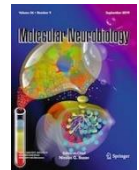


Effect of Initial Aging and High-Fat/High-Fructose Diet on Mitochondrial Bioenergetics and Oxidative Status in Rat Brain

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Effect of age and/or dietary treatment on brain mitochondrial physiology

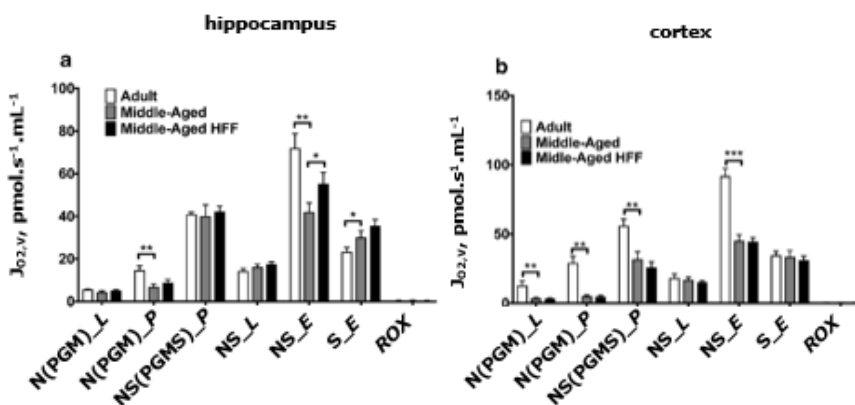
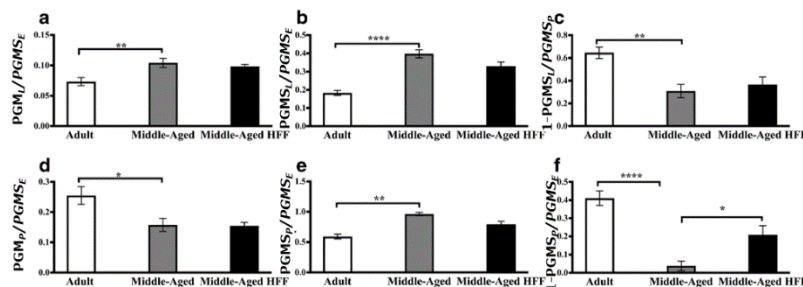


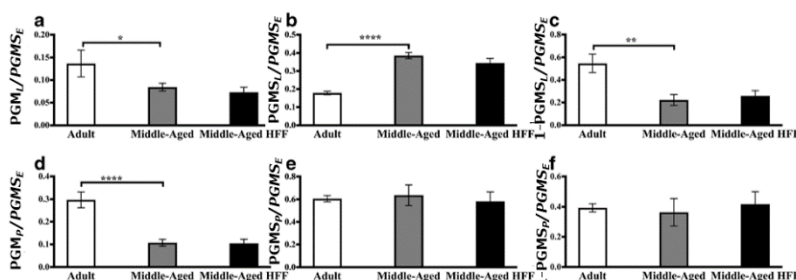
Figure 1. Age-induced decrease in ADP or FCCP supported respiration with N-linked substrates or NS-linked substrates, respectively. High-Fat/High Fructose (HFF) diet increases respiration with N- and NS-linked substrates in the hippocampus mitochondria (a). Mitochondria from the frontal cortex suffer a significant age-related decrease with N- and NS-linked substrates with no respiration effect from HFF diet (b). Values are means \pm SEM (N = 8, * p < 0.05, ** p < 0.01, *** p < 0.001). *

Impaired coupling efficiency and limitation by ATP synthase in an age-dependent manner



Figures 2 and 3. Respiratory flux control ratios and coupling control factors in hippocampus (2) and frontal cortex (3). Leak respiration with electron provision from complex I ($\text{PGM}_L/\text{PGMS}_E$) (a) and complexes I and II ($\text{PGMS}_L/\text{PGMS}_E$) (b), coupling efficiency of oxidative phosphorylation ($1 - \text{PGMS}_L/\text{PGMS}_P$) (c), phosphorylating respiration with electron provision from complex I ($\text{PGM}_P/\text{PGMS}_E$) (d), and complexes I and II ($\text{PGMS}_P/\text{PGMS}_E$) (e), apparent excess capacity of the electron transport chain ($1 - \text{PGM}_P/\text{PGMS}_E$) (f) Values are the means \pm SEM (N=8). * p < 0.05, ** p < 0.01, **** p < 0.0001

Functional impairment of Complex I with age in the cortex



Keywords: Substrates added and their corresponding rates: malate + pyruvate + glutamate = N(PGM)_L, ADP = N(PGM)_P, succinate = NS(PGMS)_P, oligomycin = NS_L, FCCP = NS_E, rotenone = S_E, antimycin A = ROX
PGM_L = LEAK respiration with complex I substrate; PGMS_L = LEAK respiration with complex I and II substrates; PGM_P = phosphorylating respiration with complex I substrate; PGMS_P = phosphorylating respiration with complex I and II substrates; PGMS_E = maximum capacity of the electron transfer pathway with complex I and II substrates

Reference: Crescenzo R, Spagnuolo MS, Cancelliere R, Iannotta L, Mazzoli A, Gatto C, Iossa S, Cigliano L (2019) Effect of initial aging and high-fat/high-fructose diet on mitochondrial bioenergetics and oxidative status in rat brain. Mol Neurobiol [Epub ahead of print].

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