The intake of a hyperlipidic diet stimulates the gastric leptin signalling pathway in female rats

J. Sánchez · T. Priego · P. Oliver · A. Palou ·
C. Pico

Published online: 19 September 2007
© Springer-Verlag and NuGO 2007

Keywords Gastric leptin · High-fat diet ·
Short-term control of food intake

The hormone leptin is mainly produced in the adipose tissue and plays an important role in the central regulation of energy balance. Leptin is also synthesised by the stomach [1–3]. Particularly, leptin has been found in the lower half of the stomach glands both in the pepsinogen granules of chief cells and in the granules of a specific type of endocrine cells [3]. It has been reported that the stomach can produce and store leptin and release it in response to food intake in both human and rats [1,4], so it has been suggested a role of gastric leptin in the short-term control of food intake [5].

The aim of this work was to study in both male and female rats, whether the intake of a high-fat (HF) diet affects leptin production by the stomach.

Male and female Wistar rats were fed after weaning and until 6 months of age either with a normal- or a high-fat diet (with 10 and 45% calories from fat, respectively). We measured, in the gastric mucosa, mRNA levels of leptin and leptin receptor by real-time PCR and gastric concentrations of leptin by ELISA.

Animals under a HF diet ate more calories than control animals, being the increase higher in females than in males; body weight gain was also higher in females than in males (10.6 vs. 6.92%). In females but not in males, HF diet

intake was associated with higher expression of leptin (68.4%) and leptin receptor (70.2%) in the stomach, while gastric leptin concentration was lower in both male and female rats (23.1 and 37.9%, respectively), probably indicating higher leptin secretion due to overeating. These data suggest that HF diet stimulates the gastric leptin signalling pathway, particularly in female rats, although this system does not seem to be able to counterbalance the hyperphagia induced by the prolonged intake of a hyperlipidic diet.

Acknowledgments This work was supported by the Spanish Government (grants G03/028, BFI2003-04439 and AGL2004-07496/ALI). Our Laboratory is member of the European Research Network of Excellence NuGO (The European Nutrigenomics Organization, EU Contract: n° FP6-506360).

References

1. Bado A, Levasseur S, Attoub S, Kermorgant S, Laigneau JP, Bortoluzzi MN, Moizo L, Lehy T, Guerre-Millo M, Le Marchand-Brustel Y, Lewin MJ (1998) The stomach is a source of leptin. *Nature* 394:790–793
2. Cinti S, de Matteis R, Ceresi E, Pico C, Oliver J, Oliver P, Palou A, Obrador A, Maffei C (2001) Leptin in the human stomach. *Gut* 49:155
3. Cinti S, Matteis R, Pico C, Ceresi E, Obrador A, Maffei C, Oliver J, Palou A (2000) Secretory granules of endocrine and chief cells of human stomach mucosa contain leptin. *Int J Obes Relat Metab Disord* 24:789–793
4. Pico C, Sanchez J, Oliver P, Palou A (2002) Leptin production by the stomach is up-regulated in obese (fa/fa) Zucker rats. *Obes Res* 10:932–938
5. Pico C, Oliver P, Sanchez J, Palou A (2003) Gastric leptin: a putative role in the short-term regulation of food intake. *Br J Nutr* 90:735–741

J. Sánchez · T. Priego · P. Oliver · A. Palou · C. Pico (✉)
Laboratory of Molecular Biology, Nutrition and Biotechnology,
University of the Balearic Islands (UIB),
Palma de Mallorca, Spain
e-mail: cati.pico@uib.es