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Real Ileal Amino Acid Digestibility of Pea Protein Isolate As Compared to Casein in Healthy Adult Humans

Florence Guillin,¹ Claire Gaudichon,¹
Laetitia Guerin-Deremaux,² Catherine Lefranc-Millot,²
Gheorghe Airinei,¹ Robert Benamouzig,¹ Nadezda Khodorova,¹
Pierre-Henri Pomport,³ Juliette Martin,⁴ and Juliane Calvez¹

¹Université Paris-Saclay, AgroParisTech, INRAE, UMR PNCA, France; ²Roquette Frères, France; ³AgroParisTech; and ⁴INRAE

Objectives: In the current context of finding plant alternatives to animal proteins, pea would be a good option regarding its high protein content and its well-balanced amino acid (AA) profile. However, we must examine its digestibility, a main criteria of protein nutritional quality. The aim of this study was to determine the real ileal AA and nitrogen (N) digestibility (RID_{AA} and RID_N) of pea protein as compared to milk casein in humans. We also evaluated their respective nutritional qualities through the calculation of the digestible indispensable amino acid score (DIAAS) and the net postprandial protein utilization (NPPU).

Methods: Fifteen healthy adult volunteers completed the study and were equipped with a triple-lumen naso-ileal tube. They were given 9 portions of mashed potatoes containing either pea protein or casein

isolates that were intrinsically labelled with ¹⁵N. PEG-4000 was perfused in the ileum as a non-absorbable marker to measure the intestinal flow rate. Ileal digesta were collected continuously by aspiration with a syringe over an 8-h postprandial period, while plasma and urine were sampled regularly. N and AA contents of digesta and protein isolates were measured using EA and U-HPLC. PEG-4000 content of the digesta was measured by turbidimetric method. Urea was extracted from plasma and urine samples. ¹⁵N enrichment was assessed in digesta, urea and protein isolates by EA-IRMS and in individual AAs by GC-C-IRMS.

Results: Mean RID_{AA} was 93.6 ± 2.9% and 96.8 ± 1.0% for pea protein and casein, respectively, with no significant difference between groups (P = 0.22). RID_N was 92.0 ± 2.7% and 94.0 ± 1.7% for pea protein and casein, respectively, and were not different (P = 0.11). The DIAAS was 1.00 for pea protein and 1.45 for casein. The NPPU was 67.0 ± 6.2% for pea protein and 70.7 ± 1.9% for casein and the difference was not significant (P = 0.15).

Conclusions: Overall, the bioavailability was not different between pea protein and casein in healthy adults. The DIAAS of pea protein reached 1, revealing the absence of limiting AA in regard to the requirements. Considering its AA composition and the digestibility results we obtained, pea protein can be qualified as a high-quality protein.

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