ABSTRACT

The intermediary metabolism of six isotopic amino acids, ^{15}N-aspartic acid, ^{15}N-glutamic acid, ^{15}N-alanine, ^{15}N-glutamine (amide-^{15}N), ^{15}N-glycine and ^{15}N-lysine (α-^{15}N), and ^{15}N-ammonium chloride were investigated.

The aim of this study was to establish the precursor-product relationships existing between these amino acids, ammonia and urea in the amino-N pools of the major organs and tissue beds of the normal postprandial rat with the specific objective of following the movement of nitrogen to urea synthesis. It was hoped to ascertain whether glutamic acid played a central role in providing nitrogen for urea synthesis and whether there existed any relationship between ^{15}N distribution patterns of the different isotopes and WBPT rates calculated from hepatic and renal urea-N and ammonia-N enrichments.

The method employed involved the administration of tracer quantities of the isotopes by the constant infusion technique and measuring the ^{15}N excess of ammonia-N, glutamine amide-N, alanine-N, glutamate-N, aspartate-N and urea-N.

It was found that nitrogen from ^{15}N-alanine, ^{15}N-aspartic acid and ^{15}N-glutamic acid was distributed evenly in most of the amino-N pools studied. Nitrogen from the other four isotopes was distributed unevenly, preferentially to ammonia, glutamine amide and urea. ^{15}N-glycine and ^{15}N-lysine were only sparingly meta-

bolised. WBPT rates obtained from urea-N enrichments were not affected by the nitrogen distribution patterns of the isotopes but by the extent to which they were metabolised. WBPT rates calculated from ammonia-N enrichments were unduly affected by the extent to which each isotope contributed nitrogen to ammoniagenesis. Glutamic acid does not seem to be the precursor of both nitrogens used for urea synthesis. It supplies only one nitrogen. It is possible that urea is synthesised from an amino-N received via the glutamate to aspartate pathway and an amide-N received via the glutamine to ammonia to carbamyl phosphate pathway. Free ammonia entering the liver is first fixed as glutamine amide before being used for urea synthesis.