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Toxicity to the dietary administration of hydrogen peroxide in acatalasemic Drosophila.

We have recently demonstrated that the dietary administration of the catalase inhibitor 3-amino-1,2,4-triazole (AT) provides a very sensitive and simple technique for the destruction of existing catalase molecules in vivo (Lubinsky and Bewley, 1979). Adult flies are starved for 24 hours on agar, and then fed on a 5 mM AT-sucrose solution for two hours, which results in a complete destruction of catalase activity with no apparent effect on viability. This technique has provided a mechanism for examining the toxicity of the substrate H_2O_2 in flies with normal catalase activity and flies made acatalesemic by the AT-method.

Adult flies with normal catalase levels appear to be relatively resistant to the dietary administration of the substrate H_2O_2 (Fig. 1). However, these same concentrations of H_2O_2 are extremely toxic to flies that have been made acatalesemic following the administration of 5 mM AT. In fact, as little as 0.05% H_2O_2 in the diet results in 100% mortality within five days of exposure while 0.1% results in 100% mortality within three days of exposure. The threshold for H_2O_2 tolerance in normal flies is apparently close to 1% H_2O_2 since this concentration will eliminate a population with normal catalase levels within three days of exposure. These results indicate that H_2O_2 can serve as a sensitive discriminator between CAT-positive and CAT-negative flies in a similar fashion that the substrate ethanol serves as a discriminator between ADH-negative and ADH-positive flies (Vigue and Sofer, 1976), and as such may prove useful as a positive selection agent in studies focusing on reversion, intracistronic recombination, conversion, and suppression at the Cat locus.

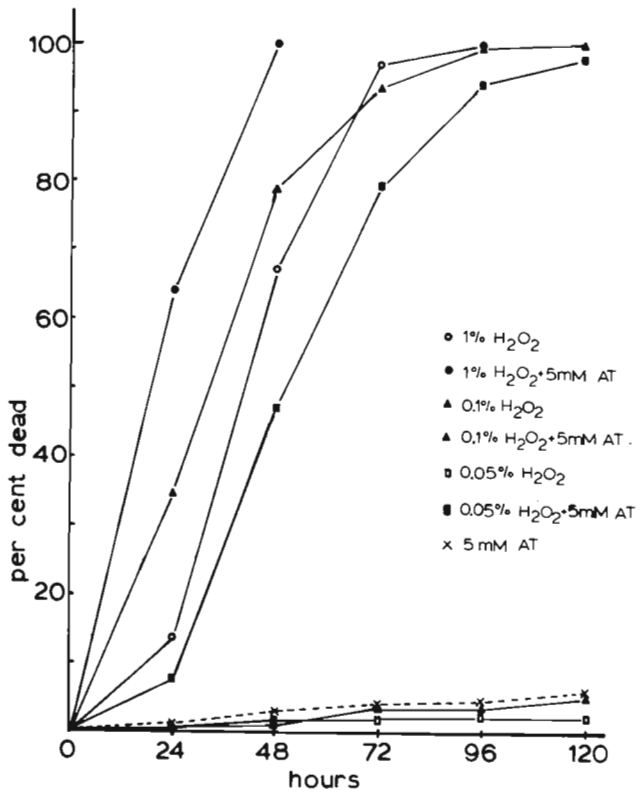

Fig. 1. The mortality rate of adult male Drosophila of an Oregon-R strain when fed on differing concentrations of H_2O_2 with or without 5 mM AT.

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