Ethanol and Methanol Metabolites in Alcohol Withdrawal

The twenty-one subjects participating in this study were serial admissions to the St Louis Detoxification Center during the period of December 2-21, 1971. Their ages ranged from 29 to 72 yr and they comprised twenty males and one female. A blood sample (10 ml) was obtained from the patient on admission, when a symptom intensity rating evaluation was carried out. Blood concentrations of ethanol, methanol, acetaldehyde and formaldehyde-formate were determined by gas-liquid chromatography. This procedure was repeated on four consecutive days (total of five samples), after which the patient was discharged from the Center.

All participating subjects received chlordiazepoxide, flurazepam and a high potency vitamin B complex and C in a fixed schedule. About one-half of the subjects had initial blood levels of ethanol of less than 100 mg/100 ml, while those of the remainder were well above 100 mg/100 ml. We therefore arbitrarily selected a blood level of ethanol of 100 mg/100 ml as the criterion for categorizing the patients into two groups—a low-alcohol group and a high-alcohol group. Students' t-test or the t-test for the difference of matched pairs was used for the statistical evaluation of the data.

The mean admission blood alcohol level of the low-alcohol group was 14.4 mg/100 ml (s.e. ±7.1) while that of the high-alcohol group was 309 mg/100 ml (±27.2). The blood ethanol levels for both groups over the 5-d observation period (Fig. 1) rapidly returned towards a non-alcoholic level, although on days 1 and 2 they were still significantly higher in the high-alcohol group. Blood acetaldehyde concentrations over the 5 withdrawal days for the two groups are shown in Fig. 1. The high-alcohol group acetaldehyde blood level was significantly higher on admission day (0.747 ± 0.162 mg/100 ml) than it was in the low-alcohol group (0.378 ± 0.080 mg/100 ml). This large and statistically significant difference between the two groups rapidly returned towards a non-alcoholic level, although on day 1 (0.17 ± 0.08 mg/100 ml) the difference was still apparent on day 1 (0.17 ± 0.08 mg/100 ml).

The formalddehyde-formic acid blood concentrations for the high-alcohol group (1.54 ± 0.27 mg/100 ml) was also apparent on day 1 (0.17 ± 0.08 mg/100 ml). The formalddehyde-formic acid blood concentrations for the high-alcohol group were higher on admission and for each of the 4 observation days (Fig. 2). Peak levels (5.53 ± 1.19 mg/100 ml) achieving significance was reached on the third observation day, and this significant elevation over the formalddehyde-formic acid blood concentration in the low-alcohol group (1.20 ± 0.17 mg/100 ml) was still observed on the fourth observation day.

Our knowledge, this formalddehyde-formic acid response has not been reported before from this type of clinical population. Both the high- and the low-alcohol groups exhibited high (abnormal) total scores in the intensity of withdrawal symptoms rating scores obtained on the admission day evaluation. Subsequent daily behavioral evaluations showed that the rating scores for total withdrawal symptoms of the low-alcohol group rapidly returned towards normal, the total scores on all days being significantly lower than the admission score. In the high-alcohol group, the abnormal behaviour was greatest on this first observation day and then gradually returned towards normal levels. Examination of the peak scores for each of the ten factors revealed that only eating and sleeping disturbances
we speculate alcohol withdrawal. 

withdrawal signs and symptoms significantly greater than those methanol and their metabolites and also showed total disrupted when ethanol is abruptly withdrawn. This would be expected hypothesis that the oxidative enz

methanol metabolites, formaldehyde-formate. 

delayed and marked elevation in blood concentrations a number of interesting differences between the two groups. The 

into high- and low-alcohol groups resulted in the emergence of 

of the low-alcohol groups.

significant elevations in blood concentrations of ethanol, 

methanol metabolites. 

Time (d) 

shortly after abrupt ethanol withdrawal was thus associated 

with a marked decrease in methanol blood level and a delayed 

and marked elevation in the blood concentration of the (N=12) and low-alcohol (N=9) separated groups during alcohol withdrawal. *: P<0.05 between groups on common measurement day. *: P<0.05 between each group on different measurement days. Lower: Blood formaldehyde - formic acid levels and standard errors as above.

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