Biosynthesis of the Nutritionally Nonessential Amino Acids Assist. Prof. Dr. Shakir .F. T. Al-Aaraji

Ph. D. Biochemistry

University of Anbar

College Of Education For Pure Science

Chemistry department

BIOMEDICAL IMPORTANCE

AMINO ACIDS PRESENT IN PROTEINS AMINO ACID DEFICIENCY KWASHIORKOR MARASMUS CALORIC INTAKE & SPECIFIC AMINO ACIDS ARE DEFICIENT HUMANS CAN SYNTHESIZE 12 OF THE 20 COMMC AMINO ACIDS FROM THE AMPHIBOLIC

Amino acid requirements of humans

Nutritionally	Essential
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Arginine¹ Histidine Isoleucine Leucine Lysine Methionine Phenylalanine Threonine Threonine Tryptophan Valine

Nutritionally Nonessential

Alanine Asparagine Aspartate Cysteine Glutamate Glutamine Glycine Hydroxyproline² Hydroxylysine² Proline Serine Tyrosine

¹"Nutritionally semiessential." Synthesized at rates inadequate to support growth of children.

²Not necessary for protein synthesis but formed during posttranslational processing of collagen. >amino acids from Amphibolic intermediates >a-ketoglutarate Oxaloacetate >3-phosphoglycerate Dietary amino acids

Biosynthesis of glutamic acid





Biosynthesis of proline from I-Glutamate



biosynthesis of alanine by transamination of pyruvate



Biosynthesis of aspartate



Biosynthesis of aspargine



Biosynthesis of tyrosine



Biosynthesis of serine







D-3-Phosphoglycerate





Biosynthesis of glycine



THE SERINE HYDROXYMETHYLTRANSFERASE REACTION

SKELETAL FORMULA OF TETRAHYDROFOLIC ACID





Conversion of homocysteine and serine to homoserine and cysteine





Selenocysteine-specific UGA codon Selenocysteine insertion element SELENOCYSTEINE (TOP) AND THE REACTION CATALYZED BY SELENOPHOSPHATE SYNTHETASE (BOTTOM)

> The prolyl hydroxylase reaction

