



Association between ACP₁ genetic polymorphism and favism

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ABSTRACT. An association between favism (a hemolytic reaction to consumption of fava beans), glucose-6-phosphate dehydrogenase deficiency (G6PD⁻) and acid phosphatase locus 1 (ACP₁) phenotypes has been reported; the frequency of carriers of the p^a and p^c ACP₁ alleles was found to be significantly higher in G6PD⁻ individuals showing favism than in the general population. Here, we investigated the hypothesis that favism is caused by toxic *Vicia faba* substances, which in some ACP₁ phenotypes cause increased phosphorylation and consequently increased glycolysis, with strong reduction in reduced glutathione production, resulting in hemolysis. It has been demonstrated that ACP₁ *f* isoforms have physiological functions different from those of *s* isoforms and are responsible for most of the phosphatase activity, in addition to being less stable in the presence of oxidizing molecules. Thus, the C, CA and A phenotypes, characterized by lower concentrations of *f* isoforms, could be more susceptible to damage by oxidative events compared to the other phenotypes. To test this hypothesis, the (*f*+*s*) enzymatic activity of different ACP₁ phenotypes with and without added *V. faba* extract was analyzed. Enzymatic activities of ACP₁ A, -CA, -C groups (low activity) and -B,

-BA, -CB groups (high activity) were significantly different after addition of *V. faba* extract. Phenotypes A, CA and C had extremely low enzymatic activity levels, which would lead to low levels of reduced glutathione and bring about erythrocyte lysis.

Key words: Acid phosphatase locus 1; Genetic polymorphism; Favism; Glucose-6-phosphate dehydrogenase deficiency; LMW protein tyrosine phosphatases