

## **The activity of aldehyde dehydrogenase and glutathione S-transferase in blood of diabetes mellitus patients comparing to healthy control.**

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### **Introduction:**

Oxidative stress plays an important role in the pathophysiology of diabetes mellitus (DM). The high levels of reactive oxygen species and the simultaneous decline in antioxidant defense mechanisms can lead to e.g. damage of cellular enzymes, increased lipid peroxidation and development of insulin resistance. Evidence from a few studies suggest that erythrocyte glutathione S-transferase (GST) and other antioxidant enzymes tend to decrease in DM. Ubiquitously spread ALDH1A1 is indirectly involved in the protection against effects of oxidative stress, oxidizing cytotoxic 4-HNE and MDA, the concentration of which increases as a result of lipid peroxidation. There are no studies either comparing the activity of ALDH1A1 in whole blood in DM and healthy subjects or analyzing the correlation between ALDH1A1 and patients' glycemic status.

### **Aim of the study:**

The aim of our studies was to compare the ALDH1A1 and GST activity in whole blood of DM patients and healthy control and analyze the relation of those enzymes activity with concentration of HbA1c.

### **Material and methods:**

EDTA-blood samples were collected from 50 DM patients of Warsaw Medical University Hospital and 50 healthy subjects from out-patient clinic. The blood was hemolysed using 3 mM phosphate buffer pH=7.4 with 1mM EDTA and in case of ALDH1A1 assay- 0.5 mM DTT. ALDH activity was determined fluorimetrically in the 50 mM pyrophosphate buffer, pH 8.1, at 25°C, in the presence of 1 mM EDTA and 0.5 mM DTT. The assays utilized a highly fluorogenic naphthaldehyde substrate, 6-methoxy-2-naphthaldehyde, reacting with NAD<sup>+</sup> as a co-substrate. GST activity was determined photometrically by measuring an increase in the absorbance of GST-1-chloro-2,4-dinitrobenzene conjugates. Hemoglobin concentration was measured photometrically using Drabkin's reagent. HbA1c was measured immunocolorimetrically using Vitros analyser and results were expressed as % of total hemoglobin.

### **Results:**

Our results revealed that the GST activity was lower ( $p=0.041$ ), whereas ALDH1A1 activity was higher ( $p=0.042$ ) in DM patients than in healthy group (6.1(3.2) U/g Hb and 7.8 (6.9) mU/g Hb vs 6.9(3.8) U/g Hb and 7.2(6.4) mU/g Hb). However, when enzyme activity was expressed in U/l units ( $p<0.0001$ ) even more prominent difference was observed in case of ALDH1A1, while no difference was observed for S-transferase. No correlation between GST or ALDH1A1 activity and HbA1c was found.

### **Conclusions:**

To conclude, the ALDH1A1 and GST activity changes in DM but with no relation to HbA1c in DM group.