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THE OXIDATIVE EFFECTS OF ACETYLPHENYLHYDRAZINE AND  
4-AMINOPHENYLDISULFIDE ON CANINE ERYTHROCYTES  
ASSOCIATED WITH INHERITED HIGH GSH CONCENTRATION

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Some dogs have erythrocytes characterized by high  $\text{Na}^+$ ,  $\text{K}^+$ -ATPase activity, high potassium (K) and low sodium (Na) concentrations, and a high accumulation of reduced glutathione (GSH) (HK RBCs; Maede, Y., Inaba, M. and Taniguchi, N., *Blood*, 61: 493, 1983). The HK RBCs seem to be more resistant to oxidative stresses than normal canine erythrocytes (LK RBCs), because of their high concentration of GSH, which is 6 times the normal level. However, the dogs possessing HK RBCs have shown more severe hemolytic anemia after feeding with onions, as compared to normal dogs. The present study was carried out to determine whether the HK RBCs with a high GSH concentration are more susceptible to oxidative attack than LK RBCs with a normal GSH concentration. The HK RBCs and LK RBCs were incubated with each of two oxidants, acetylphenylhydrazine and 4-aminophenyldisulfide.

When erythrocytes were incubated with acetylphenylhydrazine at  $37^\circ\text{C}$ , the number of Heinz bodies in LK RBCs increased more rapidly and abundantly than in HK RBCs. The concentrations of GSH in both erythrocytes gradually decreased during the incubation.

In contrast, when erythrocytes were incubated with 4-aminophenyldisulfide, the increases of both Heinz bodies and methemoglobin concentration in HK RBCs were more marked than those in LK RBCs. In addition, the concentrations of GSH in both erythrocytes fell immediately after the onset of the incubation. These results indicate that HK RBCs are more susceptible to oxidative attack by 4-aminophenyldisulfide, while HK RBCs showed less susceptibility to that by acetylphenylhydrazine as compared with LK RBCs.

The results strongly suggest that intracellular GSH plays an important role, as is well known, in protecting erythrocytes from oxidative damage induced by some oxidants, such as acetylphenylhydrazine, but that, on the other hand, it seems to induce oxidative damage to the cells by co-operating with some kinds of oxidants, such as 4-aminophenyldisulfide.