7.10: Pyrimidine de novo Biosynthesis

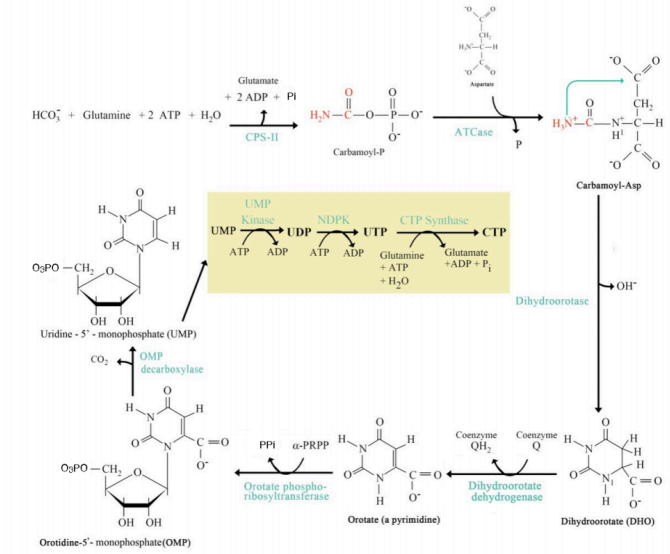

Figure 7.10.1: *De Novo Synthesis of Pyrimidine Nucleotides*

ATCase is regulated by three compounds. One of these (aspartate) is a substrate and it activates the enzyme by binding to the catalytic site and favoring the enzyme's R state. The other two regulators bind to regulatory subunits of the enzyme and either inhibit (CTP) or activate (ATP) the enzyme.

The reaction product, carbamoyl aspartate, is transformed in two reactions to orotic acid, which is, in turn combined with phosphoribosylpyrophosphate PRPP). The product of that reaction, orotidyl monophosphate (OMP) is decarboxylated to form the first pyrimidine nucleotide, UMP. Conversion of UMP to UDP is catalyzed by nucleoside monophosphate kinases (NMPs) and UDP is converted to UTP by nucleoside diphosphokinase (NDPK).

UDP (like all of the nucleoside diphosphates) is a branch point to deoxyribonucleoside diphosphates, catalyzed by ribonucleotide reductases, which are discussed later. UTP is converted to CTP by CTP synthase. This enzyme, which uses an amino group from glutamine for the reaction, serves to balance the relative amounts of CTP and UTP, thanks to inhibition by excess CTP.

Contributors

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