Abstract

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Effect of chain length on absorption of biologically active peptides from the gastrointestinal tract.

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Abstract

OBJECTIVES: Protein digestion generates many peptides in the gut lumen. Some of these peptides possess biological effects when tested using in vitro systems. It is clear that dipeptides and tripeptides can be absorbed intact from the gastrointestinal tract. However, the fate of larger peptides and small proteins remains unclear. Equally unclear are the biologic potencies of absorbed peptides and the quantity of peptide that must be administered into the gut to produce a biologic effect. Thus, the purpose of this study was to determine the effect of amino acid chain length on the ability of enterally administered peptides to produce biologic effects.

METHODS: Small bowel feeding tubes, jugular catheters, and arterial lines were placed into adult male Sprague-Dawley rats. Rats were administered intravenous (50 microg) and enteral (125 and 500 microg) thyrotropin-releasing hormone (TRH, a tripeptide), intravenous (100 microg) and enteral (100 and 500 microg) luteinizing hormone-releasing hormone (LHRH, a decapeptide), and intravenous (0.5 mg) and enteral (0.5 and 25 mg) insulin (a 51-amino acid polypeptide). The quantity of peptide administered represented less than 0.5% of a rat's normal daily protein intake. The biologic effect of TRH, LHRH, and insulin were assessed using thyroid-stimulating hormone (TSH) response, follicle-stimulating hormone (FSH) response, and glucose. We also measured serum levels of insulin in the rats following enteral insulin administration.

RESULTS: The results indicate that enteral TRH (125 and 500 microg) produced the same TSH response as intravenous TRH. The response to 500 microg enteral LHRH was 50% of the response to intravenous LHRH and the response to 25 mg enteral insulin was 30% of the response to 0.5 mg intravenous insulin. Serum insulin levels increased significantly following both 0.5 and 25 mg enteral insulin.

CONCLUSIONS: These results support the concept that small (di- and tripeptides) and large (10-51 amino acids) peptides generated in the diet can be absorbed intact through the intestines and produce biologic effects at the tissue level. The potency of the enterally administered peptides decreases as the chain length increases. We postulate that absorbed dietary peptides play a role in the modulation of organ function and disease progression.

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MeSH Terms, Substances

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