STUDY ON THE POSSIBILITY OF ANTIBODIES AGAINST HEAT STRESS PROTEINS AS BIOMARKERS TO ASSESS ABNORMAL XENOBIOTIC-INDUCED STRESS

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Heat shock or stress proteins (Hsps) are a group of proteins induced by a large of xenobiotics, many of which are common in the working environment. The important biological functions of Hsps are closely related to thermatolerance or poison tolerance. The present aim in this paper is to explore the possibility of antibodies against as biomarkers to assess whether workers are experiencing or have experienced abnormal xenobiotics-induced stress within their working environment. In the present study, We used immunoblotting to investigate the presence of antibodies against the different Hsps, Hsp27, Hsp60, Hsp71, Hsc (heat shock cognate) 73, Hsp90α and β in groups of workers exposed to high temperature, carbon monoxide, to either low (<300mg/m^3) or high concentrations of benzene (300mg/m^3) and a group of workers who had experienced benzene poisoning. In the same time, blood samples from this workers were assayed for the number of peripheral white blood cells, concentration of hemoglubin, activities of serum superoxide dismutase (SOD), lymphocyte DNA damage et al. We further investigated the difference in oral temperature, heart rate, and lymphocyte DNA damage in the man-made climate high temperature room between pilot with and without anti-Hsps. The significance of the presence and dilution of anti-Hsp71 were analyzed in patients with heat inducing illness using western blot-ELISA. Antibodies to Hsp27 and Hsp71 were found more frequently in the high temperature and carbon monoxide-exposed groups than in control ($P<0.05$). The carbon monoxide-exposed group showed the highest incidence of anti-Hsp antibodies. Anti-Hsp60 antibodies were only detected in workers exposed to high temperature and carbon monoxide. The high incidence of anti-Hsp was related to the percentage of workers with abnormal electrocardiogram, B echogram changes, displaying hepatitis B antigen, a significant increase in the activities of ananine aminotransferase and acid phosphatase, and a significant increase in lymphocyte DNA damage. Benzene-poisoned workers showed a high incidence of antibodies against Hsp71 (~40%) which was associated with a decrease in white blood cells (3.84 ±1.13×109 versus 7.68±1.84×109 in control) and with an increase in activities of serum SOD (138.43 ±23.15μ/ml) and lymphocyte DNA damage (18.7%). The results from the man-made climate room showed that the increase in oral temperature, heart rate and lymphocyte DNA damage in pilots with the positive antibodies to Hsp were higher than those in pilots with the negative antibodies during heat stress. The presence and dilution of anti-Hsp71 in patients with acute heat inducing illness were significantly higher that in control. These results suggest that the increased frequency of antibodies to Hsps is the result of these damage, of the release of denatured Hsps and of a decrease in the phagocytic ability of macrophages in these worker and the presence of these autoantibodies in plasma of workers and pilots may indicate the increase of heat damage and high sensitivity to heat or others. These results also suggest that whether antibodies against Hsps can potentially be useful biomarkers to assess if workers are experiencing abnormal stress within their living and working environment.

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