Adaptation of Mitochondrial Substrate Flux in a Mouse Model of Nonalcoholic Fatty Liver Disease

International Journal of Molecular Sciences

Pavla Staňková [1], Otto Kučera [1,*], Eva Peterová [2], Halka Lotková [1], Tumisang Edward Maseko [1], Kateřina Nožičková [1] and Zuzana Červinková [1]

Coupling/pathway control diagrams for respiratory protocols

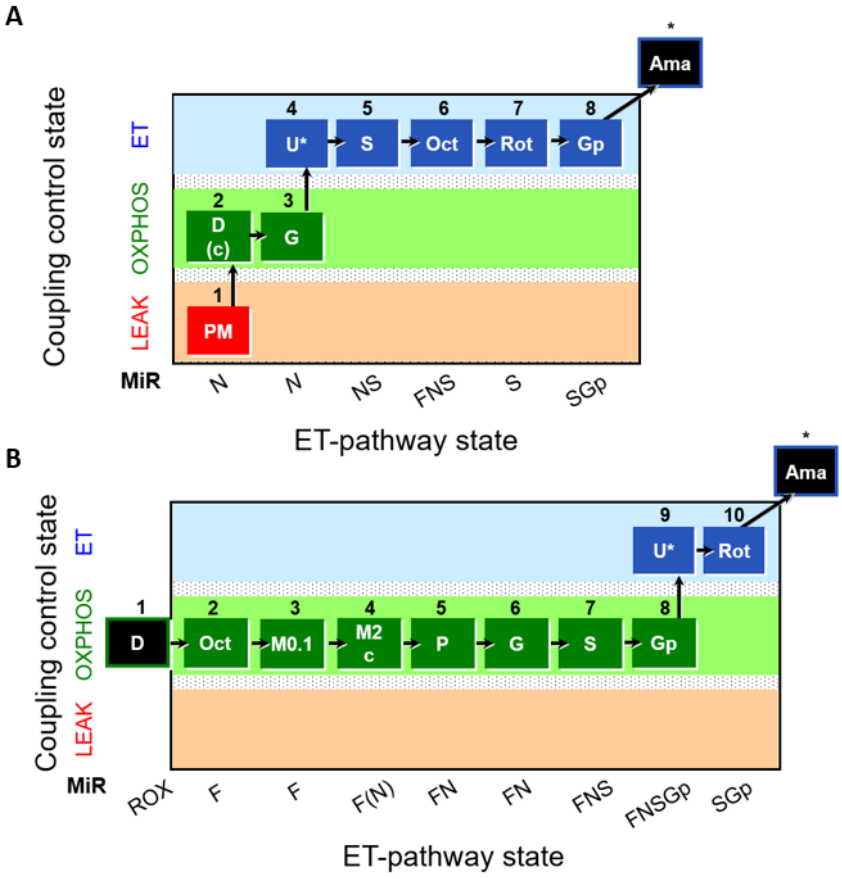

Figure 1. (A) Coupling/pathway control diagram of modified respiratory protocol 1 (RP1). **(B)** Coupling/pathway control diagram of modified respiratory protocol 2 (RP2). Pyruvate, 5 mM (P); malate, 2 mM (M); malate, 0.1 mM (M.1); ADP, 2.5 mM (D); cytochrome *c*, 10 µM (c); glutamate, 10 mM (G); carbonyl cyanide 4-(trifluoromethoxy)phenylhydrazone, 1.5–2 µM (U); succinate, 50 mM (S); octanoylcarnitine, 0.5 mM (Oct); rotenone, 0.5 µM (Rot); and glycerophosphate, 10 mM (Gp); antimycin A 2.5 µM (Ama).

ET-pathway states: NADH-linked (N); succinate-linked (S); fatty acid oxidation (F); glycerophosphate-linked (Gp); N- and S-linked (NS); F-, N- and S-linked (FNS); F-, N-, S- and Gp-linked (FNSGp); S- and Gp-linked (SGp); F- and anaplerotic pathway (F(N)); residual oxygen consumption (ROX).

O2k-brief communicated by T Komlodi and L Tindle-Solomon
Oroboros Instruments

Supported by project NextGen-O2k which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 859770

Liver mitochondrial respiration in mice fed with control diet (CD) or a Western-style diet (WD) modeling nonalcoholic steatohepatitis (NASH)

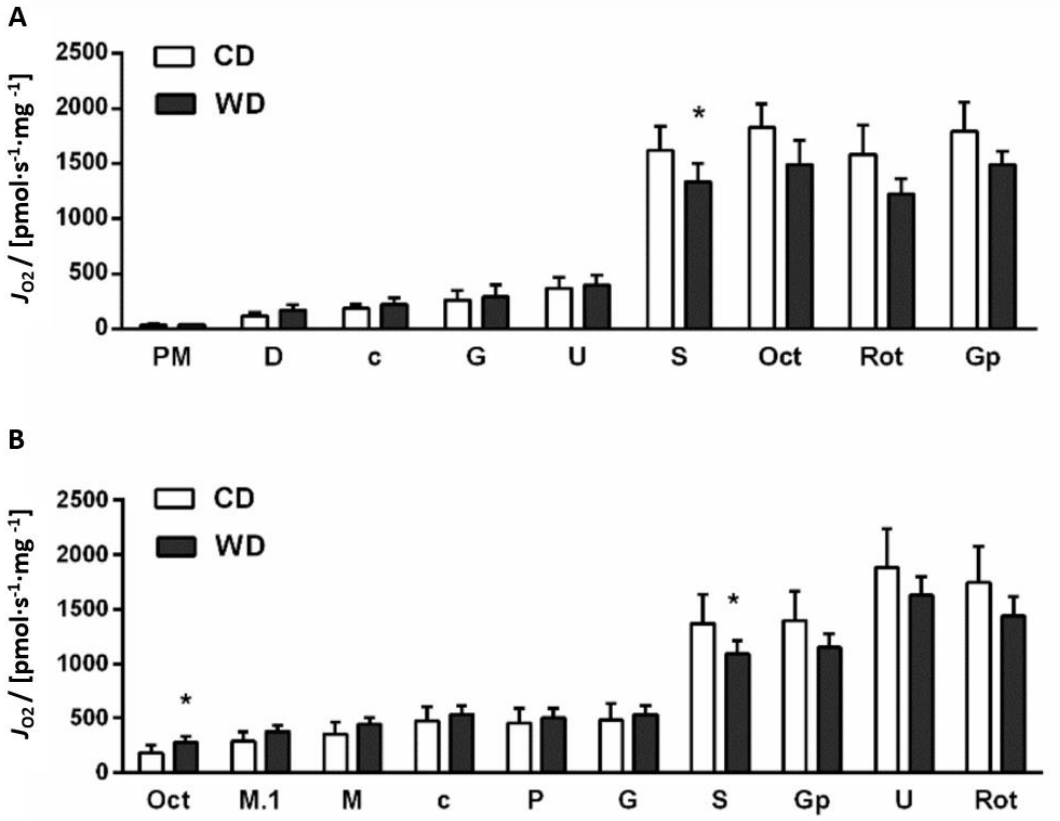

Figure 2. (A) Oxygen flux (J_{O2}) of modified RP1. **(B)** Oxygen flux (J_{O2}) of modified RP2. Experiments were performed in 2 mL of mitochondrial respiratory medium MiR05. Liver homogenates were loaded at a protein concentration of 0.2 mg/mL, and substrates, uncoupler, and inhibitors were sequentially added according to the protocol, see: Figure 1. The data were corrected for residual oxygen consumption as the baseline state. Data presented as means ± SD; * $P < 0.05$ ($N = 6$ each group).

A 24-week Western-style diet, modelling NASH, decreased NS-ET and FNS-OXPHOS capacities in mouse liver, which is related to decreased succinate dehydrogenase activity

Reference: Staňková P, Kučera O, Peterová E, Lotková H, Maseko TE, Nožičková K, Červinková Z (2020) Adaptation of mitochondrial substrate flux in a mouse model of nonalcoholic fatty liver disease. Int J Mol Sci 21:E1101.

Text slightly modified based on the recommendations of the COST Action MitoEAGLE CA15203. doi:10.26124/bec:2020-0001.v1

O2k-brief communicated by T Komlodi and L Tindle-Solomon
Oroboros Instruments

Supported by project NextGen-O2k which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 859770