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Abstracts

NUTRITION AND MUSCULAR FUNCTION

Effect of fatty acid infusion on muscle glycogen resynthesis after exercise in healthy subjects: ^{13}C NMR study. M.C. Delmas-Beauvieux[a,b], B. Quesson[a], E. Thiaudière[a], P. Canioni[a], H. Gin[b] ([a]RMSB UMR5536 CNRS Université Bordeaux 2, 146, rue Léo Saignat, 33076 Bordeaux cedex; [b]Service de nutrition et diabétologie, Hôpital Haut-Lévêque Pessac, France).

A tissue level competition between carbohydrate substrates and lipid substrates does not clearly explain the role of free fatty acids (FFA) in muscular metabolism and the muscular insulinoresistance (IR) observed in non-insulinodependent diabetes mellitus. FFA could impair the recovery of the glycogen depleted during an exercise, but the use of methods such as a hyperinsulinic clamp and/or muscular biopsies does not allow the determination of the exact role of FFA. Their effect on the kinetic of the glycogen pool of gastrocnemius can be non-invasively studied by carbon 13 nuclear magnetic resonance (NMR). Six male healthy subjects (40 ± 2 years, BMI 24.34 ± 1.28 kg/m^2, m ± SEM) were perfused, after informative consent, with glycerol (0.26 mg/kg/h) (GLY) or Ivélip 10 % (0.015 mL/kg/h) (IVE), with a washout period of 5 weeks. ^1H decoupled ^{13}C NMR spectra were obtained with a surface coil (50.3 MHz) on a Brucker Biospec 47/50 spectrometer (4.7 Tesla). Plantar flexions performed during 92 ± 4 min led to similar glycogen depletion whatever the substrate (GLY = 46.7 %, IVE = 47.6 % of glycogen initial value). The glycogen resynthesis was then studied for 3.5 h in a resting state. Plasmatic glucose, insulin, FFA and triglycerides were measured during the same period. During the insulinodependent phase of glycogen synthesis following the moderate exercise, the glycogen recovery was significantly higher in GLY (61 ± 3 %) than in IVE (49 ± 4 %) (P = 0.05, ANOVA). The peripheral IR obtained with the infusion of FFA led to a lower level of glycogen resynthesis demonstrating their role in the IR in the muscular effector. A lipid substrate decreases muscle glycogenogenesis in healthy subjects. The establisment of an IR is the *primum movens*.

Time-course metabolic adaptations during endurance training according to initial physical capacities of sedentary elderly people. B. Morio[a], P. Ritz[a], C. Montaurier[a], N. Fellmann[b], B. Beaufrère[a], M. Vermorel[a] ([a] Laboratoire de nutrition humaine; [b] Laboratoire de physiologie et biologie du sport, 58, rue Montalembert, BP 321, 63009 Clermont-Ferrand cedex, France).

Fast mass loss is one of the main alterations induced by endurance training in elderly people. It can only result from a negative lipid balance due to either a decreased lipid intake (which is probably not the case) or to an increased capacity to oxidize lipids. However, the latter explanation has not been studied previously. Therefore, we studied the short-term (7 weeks) and the medium-term (14 weeks) effects of a progressive endurance training programme on lipid oxidation (LIPox) over 24 h and during sleep in 13 healthy and initially sedentary subjects aged 63 ± 2 years. LIPox was determined from respiratory gaseous exchanges measured in wholebody calorimeters. Energy balance during the measurement period was calculated as the difference between daily energy expenditure and energy intake.