EFFECT OF TOPICAL APPLICATION OF AMINO ACIDS ON GASTRIC PEPsin SECRETION IN THE RAT
PART III: EFFECT OF L- AND D-ISOMERS OF AMINO ACIDS ON GASTRIC SECRETION IN REPERFUSION SYSTEM

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Summary
This study was undertaken to compare the potency of each L- and D-isomers of 5 amino acids in stimulating gastric acid and pepsin secretion by the intragastric reperfusion preparation in rats. Gastric basal and glycine-stimulated secretions in this preparation were lower than those Ghosh-Lai preparation, but not to a statistically significant extent. All D- and L-isomers of amino acids tested were found to markedly stimulate pepsin secretion, but to only slightly stimulate acid secretion. Pepsin stimulatory response to each D- and L-isomer of amino acid was similar. The stimulatory effects of amino acids thus seem to be unrelated to the optical stereoisomeric configuration.

Key Words: perfused rat stomach preparation, L-amino acids, D-amino acids, gastric secretion, pepsin.

Introduction
Amino acids and peptides are the components of food most potent in stimulating gastric acid secretion1). Evidence has been presented that L-isomers of amino acids bathing the oxyntic gland area have the ability to stimulate parietal cells2). It is also reported that perfusion of L-isomers of amino acids produced a marked effect on pepsin output3). Although we found a few reports4-6) comparing the effects of D- and L-isomers of amino acids on gastric acid secretion and gastrin release, little information was available in respect to pepsin secretion.

The purpose of our present study was to evaluate the effect of intragastric perfusion of D-isomers of amino acids on gastric secretion, and to compare it with the analogous effect of L-isomers.

Materials and Methods
Male Wistar albino rats (250 ± 50 g) were not starved, and were anaesthetized by urethane (1.8 g/kg i.m.). The body temperature of the rats was maintained at 36° ± 1°C by means of a rectal probe and a warming system throughout the study. The effect of L- and D-isomers of amino acids on gastric secretion was tested in the reperfusion preparation by a modification of the method of Smith, Lawrence et al.7). The

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stomach was perfused with a solution at 36°C using an automatic peristaltic pump that delivered the solution at a rate of 1 ml/min. After the surgical procedure the preparation was allowed to stabilize until the pH of the gastric effluent rose to above 6.0. A phosphate citrate buffered saline (PBS) of pH 6.6 was used as a control perfusate. After stabilization periods, 30 ml of PBS was instilled and recirculated initially for 60 min, followed by a 60 min perfusion with 30 ml of an amino acid solution. The reperfusion preparation was compared with the Ghosh-Lai rat preparation\(^5,8,9\) using 0.1 M glycine before the effect of L- and D-isomers of amino acids was investigated.

**Test Solutions**

Each 0.1 M of amino acid was dissolved in PBS and its pH was adjusted to 6.6 except L- and D-isomers of histidine (pH 4.0). Amino acids were of reagent grade or of best commercially available grade. The osmolarity of PBS and 0.1 M of amino acid was adjusted to 285 and 380 mOsm/kg respectively by osmometer (Advanced Dig Matic Osmometer Model D, Advanced Osmometers, Masachussetts, USA).

**Analysis of Gastric Perfusate**

The 60 min aliquots of perfusate were used for the determination of acid and pepsin contents. Acid output was determined by an automatic titrater. Pepsin activity was measured by a modification of the Anson-Mirsky method\(^10\). All the results were expressed as the means and standard errors for each group of rats. Student's t-test for paired and unpaired values was used in this study. Differences were regarded as statistically significant when \(p<0.05\).

**Results**

In the reperfusion by Smith-Lawrence method gastric basal acid output by PBS was 9.330 ± 3.372 μEq/hr and pepsin output was 0.139 ± 0.044 mg Tyr/hr. Gastric basal secretion in this preparation was lower than the perfusion preparation of the Ghosh-Lai method. Intragastric perfusion of 0.1 M glycine caused marked stimulation of acid and pepsin output in both preparations. Stimulated secretion by glycine in reperfusion system was also lower than that in the Ghosh-Lai preparation. In both basal and glycine-stimulated conditions, however, no statistically significant differences between the gastric secretion levels in these preparations were observed (Fig. 1).