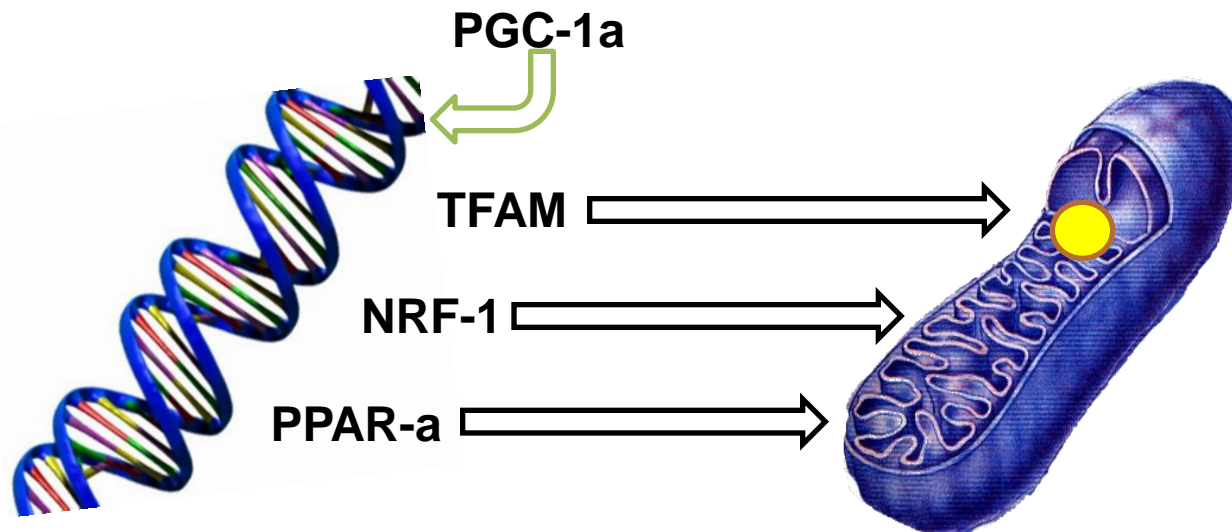
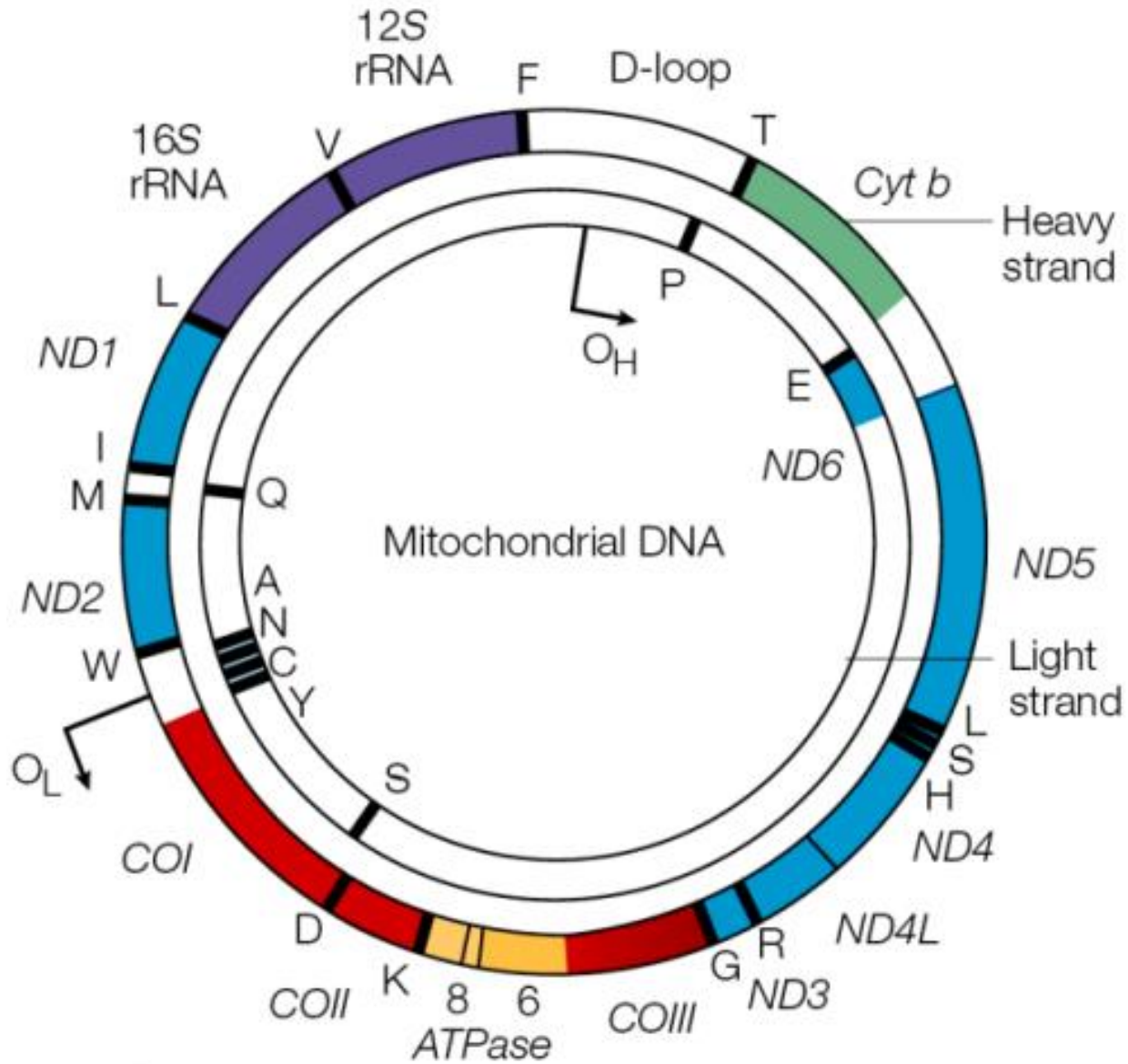


The Mitochondrial Transcription Factor and the Interaction on Cell Aging



Marcelo Ferro

*University São Judas Tadeu
São Paulo Brazil*



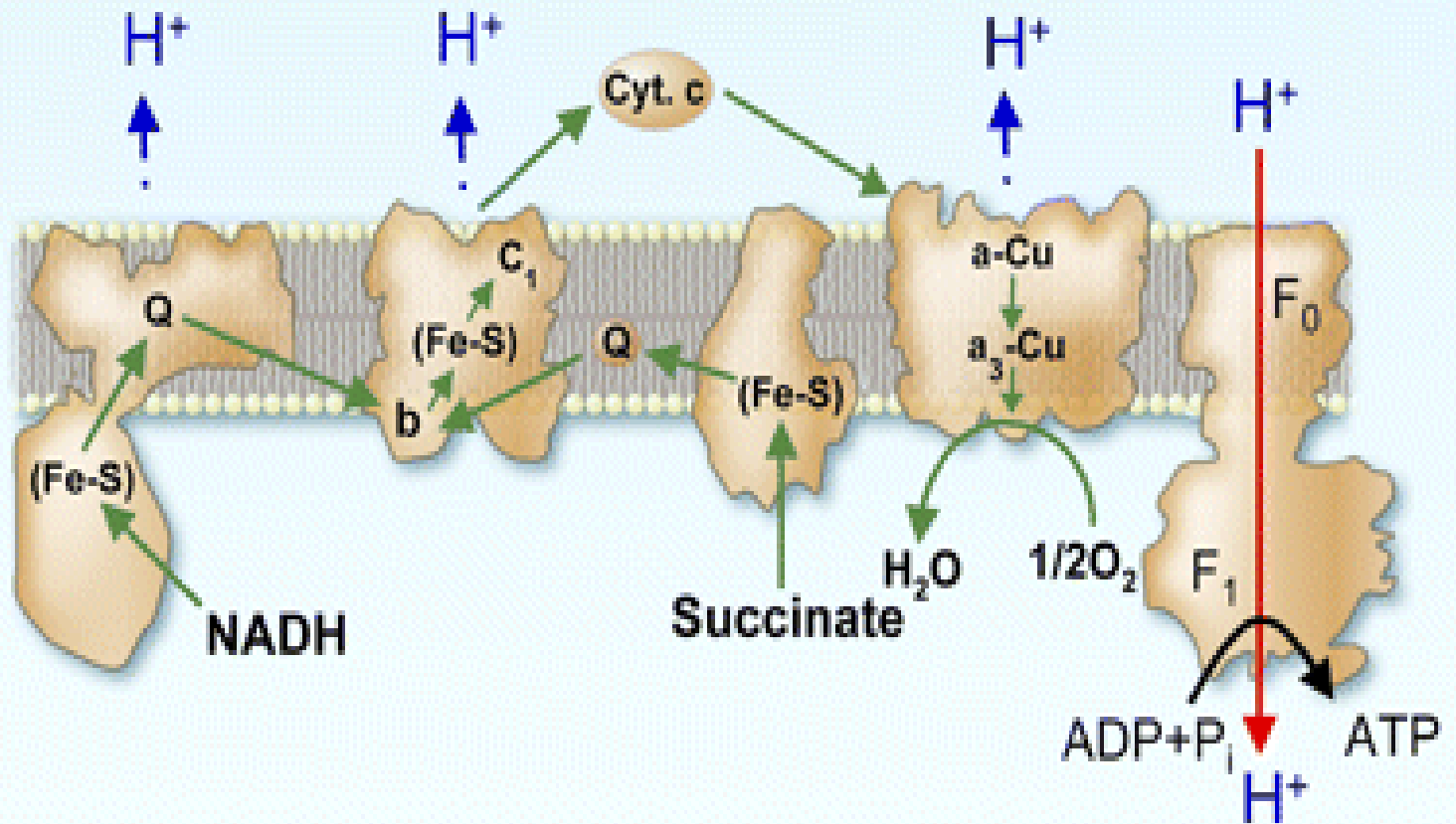
Mitochondrial DNA:

• The mitochondria are not completely autonomous and require nuclear encoded proteins for their optimal function.

- 37 genes
- 16.569 base pairs (3.3 billion in nucleus)
- **13 genes encode protein subunits of mitochondrial respiratory complex**
- 22 tRNA
- 2 rRNA

Complex I Complex III Complex II Complex IV Complex V

mtDNA	7	1	0	3	2
nDNA	39	10	4	10	14



Metabolic Syndrome

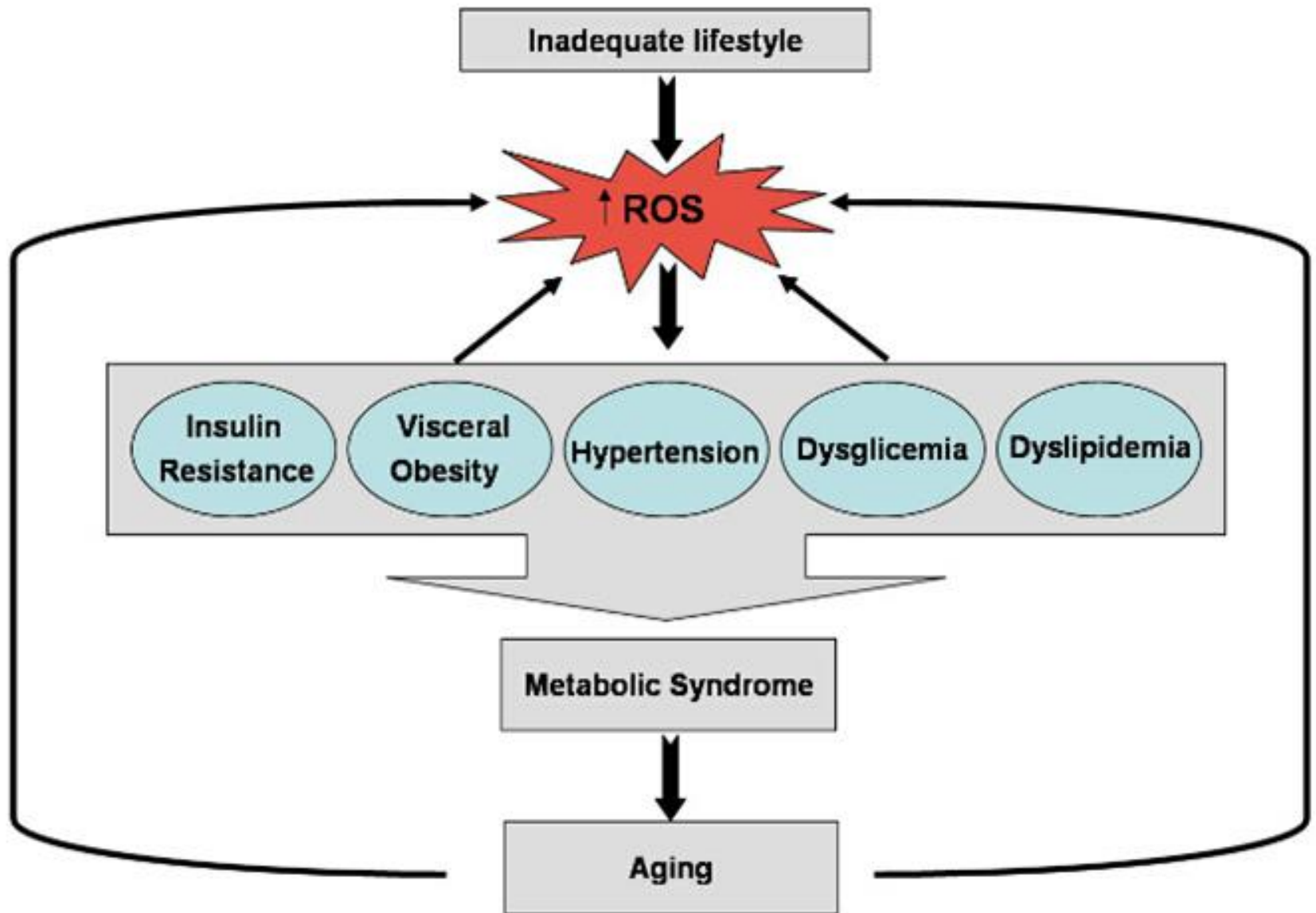
A major health challenge of the twenty-first century.

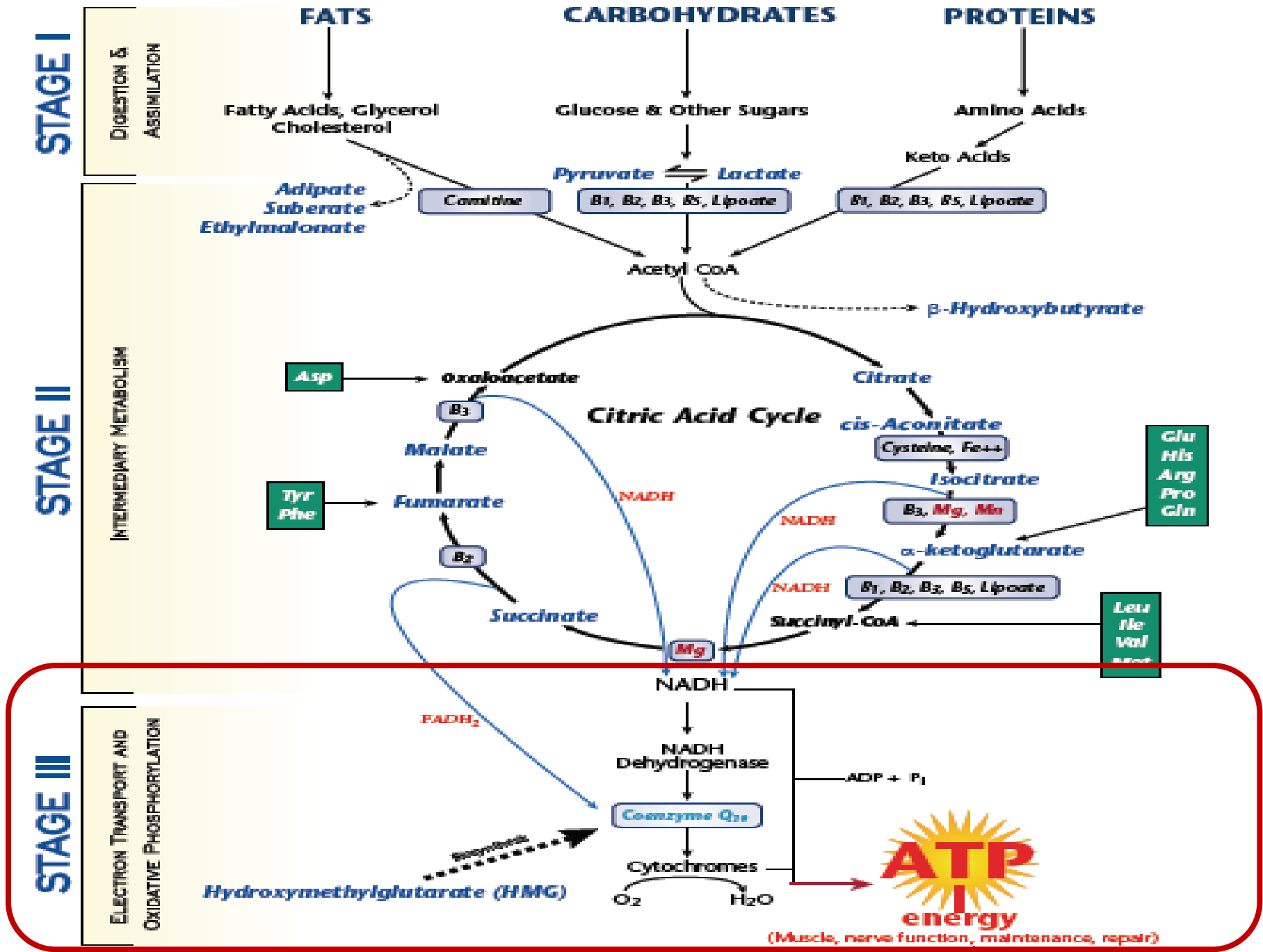
Molecular
Understanding
Aging



How it is
regulated by diet

Aging Dis. 2015 Mar 10;6(2):109-20. doi: 10.14336/AD.2014.0305. eCollection 2015.
Metabolic syndrome, aging and involvement of oxidative stress.
Bonomini F, Rodella LF, Rezzani R





Many authors say that ageing-related diseases are linked to mitochondrial disturbance; for example:

- Mitochondrial dysfunction
- High ROS and damage mtDNA

Parkinson disease (PD)

Alzheimer disease (AD)

Many authors say that ageing-related diseases are linked to mitochondrial disturbance; for example:

- Alterations of mitochondrial functionality

Obesity

Type II diabetes mellit.

Many authors say that ageing-related diseases are linked to mitochondrial disturbance; for example:

- Alteration of the energy capacities of the cell
- Alteration on OXPHO and mtDNA mutation.

General Cancer

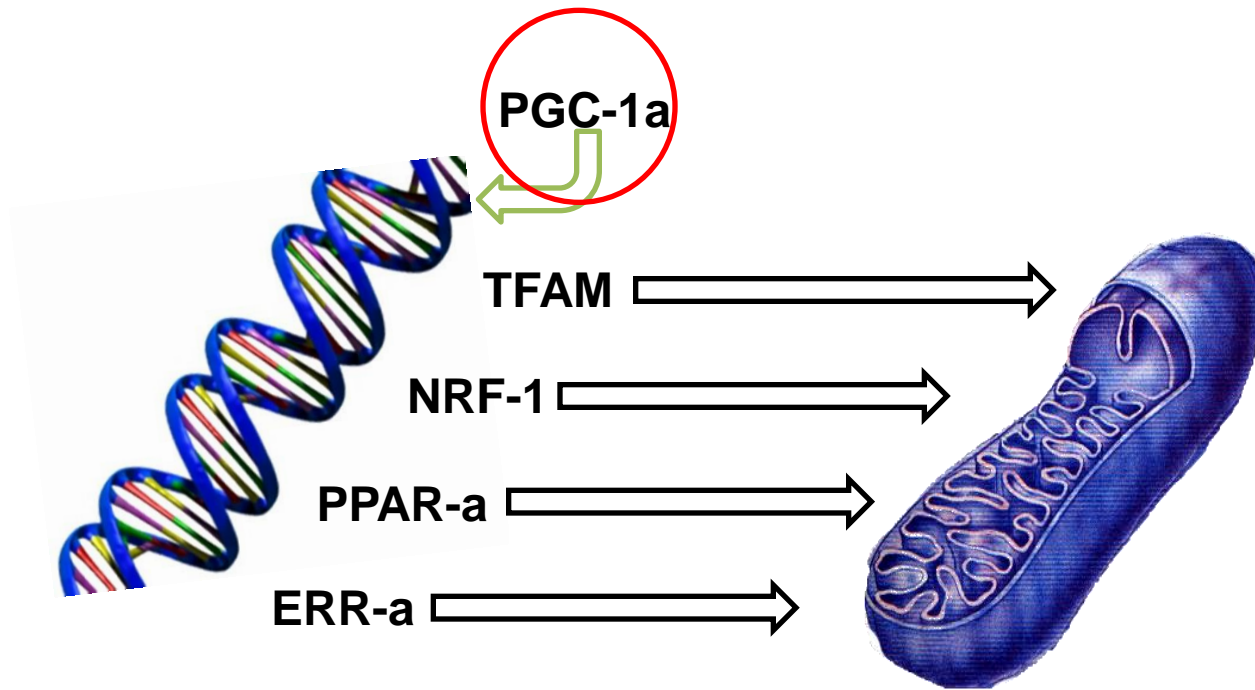
World J Stem Cells **2015** Mar 26;7(2):418-27. doi: 10.4252/wjsc.v7.i2.418.
Mitochondria as therapeutic targets for cancer stem cells.
Song IS, Jeong JY, Jeong SH, Kim HK, Ko KS, Rhee BD, Kim N, Han J

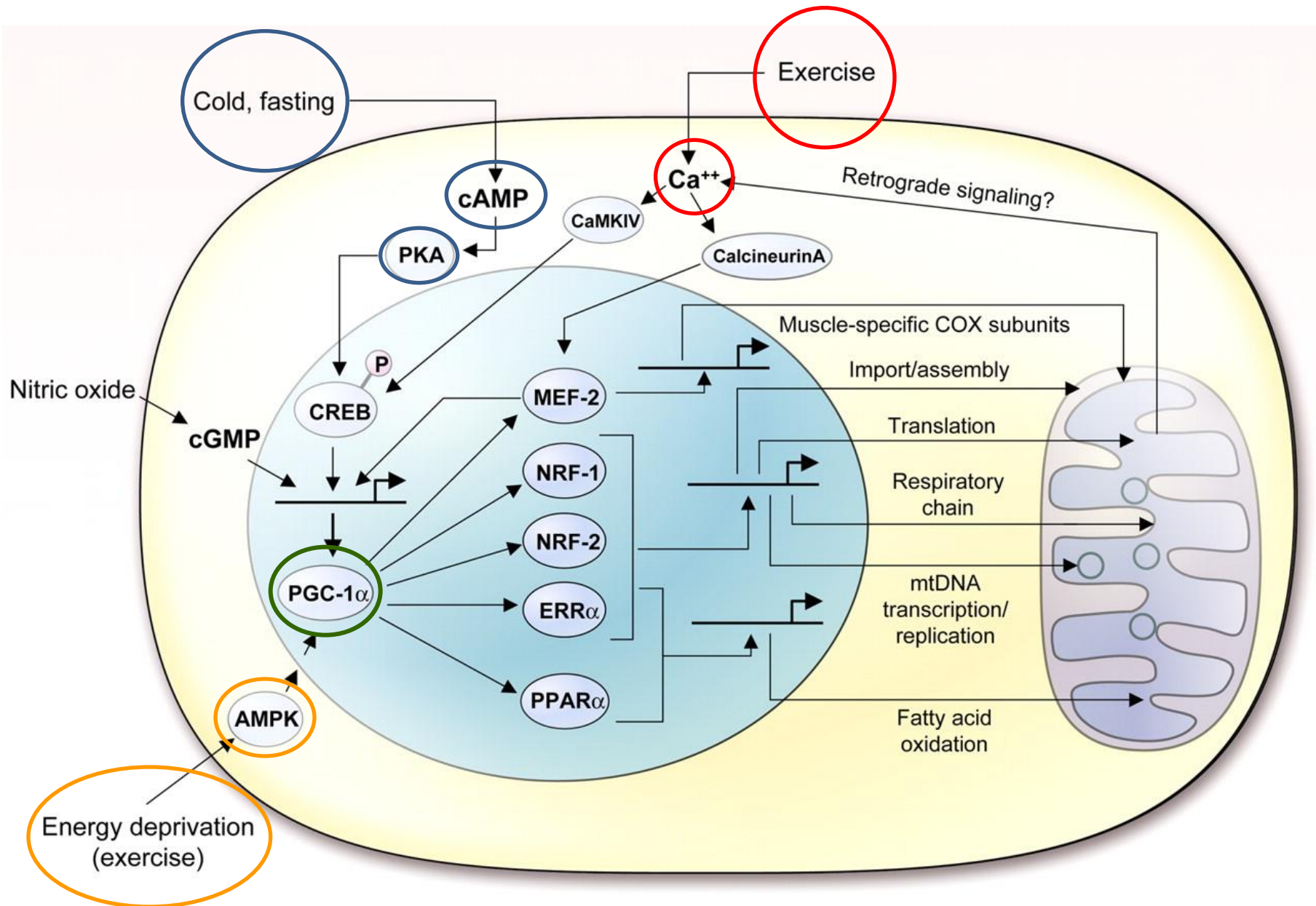
Many authors say that ageing-related diseases are linked to mitochondrial disturbance; for example:

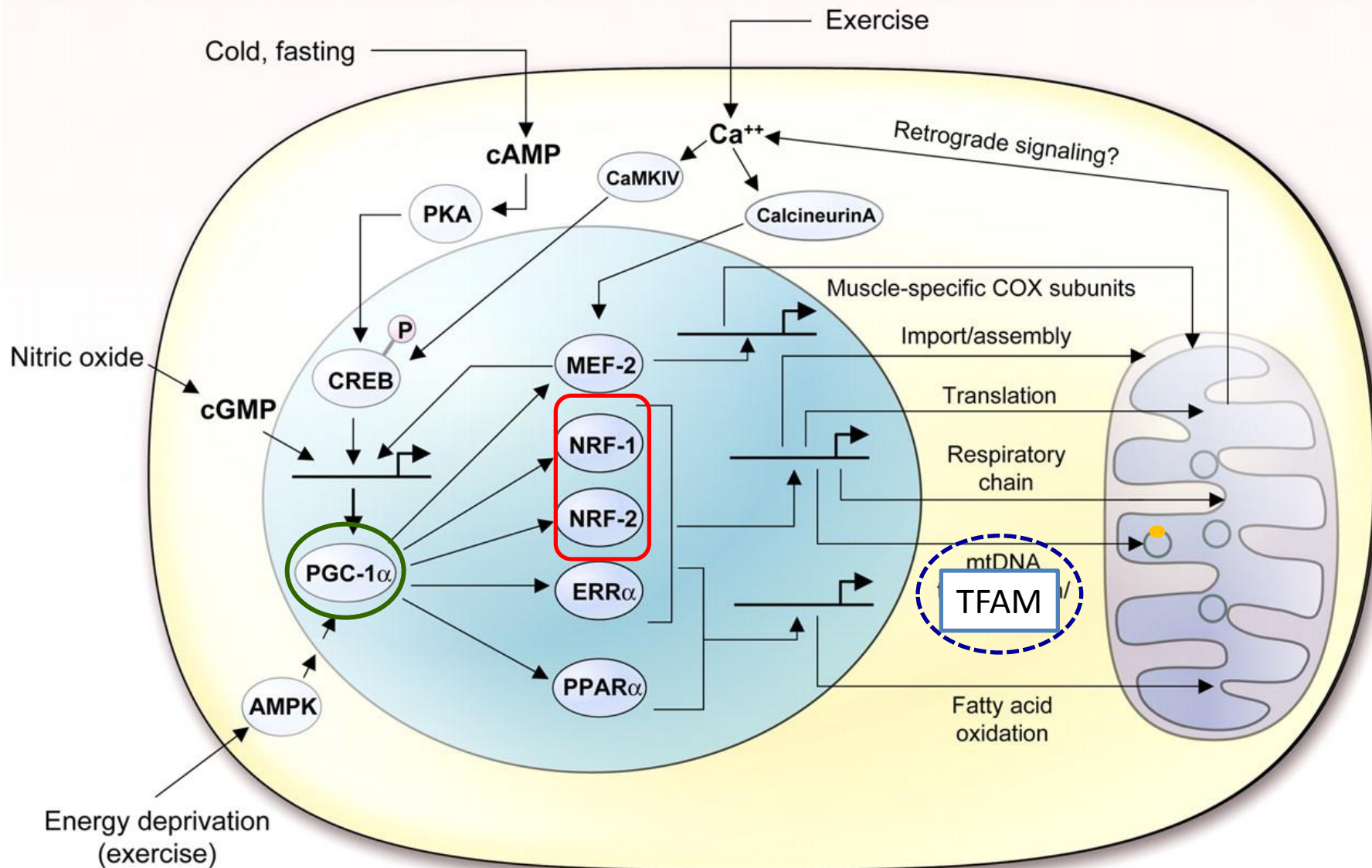
- Diminished energy supply
- ATP synthase capacity reduced

Congestive heart failure

Mitochondrial Transcription Factor:





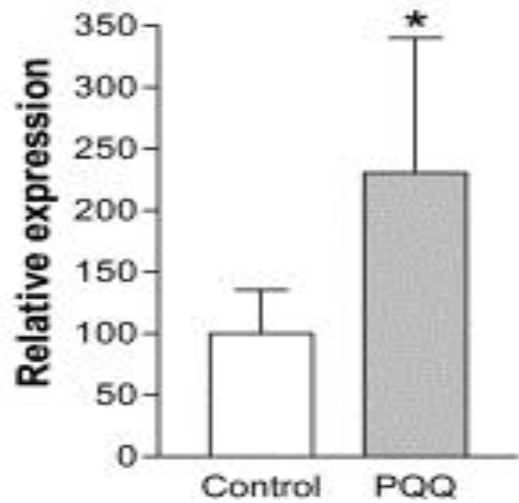
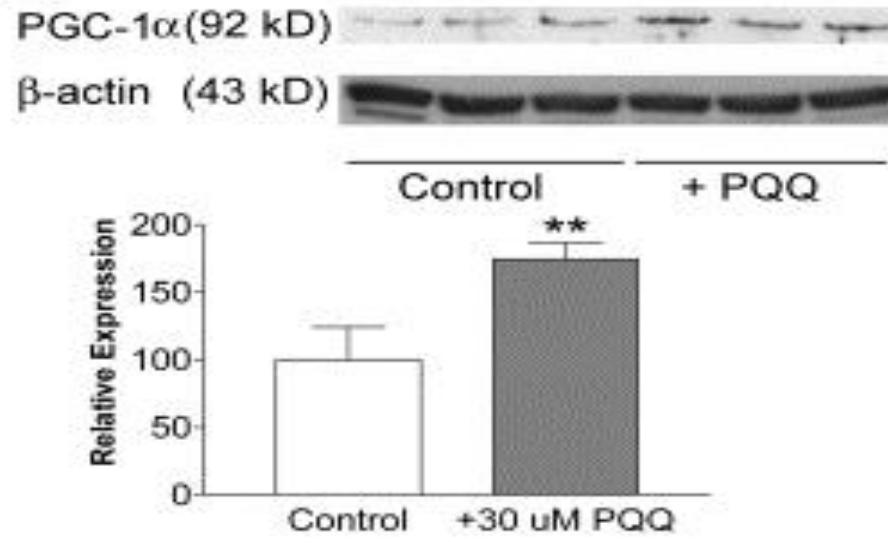
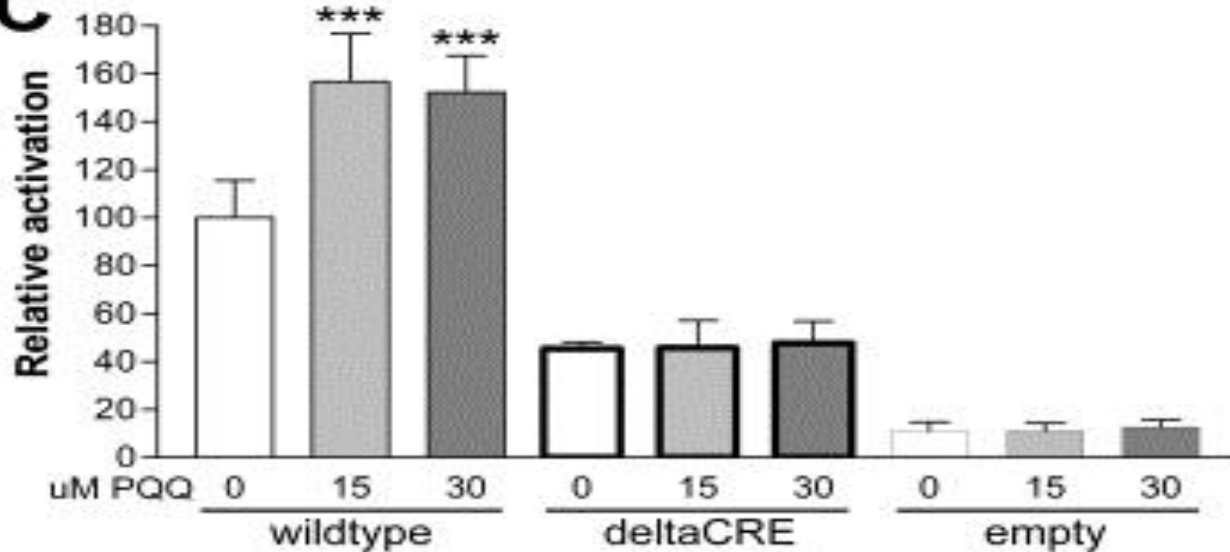


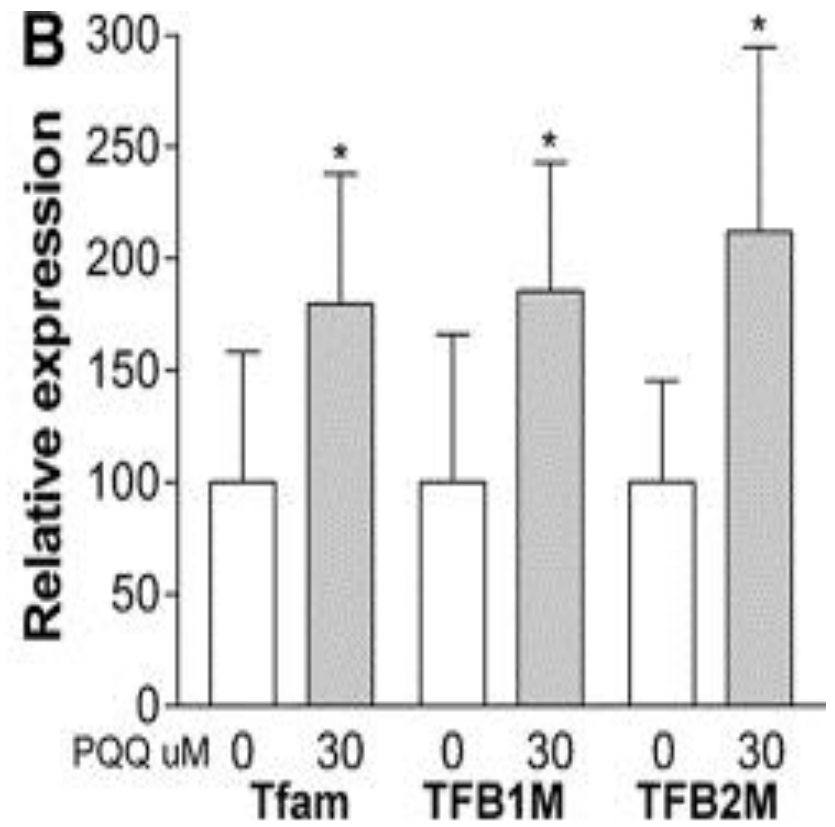
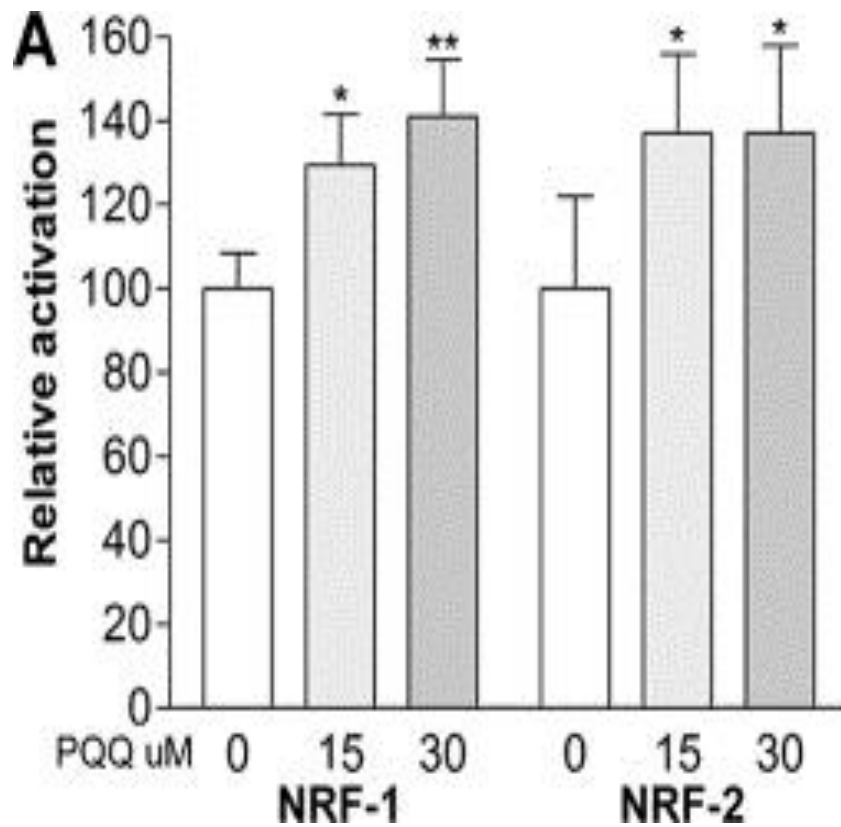
Nutritional Supplement on Mitochondrial Biogenesis

Pyroquinoline quinone (PQQ)

Previous studies show that PQQ influences **PGC-1 α** activity, which is a major mechanism for the regulation of mitochondrial biogenesis in **mouse hepatocytes**.

J Biol Chem. 2010 Jan 1;285(1):142-52. doi: 10.1074/jbc.M109.030130. Epub 2009 Oct 27.
Pyroloquinoline quinone stimulates mitochondrial biogenesis through cAMP response element-binding protein phosphorylation and increased PGC-1 α expression.
Chowanadisai W, Bauerly KA, Tchapanian E, Wong A, Cortopassi GA, Rucker RB

A**B****C**



Nutritional Supplement on Mitochondrial Biogenesis

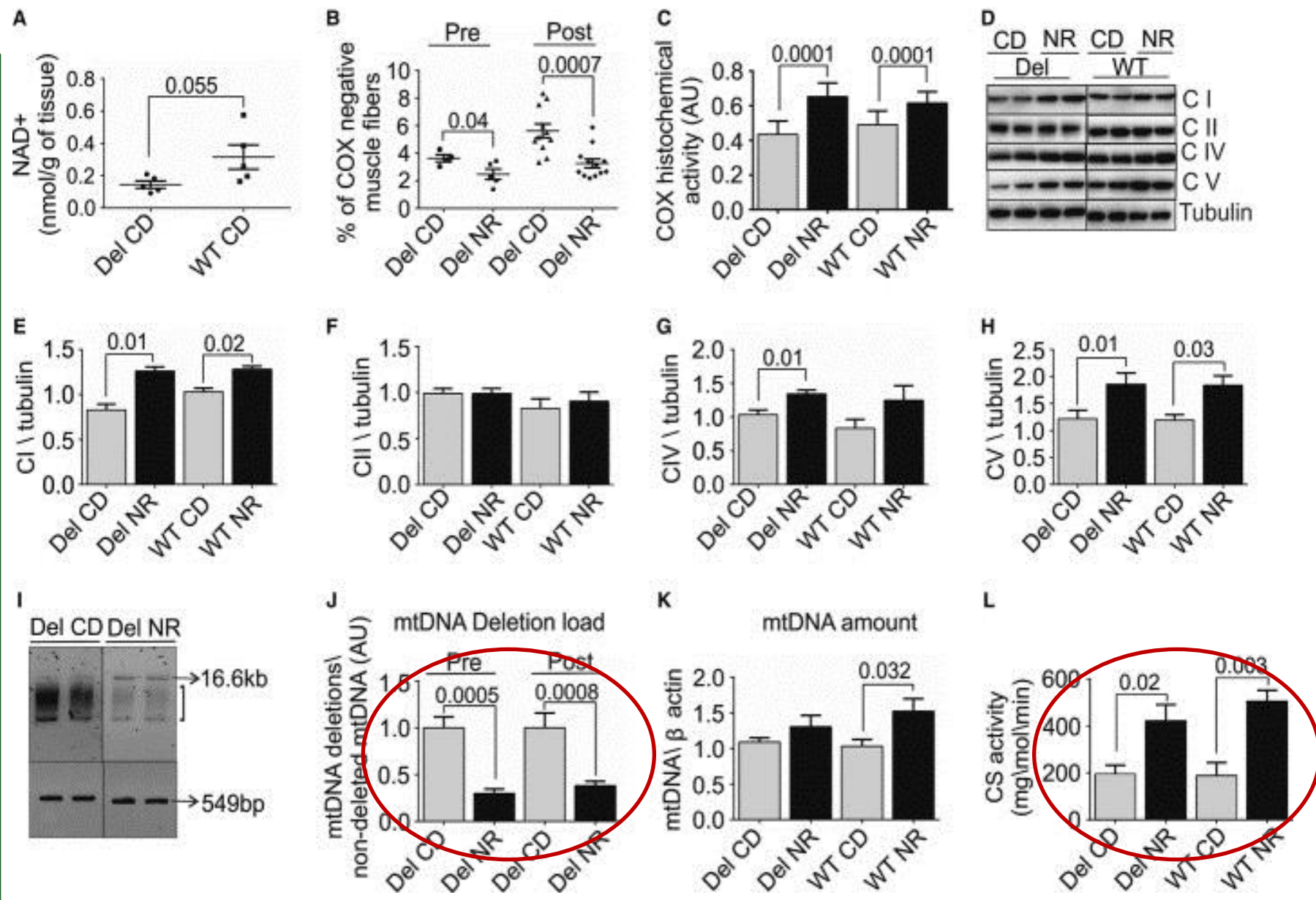
Nicotinamide riboside

- Supplementation with nicotinamide riboside 400mg/kg/day significantly increased mitochondrial biogenesis in **muscle** and **brown tissue** and prevented ultrastructural abnormalities in mitochondrial proteins and **mtDNA deletion**.

EMBO Mol Med. 2014 Apr 6;6(6):721-31. doi: 10.1002/emmm.201403943.

Effective treatment of mitochondrial myopathy by nicotinamide riboside, a vitamin B3.

Khan NA, Auranen M, Paetau I, Pirinen E, Euro L, Forsström S, Pasila L, Velagapudi V, Carroll CJ, Auwex J, Soumalainen A



Nutritional Supplement on Mitochondrial Biogenesis

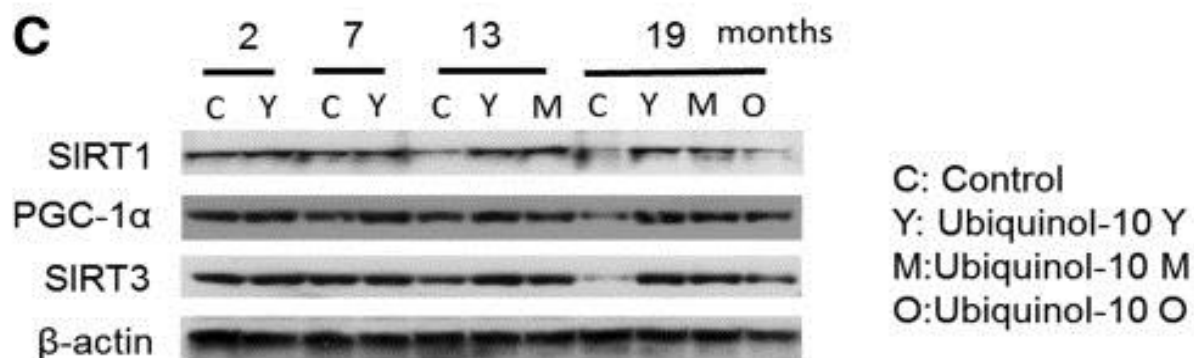
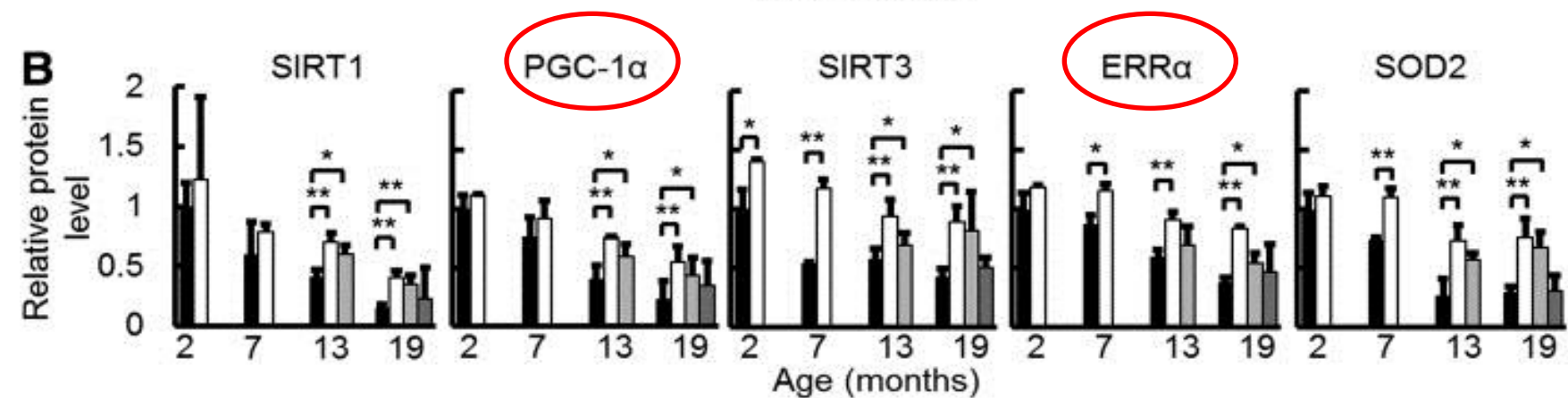
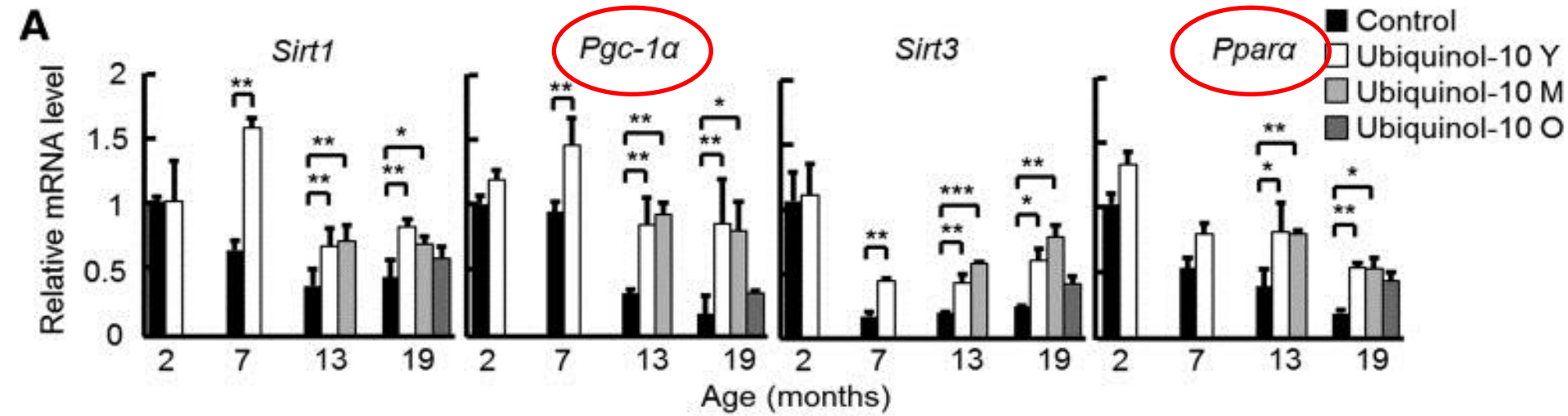
Ubiquinol

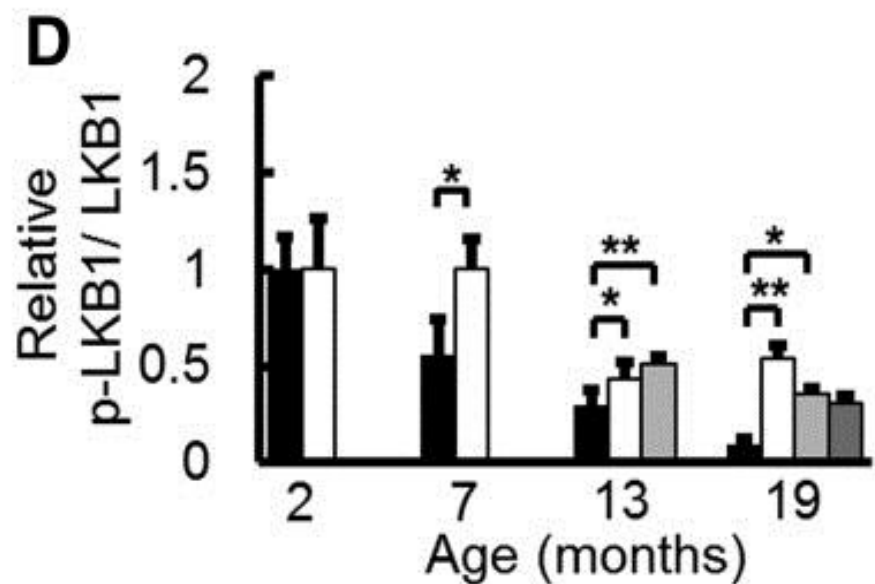
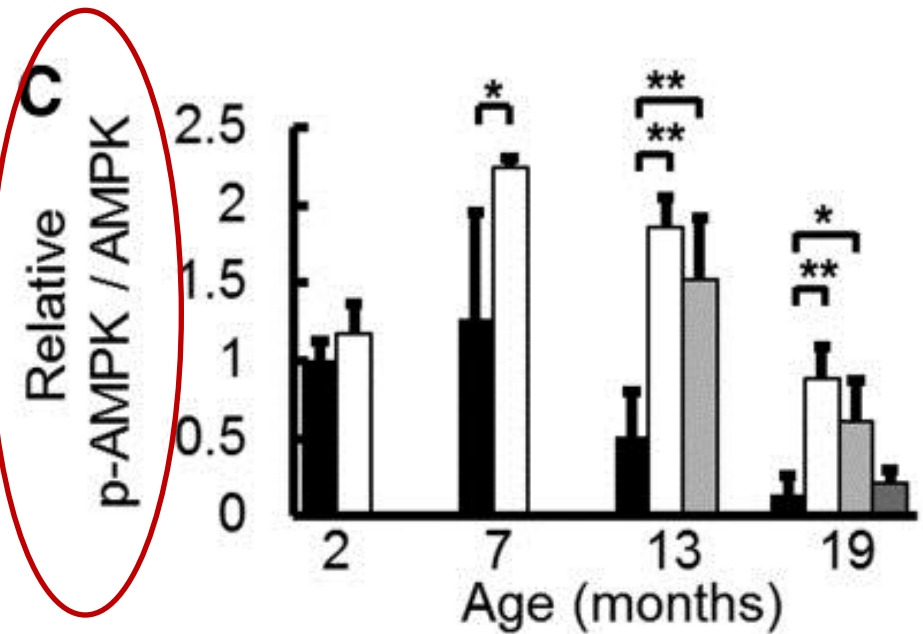
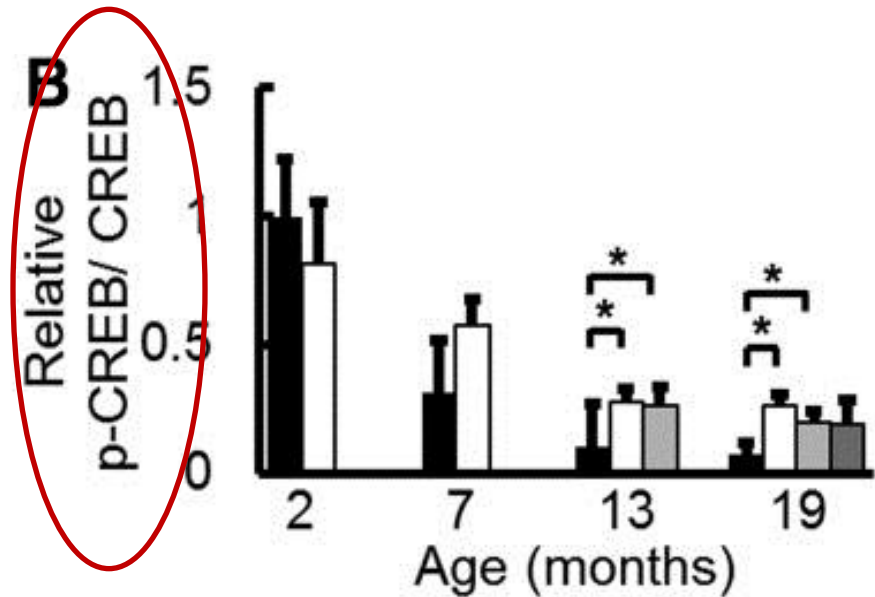
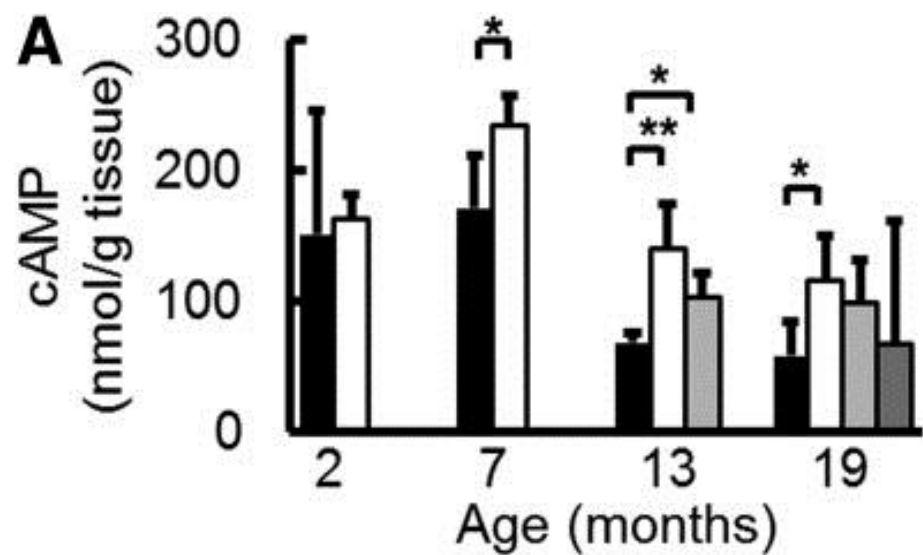
Ubiquinol may enhance mitochondrial activity by increasing levels of SIRT1, **PGC-1 α** , and SIRT3 in **mouse livers**.

Antioxid Redox Signal. 2014 Jun 1;20(16):2606-20. doi: 10.1089/ars.2013.5406. Epub 2013 Dec 14.

Ubiquinol-10 supplementation activates mitochondria functions to decelerate senescence in senescence-accelerated mice.

Tian G, Sawashita J, Kubo H, Nishio SY, Hashimoto S, Suzuki N, Yoshimura H, Tsuruoka M, Wang Y, Liu Y, Luo H, Xu Z, Mori M, Kitano M, Hoseo K, Takeda T, Usami S, Higuchi K





■ Control □ Ubiquinol-10 Y ▒ Ubiquinol-10 M ▓ Ubiquinol-10 O

Other factors that influence mitochondrial biogenesis

- Caloric restriction
- Physical activity
- Resveratrol
- Quercetin
- Alpha Lipoic Acid
- Acetyl L-carnitine

Thank you!

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