

Dietary cocoa flavanols boosts NAD+ metabolism and stimulates mitochondrial biogenesis in skeletal muscle from mice.







p=0.084



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Introduction

Mitochondrial dysfunctions are widely reported in various diseases and participate in their pathogenesis. Among the natural compounds, cocoa flavanols (CF) are considered as a promising compound to improve mitochondrial function and their consumption has been shown to improve a variety of health indicators such as cardiovascular mortality, insulin resistance or immune function. We assessed the effect of CF supplementation on mitochondrial function and on whole metabolism and we explored whether the NAD metabolism is involved or not.

Methods



Whole body metabolism assessment

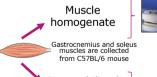


- → Calorimetric assessment for 72h
- → Daily food intake
- → Daily spontaneous activity



→ Oral Glucose Tolerance Test (OGTT)

Mitochondrial function and NAD metabolism assessment



➤ Enzymatic activities of complex I. complex II (SDH), complex IV (COX) and citrate synthase (CS) were measured spectrophotometrically.

>> Total NAD and NADH levels were measured using a commercial kit

Permeabilized fibers



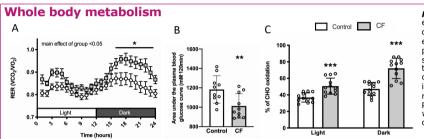


Respirometry: O₂ consumption is measured in small muscle bundles using Clark-type oxygen sensitive electrodes under various substrates



ROS measurement: Net H₂O₂ release from small bundles is measured using Amplex RedTM

Results



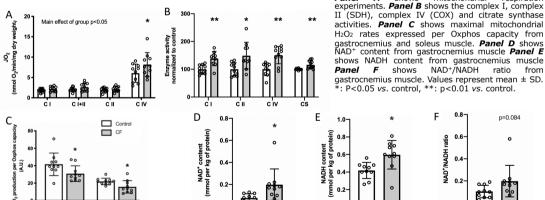
Panel A shows respiratory exchange ratio (RER) over 24h cycle. There is a main group during phase(p<0.05). Panel B shows area under the curve of the OGTT. Panel C shows carbohydrate and fat oxidation in light and dark cycle. Values represent mean ± SD. *: P<0.05 vs. control, **: p<0.01 vs. control, ***: p<0.001 vs.

mitochondrial

0.4

shows





Conclusion

CF supplementation boosted the NAD metabolism and improved mitochondrial function which probably contributed to the whole-body metabolism adaptation with a greater ability to use CHO. Future studies should evaluate the interest of CF supplementation strategy in human.