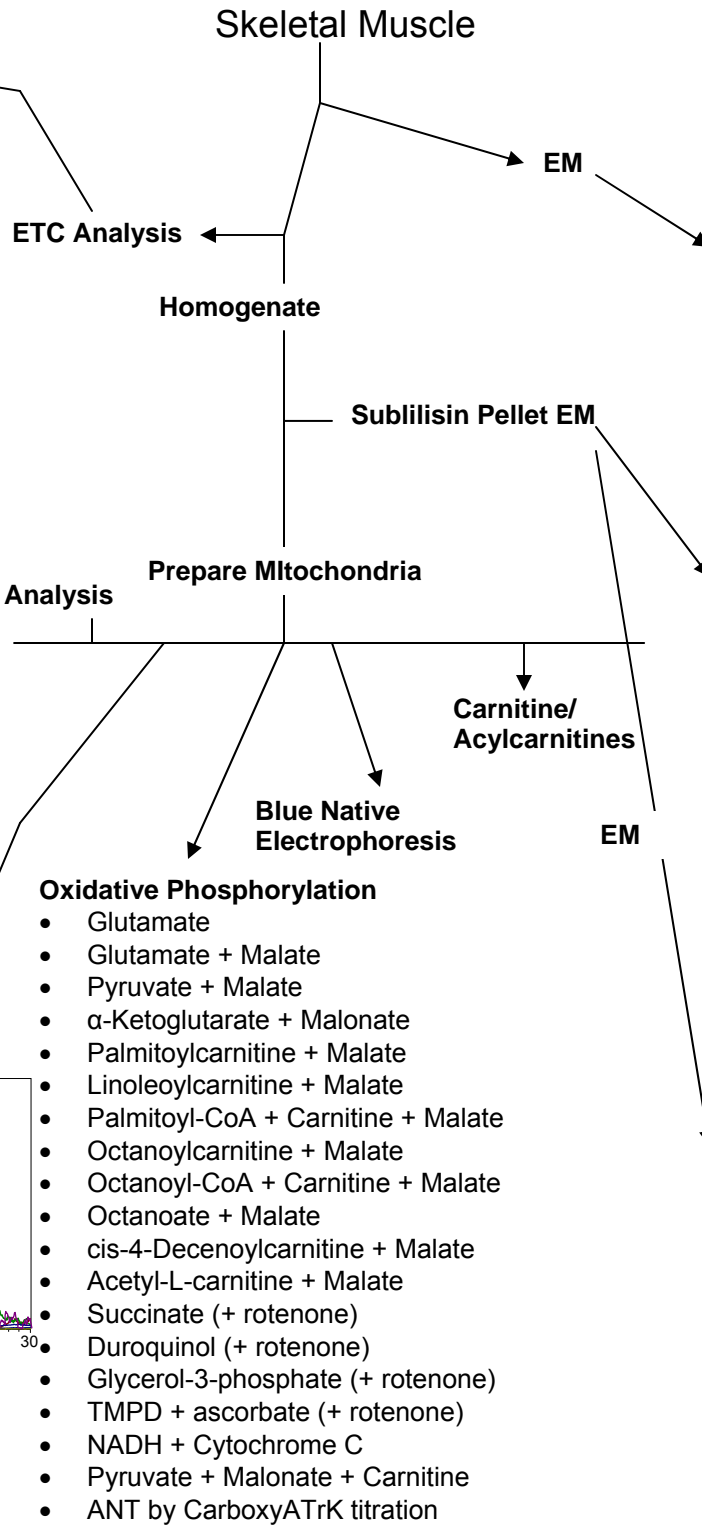
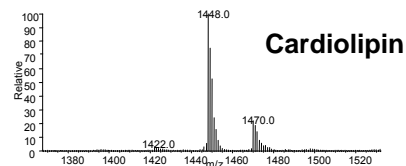
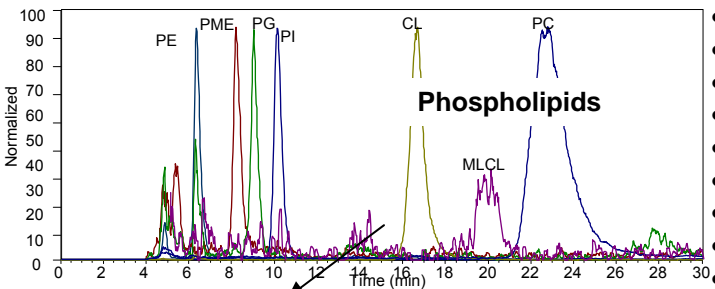
ELECTRON TRANSPORT CHAIN ANALYSIS

Skeletal Muscle, Liver, Heart, Brain

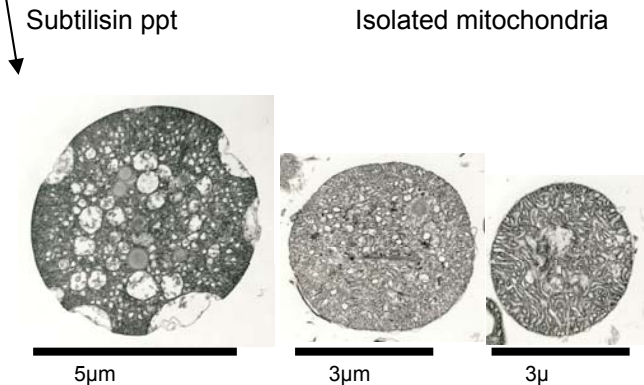
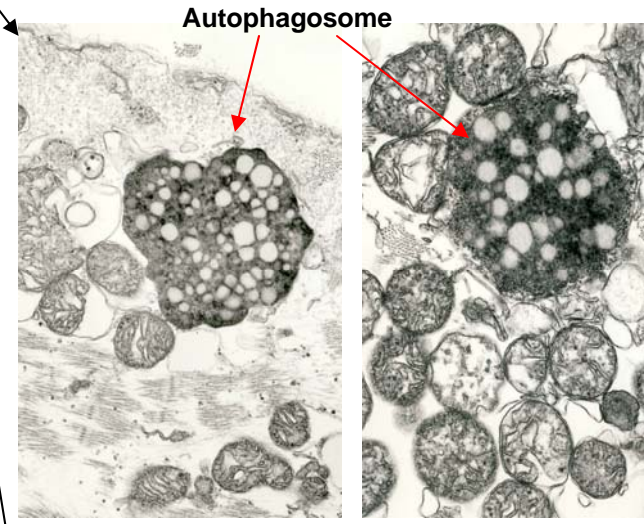
- Complex I/III linked
- NADH-Cytochrome c Reductase (rotenone-sensitive)
- Complex II/III linked
- Succinate - Cytochrome c Reductase (antimycin A sensitive)
- Complex III
- Decylubiquinol - Cytochrome c Reductase (antimycin A sensitive)
- Cytochrome c Oxidase (cyanide sensitive)
- NADH-Ferricyanide Reductase (first 3 proteins of Complex I)
- Succinate Dehydrogenase
- Citrate Synthetase
- Lactate Dehydrogenase
- Calculate Mitochondrial protein content (mg/g wet weight muscle)

Isolated Skeletal Muscle Mitochondria (and Liver)

- Complex I
- * NADH-Decylubiquione Reductase (rotenone-sensitive)
- Complex II ± duroquinone
- Complex I/III linked
- * NADH-Cytochrome c Reductase (rotenone-sensitive)
- Complex II/III linked
- * Succinate - Cytochrome c Reductase (antimycin A sensitive)
- Complex III
- * Decylubiquinol - Cytochrome c Reductase (antimycin A sensitive)
- Cytochrome c Oxidase (cyanide sensitive)
- NADH-Ferricyanide Reductase (first 3 proteins of Complex I)
- Succinate Dehydrogenase
- Citrate Synthetase



A. SSM aggregation. B. Higher magnification of A. Individual organelles are pleomorphic and possess distorted cristae. One mitochondrion has a lipid droplet-like structure inside the organelle. Bars=1µm



Three large mitochondria, 5.57µm, 3.7µm, and 3µm, found in a subtilisin pellet.

- Oxidative Phosphorylation**
- Glutamate
 - Glutamate + Malate
 - Pyruvate + Malate
 - α-Ketoglutarate + Malonate
 - Palmitoylcarnitine + Malate
 - Linoleoylcarnitine + Malate
 - Palmitoyl-CoA + Carnitine + Malate
 - Octanoylcarnitine + Malate
 - Octanoyl-CoA + Carnitine + Malate
 - Octanoate + Malate
 - cis-4-Decenoylcarnitine + Malate
 - Acetyl-L-carnitine + Malate
 - Succinate (+ rotenone)
 - Duroquinol (+ rotenone)
 - Glycerol-3-phosphate (+ rotenone)
 - TMPD + ascorbate (+ rotenone)
 - NADH + Cytochrome C
 - Pyruvate + Malonate + Carnitine
 - ANT by CarboxyATRk titration