

Rat liver microsomal desaturase activities during undernutrition. N Narce ^{1,2}, JP Poisson ¹, J Belleville ¹ (¹ *Université de Bourgogne, Unité de Recherches de Nutrition Cellulaire et Métabolique, BP 138, 21004 Dijon Cedex;* ² *Université de Toulon et du Var, BP 132, 83957 La Garde Cedex, France*)

In the animal, linoleic acid (LA, 18 : 2 n-6) is converted into arachidonic acid (AA, 20 : 4 n-6) by a succession of desaturation and elongation steps. These polyunsaturated fatty acids are highly present in membrane lipids. $\Delta 6$ and $\Delta 5$ desaturases – enzymes responsible for these desaturation reactions – are membrane-bound enzymes of the endoplasmic reticulum and limiting steps for these bioconversions. The nutritional control of fatty acid desaturation has been evidenced during fasting and protein restriction (Narce *et al*, 1988a). No data is available concerning undernutrition, which is why we investigated in the rat liver these enzyme activities during a 40- and 60-d diet restriction period.

Ten control Wistar rats (10 wk old) were fed a commercial diet (A.04 UAR, France) for 60 d. Ten experimental rats received 60% of the standard diet. The animals were killed after 40 and 60 d of diet. $\Delta 6$ and $\Delta 5$ desaturase activities were determined by incubation of liver microsomes in

the presence of appropriate labelled substrates (Narce *et al*, 1988a,b). Fatty acid composition of total lipids from microsomes and liver were determined by gas liquid chromatography.

Underfed animals were found to have lost 25% of their body weight after 60 d of diet. LA level increased in total liver and total liver microsomal lipids. AA level increased in liver microsomes after 60 d of diet. $\Delta 6$ and $\Delta 5$ desaturase activities increased greatly: +35% after 40 d of diet and +50% after 60 d for $\Delta 6$ desaturase activity, and +50% after the 2 periods of diet for $\Delta 5$ desaturase activity.

These results suggest an increased fluidity of the endoplasmic reticulum membrane. They agree with the reported data of Vajreswari *et al* (1990) showing an increased polyunsaturated fatty acid level in erythrocyte membrane of marasmic children. This study indicates that the regulation of AA biosynthesis during undernutrition is the opposite of that observed during protein restriction.

References

- Narce M, Poisson JP, Belleville J, Chanussot B (1988a) *Br J Nutr* 60, 389-402
Narce M, Gresti J, Bezard J (1988b) *J Chromatogr* 448, 249-164
Vajreswari A, Narayanreddy K, Srinivasa Rao P (1990) *Metabolism* 39, 779-782