Respiration

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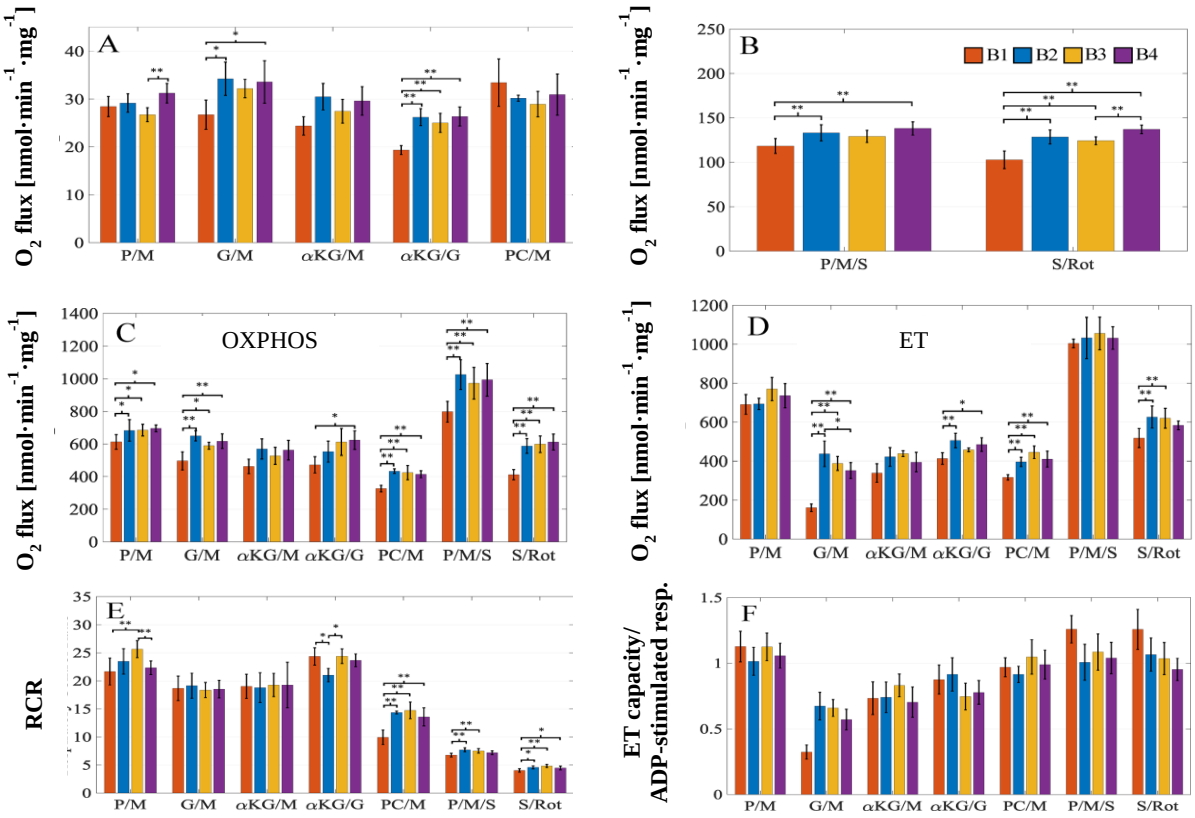
High-resolution respirometry and respiration media

PLOS ONE

The effect of respiration buffer composition on mitochondrial metabolism and function.

Wollenman LC[1,2], Vander Ploeg MR[1], Miller ML[3,4], Zhang Y[1], Bazil JN[1].

Composition of the respiration media influences the mitochondrial respiration and function



Effect of respiration media on mitochondrial respiration using heart mitochondria isolated from guinea-pig. (A) LEAK-respiration supported by NADH-linked substrates (GMP) and palmitoylcarnitine (PC). (B) LEAK-respiration supported by succinate in presence of rotenone (SRot) or in combination with NADH-linked substrates (PMS). (C) ADP-stimulated respiration supported by different substrates. (D) FCCP-stimulated respiration (ET; electron transfer-pathway capacity) in the presence of different substrates. (E) Respiratory control ratio (ADP-stimulated respiration/LEAK-respiration). (F) FCCP-stimulated respiration over the ADP-stimulated respiration (ET capacity/ADP-stimulated respiration). Data presented as mean ± standard deviation. * indicates a significance level p<0.05, and ** indicates significance level of p<0.01. Abbreviations: αKG: α-ketoglutarate; G: glutamate; M: malate; P: pyruvate; PC: palmitoylcarnitine; Rot: rotenone; S: succinate.

Respiration media:
B1 [mM]:130 KCl, 5 K_2HPO_4, 1 $MgCl_2$, 20 MOPS, 1 EGTA, 0.1% BSA, pH=7.1; **B2** [mM]: MiR05 containing 0.5 EGTA, 3 $MgCl_2$, 60 lactobionic acid, 20 taurine, 10 KH_2PO_4, 20 HEPES, 110 sucrose, 0.1% BSA (http://www.bioblast.at/index.php/MiR05); **B3** [mM]:130 K-gluconate, 5 K_2HPO_4, 1 $MgCl_2$, 20 MOPS,1 EGTA, 0.1% BSA, pH=7.1; **B4** [mM]: 110 sucrose, 60 K-gluconate, 20 taurine, 10 KH_2PO_4, 3 $MgCl_2$, 20 HEPES, 0.1% BSA, pH=7.1.

The respiration buffer containing high levels of chloride (B1) shows lower respiration in every investigated respiratory state. The authors highlight the possible role of the chloride ions inhibiting the dicarboxylate carrier, the adenine nucleotide translocase and the αKG-exchanger

Reference: Wollenman LC, Vander Ploeg MR, Miller ML, Zhang Y, Bazil JN (2017) The effect of respiration buffer composition on mitochondrial metabolism and function. PLoS One12(11):e0187523.

Figures and texts slightly modified based on the recommendations of the COST Action MitoEAGLE CA15203. Doi:10.26124/mitofit:190001.v3