Acceleration of the Average Ethanol Elimination Rate in Oral Administration Studies

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AIMS: To determine the up-to-date elimination rate per hour of ethanol in a healthy population sample considering forensic criteria.

METHODS: As part of a study on ethanol kinetics, elimination rates of blood alcohol were determined. Ninety-seven (97) sober, healthy men, aged 21 to 30 given oral alcohol in a dose of 1.10 g/Kg weight in the form of beer (4.5 Vol%), wine (12 Vol%) or vodka (40 Vol%) continuously over 2 h. All subjects were pre-examined thoroughly concerning indicative parameters of alcoholism or other liver pathology. Drinking habits showed an average weekly alcohol consumption of 130 g ethanol. Blood samples were taken in intervals of 20 minutes, starting with the beginning of alcohol consumption and ending at 0.0 mg/L breath alcohol. Therefore continuous sampling over 6 to almost 10 h was accomplished. The mean BAC of each sample was determined in quadruplicate, twice by the enzymatic ADH-method, twice by gas chromatography. Beginning 2 hours after the end of drinking linear elimination was assumed, ending with a BAC 0.2 g/Kg. In this period retrograde calculation in court (Germany) is legally allowed. The elimination rate was determined by linear regression. The hourly elimination rate (Beta-60) was determined as the gradient of the regression line.

RESULTS AND CONCLUSIONS: For the subjects tested the following results were obtained: Mean 0.1681 g/Kg/h; SD 0.0307; Median 0.1661 g/Kg/h; Max 0.2451 g/Kg/h; Min 0.1084 g/Kg/h, mean $R^2 = 0.9912$ ($y = a+bx$). The determined hourly elimination rate beta-60 is significantly higher than the 0.15 g/Kg/h that are currently considered as normal average rate. Comparing this value with older and recent scientific work under similar circumstances, a trend towards a higher average elimination rate has to be discussed. With regard to our results a beta-60 of 0.26 g/Kg/h would have to be considered as maximum elimination rate to include 99.73% of possible cases.

Keywords: Elimination rate, Pharmacokinetics, Ethanol