Abstract

Fumarate hydratase (fumarase, EC 4.2.1.2) catalyzes the reverse hydration of fumarate to S malate. In mammalian cells, it changes fumarate in the mitochondrial matrix as a part of the citric acid cycle and in the cytosol, where functions to metabolize fumarate the product of the degradation of some amino acids, of ammonia transformation to urea acid or of the purine nucleotide synthesis. .

In human cells, fumarase is encoded by *FH* gene localized on chromosome 1 (1q42.1). The *FH* gene consists of 10 exons and encodes for a 510 amino acids-long protein including the N-terminal mitochondrial signal sequence.

Germline heterozygous *FH* mutations were found in two autosomal dominant syndromes. These are multiple cutaneous and uterine leiomyomatosis (MCUL1 or MCL) and hereditary leiomyomatosis and renal cell cancer (HLRCC). In the most of tumors from these patients, loss of *FH* gene heterozygosity was also found. It has been suggested that fumarase acts as a tumor suppressor according to Knudson's two-hit hypothesis.

The aim of the bachelor thesis was to study the activity and amounts of fumarase in a series of 22 samples of uterine leiomyomas from 22 young women patients (21-31 years) with sporadic uterine leiomyomas. As a control sample, uterine leiomyoma from a 38-year-old patient was used. Activity of fumarase and a control enzyme citrate synthase as well as protein amounts of fumarase and a control protein β-actin was bellow detection limit of used methods. Of the remaining 19 leiomyoma samples, marked reduction of fumarase amounts and activity was found in one sample (sample 9).

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