INTRODUCTION: Dietary intake of conjugated linoleic acid (CLA) reduces body fat accumulation and increases body metabolism. OBJECTIVES: Here we investigate whether CLA and omega-3 diet supplementation, either alone or in combination, could change body metabolism associated to mitochondrial energetics. MATERIALS AND METHODS: C57BL6 male mice were divided into one of four groups: CLA (1:1 cis-9, trans-11: trans-10, cis-12 - 18:2 isomers), omega-3 (1:1 EPA: DHA), CLA plus omega-3 or control (linoleic acid). Each mouse received 0.1 mL (3g/kg b.w) of stated oil by gavage on alternating days, for 60 days. Weight gain was monitored weekly and body metabolic rates (indirect calorimetry), rearing and activity started after 15 days. After 30 days, tests of glucose tolerance and insulin tolerance were performed. After 60 days, the mice were euthanized and liver, adipose tissues and skeletal muscle were subsequently analyzed. Blood samples were taken for measurements of plasma lipids. Liver mitochondria were isolated by differential centrifugation. Tissue and mitochondrial respirations were monitored using a oxygraph (Oroboros) and H$_2$O$_2$ production (Amplex Red) using a fluorimeter. DISCUSSION AND RESULTS: All supplementations did not change the body weight gain or muscle weight. CLA increased body metabolism, liver weight, rearing and activity behaviors, and reduced adipose tissue gain and the insulin sensitivity, regardless of the presence of omega-3. CLA alone increased the non-coupled respiration in liver tissue and isolated mitochondria energized with succinate, whose were reversed by combined omega-3 supplementation. Omega-3 alone reduced rearing behavior and plasma cholesterol level, and induced electron back flow in the respiratory chain of isolated liver mitochondria. CONCLUSIONS: These results indicate that omega-3 alone does not promote any changes on body or liver energy metabolisms; when combined with CLA, omega-3 reverses the high liver uncoupled respiration but not the high body metabolism induced by CLA.

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Key Words: conjugated linoleic acid; omega-3; metabolism.