

## Amino acid catabolism

Sections/problems listed with an asterisk (\*) do not discuss the exact reaction indicated, but do discuss a closely related reaction.

- Transaminase (EC 2.6.1.1, EC 2.6.1.2) Section 14.4E
- Carbamoyl phosphate synthetase (EC 6.3.4.16) P12. 4

### Urea cycle:

- Ornithine transcarbamylase (EC 2.1.3.3) Section 12.2A,B\*
- Argininosuccinate synthetase (EC 6.3.4.5) Section 12.6, Section 14.1D
- Argininosuccinate lyase (EC 4.3.2.1) Section 14.1D
- Arginase (EC 3.5.3.1) P12.16

### Glycine (glycine cleavage system)

- Glycine dehydrogenase (decarboxylating) (EC 1.4.4.2) P16.4b
- Aminomethyltransferase (EC 2.1.2.10) C11.5

### Alanine (to pyruvate and glutamate):

- Alanine transaminase (EC 2.6.1.2) Section 14.4E

### Serine

- (to pyruvate): Serine dehydratase (EC 4.3.1.17) Section 13.1B, Section 14.4F
- (to glycine): Serine hydroxymethyltransferase (EC 2.1.2.1) Section 11.6D, Section 14.4D

### Cysteine (to pyruvate)

- Cysteine dioxygenase (EC 1.13.11.20) *not covered*
- Aspartate aminotransferase (2.6.1.1) Section 14.4E

### Threonine

pathway 1 (to glycine and acetyl CoA):

- Threonine dehydrogenase (EC 1.1.1.103) Section 16.4D\*
- Glycine C-acetyltransferase (EC 2.3.1.29) Section 14.4D

pathway 2 (to glycine and acetaldehyde):

- Threonine aldolase (EC 4.1.2.5) Section 14.4D\*, P14.10a

pathway 3 (to succinyl-CoA via propionyl CoA):

- Threonine dehydratase (EC 4.3.1.19) P14.2
- 2-oxobutanoate dehydrogenase (EC 1.2.4.4) Section 16.12B\*
- Propionyl-CoA carboxylase (EC 6.4.1.3) Section 13.5D\*, P13.2\*
- Methylmalonyl-CoA mutase (EC 5.4.99.2) *not covered*

### Tryptophan (to glutaryl-CoA)

- Tryptophan 2,3-dioxygenase (EC 1.13.11.11) *not covered*
- Arylformamidase (EC 3.5.1.19) Chapter 12\*
- Kynurenine 3-monooxygenase (EC 1.14.13.9) Section 16.10
- Kynureninase (EC 3.7.1.3) P14.10b
- 3-hydroxyanthranilate 3,4-dioxygenase (EC 1.13.11.6) *not covered*
- Aminocarboxymuconate-semialdehyde decarboxylase (EC 4.1.1.45) Section 13.5C\*, P13.5a
- 2-aminomuconate semialdehyde dehydrogenase (EC 1.2.1.32) Section 16.4D\*, P16.2a
- 2-aminomuconate deaminase (EC 3.5.99.5) Section 11.6\*, P11.1
- 2-oxoglutarate dehydrogenase (EC 1.2.4.2) Section 16.12B\*

### Asparagine (to aspartate)

- Asparaginase (EC 3.5.1.1) Chapter 12\*

**Aspartate**

- (to oxaloacetate): Aspartate transaminase (EC 2.6.1.1) Section 14.4E
- (to fumarate): Aspartate-ammonia lyase (EC 4.3.1.1) P14.3

**Glutamine** (to glutamate)

- Glutaminase (EC 3.5.1.2) Chapter 12

**Glutamate** (to alpha-ketoglutarate):

- Glutamate dehydrogenase (EC 1.4.1.2) Section 16.4D

**Arginine** (to glutamate):

- Arginase (EC 3.5.3.1) P12.16b
- Ornithine transaminase (EC 2.6.1.13) Section 14.4E\*
- Glutamate semialdehyde dehydrogenase (EC 1.2.1.41) Section 16.4D

**Histidine** (to glutamate):

- Histidine ammonia-lyase (EC 4.3.1.3) C14.5
- Urocanate hydratase (EC 4.2.1.49) C16.1
- Imidazolonepropionase (EC 3.5.2.7) Chapter 12\*
- Formimidoyleglutamase (EC 3.5.3.8) P11.13b

**Valine, isoleucine, leucine:**

- Branched chain amino acid transaminase (EC 2.6.1.42) Section 14.4E\*
- Branched chain ketoacid dehydrogenase complex (EC 1.2.4.4) Section 16.12B\*
- Acyl CoA dehydrogenase (eg. EC 1.3.99.13) Section 16.5C, Section 17.3C

**valine** (to succinyl CoA):

- Enoyl-CoA hydratase (EC 4.2.1.17) P16.9
- 3-hydroxyisobutyryl-CoA hydrolase (EC 3.1.2.4) P16.9
- 3-hydroxyisobutyrate dehydrogenase (EC 1.1.1.31) P16.9
- Methylmalonate-semialdehyde dehydrogenase (1.2.1.27) P16.9
- Propionyl-CoA carboxylase (EC 6.4.1.3) Section 13.5D\*, P13.2\*
- Methylmalonyl-CoA mutase (EC 5.4.99.2) *not covered*

**isoleucine** (to succinyl CoA and acetyl CoA):

- Enoyl-CoA hydratase (EC 4.2.1.17) P16.9
- Methyl-hydroxybutyryl CoA dehydrogenase (EC 1.1.1.178) Section 16.4\*
- 3-ketoacyl-CoA thiolase (EC 2.3.1.16) Section 13.4B\*
- Propionyl-CoA carboxylase (EC 6.4.1.3) Section 13.5D\*, P13.2\*
- Methylmalonyl-CoA mutase (EC 5.4.99.2) *not covered*

**leucine** (to acetyl CoA)

- Methylcrotonoyl-CoA carboxylase (EC 6.4.1.4) Section 13.5\*
- Methylglutaconyl-CoA hydratase (EC 4.2.1.18) Section 14.1\*
- Hydroxymethylglutaryl-CoA lyase (EC 4.1.3.4) Section 13.3C\*

**Methionine** (to cysteine and succinyl-CoA):

- Methionine adenosyltransferase (EC 2.5.1.6) E9.1
- Methyltransferase (eg. 2.1.1.37) Section 9.1A
- Adenosylhomocysteinase (EC 3.3.1.1) Section 14.1A
- Cystathionine beta-synthase (EC 4.2.1.22) Section 14.4G\*
- Cystathionine gamma-lyase (EC 4.4.1.1) Section 14.4G
- 2-oxobutanoate dehydrogenase (EC 1.2.4.4) Section 16.12B\*
- Propionyl-CoA carboxylase (EC 6.4.1.3) Section 13.5D\*, P13.2\*

- Methylmalonyl-CoA mutase (EC 5.4.99.2) *not covered*

**Lysine** (to glutaryl-CoA)

- Saccharopine dehydrogenase (EC 1.5.1.8) P11.6, P16.7a
- Saccharopine reductase (EC 1.5.1.10) P11.7, P16.7b
- Amino adipate-semialdehyde dehydrogenase (EC 1.2.1.31) Section 16.4D\*
- 2-amino adipate transaminase (EC 2.6.1.39) Section 14.4E\*
- 2-oxoglutarate dehydrogenase (EC 1.2.4.2) Section 16.12B\*

**Phenylalanine** (to tyrosine):

- Phenylalanine hydroxylase (EC 1.14.16.1) *not covered*

**Tyrosine** (to fumarate and acetoacetate):

- Tyrosine transaminase (EC 2.6.1.5) Section 14.4E\*
- 4-hydroxyphenylpyruvate dioxygenase (EC 1.13.11.27) *not covered*
- Homogentisate 1,2-dioxygenase (EC 1.13.11.5) *not covered*
- Maleylacetoacetate isomerase (EC 5.2.1.2) Section 14.2A\*
- Fumarylacetoacetase (EC 3.7.1.2) Section 13.4B\*

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