

Effect of palmitate on the metabolic fate of leucine and vice versa in primary adipocytes of a rat model of diet-induced obesity

Daniela Salinas Rubio^{1,2}, Nimbe Torres¹, Armando R. Tovar¹, Lilia G. Noriega¹

¹Fisiología de la Nutrición, Instituto Nacional de Ciencias Médicas y Nutrición, Vasco de Quiroga No 15, Tlalpan. 14000, México.

²Doctorado en Ciencias Biomedicas, UNAM Unidad de Posgrado Edificio A y B, Ciudad Universitaria, México.

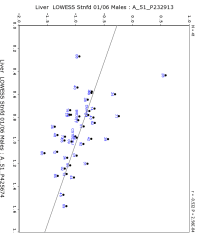
This work was supported by CONACYT grant 155949, e-mail: gnoriega@gmail.com



Abstract

Metabolic profiling studies have spotlighted altered fatty acid (FA) or branched chain amino acid (BCAA) oxidation that marks the obese and insulin-resistant phenotype. Interestingly, mRNA expression of Carnitine palmitoyltransferase 1 (CPT1), the rate-limiting enzyme of FA oxidation, and Isovaleryl-CoA dehydrogenase (IVDH)-a mitochondrial enzyme involved in BCAA oxidation-are inversely correlated in the livers of 41 recombinant inbred mouse strains of the B6D genetic reference population (<http://www.genenetwork.org>). The inverse correlation between CPT1 and IVDH suggest that a high rate of FA oxidation could decrease BCAA oxidation and vice versa. To test this hypothesis, we have evaluated the effect of increasing concentrations of palmitate or leucine in the metabolic fate of leucine or palmitate in primary adipocytes of a rat model of diet-induced obesity. We incubated primary adipocytes with: 1) 0, 250, 500 or 1000 μ M of palmitate and evaluated the oxidation, incorporation to lipids or proteins of [14 C]-leucine; or 2) 0, 250, 500 and 1000 μ M of leucine and determined the oxidation, incorporation to lipids or proteins of [14 C]-palmitic acid. Interestingly, palmitate increased leucine oxidation and decreased its incorporation to lipids and proteins. Furthermore, leucine decreased palmitate oxidation. Overall, our results demonstrate that palmitate affects the metabolic fate of leucine and that leucine modifies the metabolic rate of palmitate in primary adipocytes of a rat model of diet-induced obesity.

Introduction

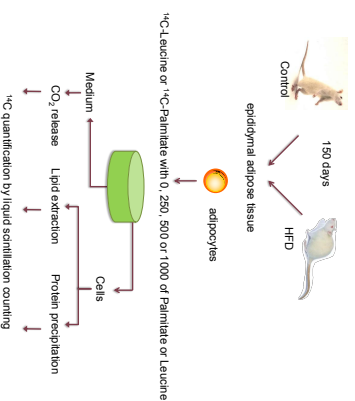


A_51_142567.4 (lnc) on Chr 2 @ 110,702,341 (kb) Isovaleryl coenzyme A dehydrogenase
Protein: A_51_142567.4 (lnc) on Chr 2 @ 110,702,341 (kb) Isovaleryl coenzyme A dehydrogenase
Y axis: IVDH (log2 (FPKM))
X axis: CPT1 (log2 (FPKM))
Both from: UNC Applicant GA121A

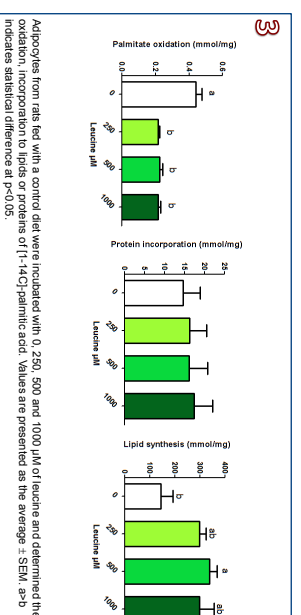
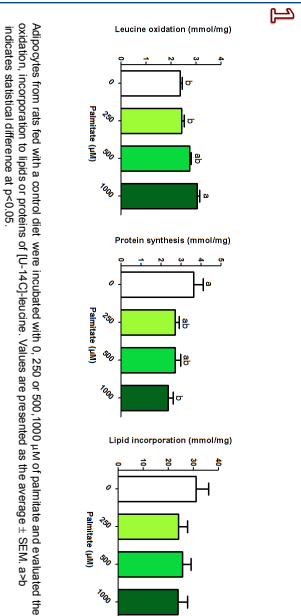
Aim

To evaluate the effect of increasing concentrations of palmitate or leucine in the metabolic fate of leucine or palmitate in primary adipocytes of a rat model of diet-induced obesity.

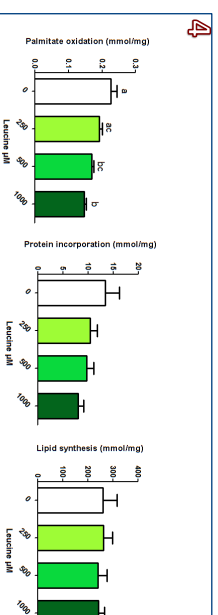
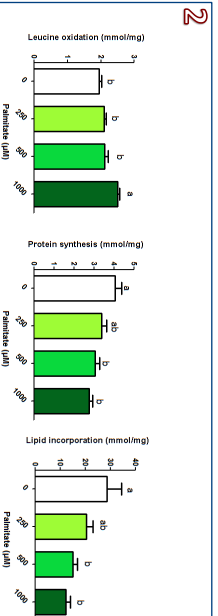
Methods



CONTROL-adipocytes



HFD- adipocytes



Conclusions

Metabolic fate of leucine and palmitate in adipocytes incubated with increasing concentrations of palmitate or leucine

