FOLACIN UPTAKE IN THE RAT SMALL INTESTINE

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Naturally occurring folacins are a group of chemically related pteroyl-glutamates which differ in the oxidation/reduction state of the pteridine ring, the number of glutamyl units in the poly-γ-glutamyl side-chain and substituents at the 5- and 10- positions. Dietary folacins, which are predominantly in the poly-γ-glutamyl form, are absorbed in the jejunum following conversion to the monoglutamyl form (Halsted 1979). Many studies on folacin absorption have used folic acid, a form which is not present in food. We have examined the uptake by the rat jejunum of these forms of folacin which occur in food and compared them with folic acid.

After a 24-hour fast, the rats were anaesthetised with pentabarbitone (60 mg/kg) and opened by a midline incision; a segment of jejunum was cannulated at the ligament of Treitz and 10 cm distal to that point. Solutions (folic acid, 5-methyltetrahydrofolate, 5-formyl tetrahydrofolate and tetrahydrofolate) of known concentrations, made iso-osmotic with sodium chloride and incorporating phenol red as a non-absorbable water marker, were perfused at 0.125 mL/min. Samples were collected every 10 min for a total period of 60 min. The perfusate folacin concentration was determined using HPLC (Briggs et al. 1982) and corrected for water flux by determining the phenol red content, using a Centrifichem 3000 Autoanalyser (Roche Instrument, Australia). Mercaptoethanol (ME) was added to the test perfusates to prevent breakdown of the reduced forms of folacin. As shown in the table, there is no significant difference between the uptake of folic acid and folic acid containing ME.

Folate uptake (nmol/min/g dry wt. of tissue)*

	Folic acid	Folic acid + 0.3% ME	5-methyl tetra-hydrofolate + 0.3% ME	5-formyl tetra-hydrofolate + 0.3% ME	Tetra-hydrofolate + 0.3% ME
$\bar{x}$	0.49	0.54	0.69	0.43	0.56
σ	0.13	0.10	0.12	0.10	0.21
SE	0.03	0.02	0.02	0.2	0.04

* duplicate determinations of folacin in solutions from four rats.

In these studies, the disappearance of the folacin from the rat perfusate was considered to be due to absorption. The addition of ME to the folacin solution was considered to have no effect on the absorption of the reduced folacins. There was no significant difference between the uptake of 5-methyltetrahydrofolate and tetrahydrofolate but both these substances had a higher uptake than 5-formyltetrahydrofolate ($p < 0.001$ and < 0.05, respectively).

These data support previous reports that different monoglutamates are absorbed with different effectiveness.

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