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Effect of rapeseed protein on postprandial tissue protein metabolism in rats

C. Boutry[1], L. Chevalier[1], H. Fouillet[1], E. Fénart[2], J. Evrard[3], C. Gaudichon[1], D. Tomé[1] and C. Bos[1]
[1]*UMR914 INRA-AgroParisTech Physiologie de la Nutrition et du Comportement Alimentaire, Paris, France and* [2]*ONIDOL, Paris, France and* [3]*CETIOM, Pessac, France*

Rapeseed protein is an important dietary source for livestock, but is not currently used in human nutrition despite recent results obtained for human subjects showing that rapeseed protein is outstanding, because of its moderate bioavailability and high metabolic utilization(1). To better understand the atypical metabolism of rapeseed protein, the impact on both postprandial tissue dietary N retention and tissue protein synthesis rates was assessed *in vivo* in rats.

Forty-eight male Wistar rats (180 g) were killed after ingestion of a test meal of rapeseed protein or milk protein. Half the rats had been adapted for the preceding 2 weeks to receive the protein source (chronic effect) while the other half received it only as the test meal (acute effect). ^{15}N-labelled protein was used to measure the digestive and N metabolic fate of dietary N in tissues and urea. Tissue synthesis rates were assessed using the flooding-dose method ([^{13}C]valine).

There were no differences in food intake or growth between rats fed diets based on rapeseed protein or milk protein. The true ileal digestibility of rapeseed protein (96%) was not different from that of milk protein. Deamination losses of dietary N were similar after ingestion of rapeseed protein and milk protein, and reached approximately 16% of the ingested N at 5 h after the meal, indicating the same level of postprandial retention for the proteins. However, the incorporation of dietary N into muscle, skin and plasma circulating protein was significantly higher after ingestion of milk protein (+66%, +89% and +50% respectively; $P<0.001$) than after rapeseed protein, for both acute and chronic conditions. No significant differences in dietary N incorporation were found in visceral organs. Fractional synthesis rates were similar between groups (rapeseed *v.* milk, acute *v.* chronic) for all tissues monitored (liver, kidney, intestinal mucosa, muscle and skin).

Rapeseed protein has a high ileal digestibility in rats, contrary to the observations in human subjects. Rapeseed protein is as efficiently retained as milk protein in the postprandial period in rats, which is very consistent with the findings in human subjects. However, this global response conceals qualitative differences at the tissue level in dietary N accretion, but not in fractional synthesis rates, suggesting a possible differential modulation of postprandial proteolysis after the ingestion of rapeseed protein compared with milk protein. The physiological significance of these postprandial dietary-protein-specific responses requires further investigation.

1. Bos C, Airinei G, Mariotti F, Benamouzig R, Berot S, Evrard J, Fenart E, Tome D & Gaudichon C (2007) *J Nutr* **137**, 594–600.