Abstract

This thesis focuses on the enzyme methionine synthase (MS), which catalyzes methylation of homocysteine to produce methionine. Two main families of these enzymes are recognized in nature – cobalamin-dependent and cobalamin-independent. These two enzymes share no sequence homology, and they also use different catalytic mechanisms, substrates and cofactors. Cobalamin-dependent MS is found in humans, whereas cobalamin-independent MS is typical for plants and fungi. In humans, the enzyme provides a connection between folate and methionine cycle – two metabolic pathways which are crucial for example for DNA synthesis and *S*-adenosylmethionine-dependent biological methylations. Recently, the enzyme has been recognized as a potentially promising target for the development of chemotherapeutics and antifungal drugs, mainly based on its essentiality for the proliferation of cancer cells and both viability and virulence of pathogenic fungal species.