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## 2-(ALLYLTHIO)PYRAZINE INHIBITS AFLATOXIN $B_1$-INDUCED HEPATOCARCINOGENESIS IN RATS

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2-(Allylthio)pyrazine (2-AP), a synthetic pyrazine derivative with an allylsulfur moiety, has hepatoprotective effects against toxicants. Effects of 2-AP on hepatic tumorigenesis, glutathione S-transferase (GST) activity and urinary elimination of aflatoxin $B_1$ ($AFB_1$)-$N^7$-guanine adduct were examined in rats exposed to $AFB_1$. $AFB_1$-DNA adduct formation was also determined in the liver. Male Sprague-Dawley rats were treated with 2-AP at the daily oral doses of 10, 25 and 50 mg/kg for 16 consecutive days, during which four repeated doses of $AFB_1$ (1.0 mg/kg) were given to the animals. Rats were then subjected to two-thirds of hepatectomy, followed by administration of phenobarbital (0.05% in drinking water for 18 days). Focal areas of hepatocellular alteration were identified after 44 days and preneoplastic foci expressing the placental form of glutathione S-transferase P (GST-P) were quantified by immunostaining of liver sections. 2-AP at the doses examined reduced the volume of liver occupied by GST-P foci by 65%-96%. Under these experimental conditions, 2-AP treatment resulted in significant elevations in GST activity and glutathione level in the liver. 2-AP pretreatment also caused a 47% reduction in the urinary elimination of $AFB_1$-$N^7$-guanine adduct over the 24-h postdosing period. The inhibitory effect of 2-AP on hepatocarcinogenesis might result from elevations of glutathione level and of activity of GST, which catalyzes detoxification of the carcinogen.