

LETTER TO THE EDITOR

INFLUENCE OF METHANOL ON THE RELEASE OF DOPAMINE FROM RAT BRAIN SLICES - AN *IN VITRO* STUDY

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Sir,

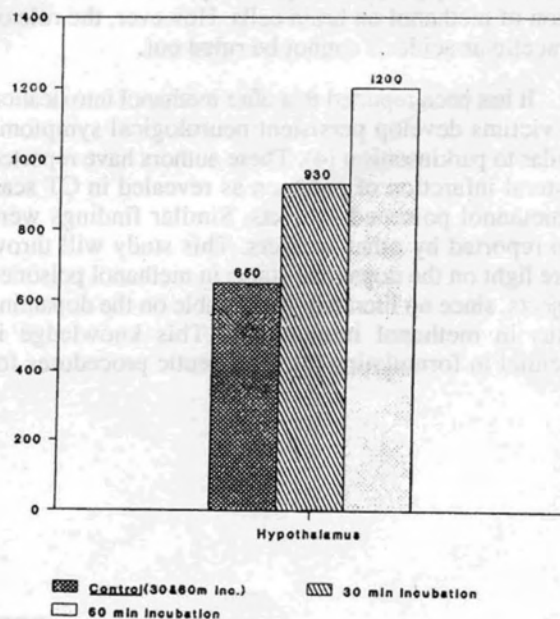
Methanol, the simplest of the alcohols, produces severe metabolic toxicity in man. It forms part of the adulterant of the illicit liquors made by bootleggers and also used extensively in industries as a useful solvent. The toxic syndrome due to methanol poisoning includes severe metabolic acidosis, ocular toxicity leading to blindness and CNS deterioration ultimately resulting in high rate of mortality. 90% of methanol is metabolised in the liver by alcohol dehydrogenase to produce formaldehyde and formic acid which is excreted through kidneys. The remaining 10% is excreted unchanged through the lungs and kidney. The half-life of methanol is about 20-24 hrs.

Ethanol is known to alter the biogenic amine release from the brain tissues. It has been shown that methanol change the brain content of biogenic amines when administered *in vivo* (1). However, it is not known whether methanol alters the release of biogenic amines from the brain slices *in vitro* also. Hence this preliminary work was undertaken. In the present study, it was proposed to study only dopamine release as a model.

Healthy adult male Wistar strain of albino rats (150-180 g) were used for this study. The animals were housed under standard laboratory conditions and fed with standard rat feed and water *ad libitum*. The experimental animals were decapitated by rapid guillotine method at 8 AM and hypothalamus dissected out on pre-cooled glass plate (2), weighed and immediately transferred to 6 ml of incubation medium (Krebs bicarbonate buffer). The medium with brain slices was incubated at 37°C for 30 min (Group I) and 60 min (Group II) respectively. 10 control slices and 20 test slices (10 for each time period) were used. The

test slices were incubated with medium containing methanol (250 mg%). After incubation, the medium was centrifuged at 1000 RPM for 5 min and supernatant was removed for fluorometric analysis of dopamine (3).

It was found that the dopamine levels increased significantly ( $P < 0.001$ ) in both 30 min and 60 min incubation with methanol. They are shown in Fig. 1.



Note :  
For 30 Min. Incubation  $P < .001$   
For 60 Min. Incubation  $P < .001$

Fig. 1 : Dopamine levels in the incubating medium. (ng/g of hypothalamus)

TABLE I : Dopamine levels in the incubating medium (ng/g of hypothalamus).

S. No.	Control hypothalamus slices	Hypothalamic slices with methanol in the medium	
		30 min of incubation	60 min of incubation
1.	686	940	1000
2.	555	714	958
3.	925	1078	1332
4.	480	727	1416
5.	761	933	1250
6.	665	999	1050
7.	553	800	999
8.	623	1249	1605
9.	666	810	965
10.	669	1050	1435
N = 10	$\Sigma x = 6574$ $\bar{x} = 657.4$ S.D. = 123.53 S.E. = 39.09	$\Sigma x = 9300$ $\bar{x} = 930$ S.D. = 170.65 S.E. = 54.00 'T' Value 4.092 (P<.001)	$\Sigma x = 12010$ $\bar{x} = 1201$ S.D. = 236.29 S.E. = 74.77 'T' Value 6.447 (P<.001)

and Table 1. It can be inferred from this study that the release of dopamine was probably due to the direct action of methanol on brain cells. However, the role of intracellular acidosis cannot be ruled out.

It has been reported that after methanol intoxication the victims develop persistent neurological symptoms similar to parkinsonism (4). These authors have reported bilateral infarction of putamen as revealed in CT scan in methanol poisoned subjects. Similar findings were also reported by other workers. This study will throw more light on the dopamine status in methanol poisoned subjects, since no literature is available on the dopamine status in methanol intoxication. This knowledge is essential in formulating the therapeutic procedures for

these patients in future.

This study will also form the basic model to explore further the mechanism of action of methanol. It is proposed to use various blockers which blocks the synthesis and break down of the monoamines, to study the biodynamics of monoamines under the influence of methanol, at a later date. Further this study raises the question : does methanol increase the release of dopamine by altering the fluidity of cell membranes in the brain slices?

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V. SREEDHAR, R. RAMAKRISHNAN AND  
A. NAMASIVAYAM\*

Department of Physiology,  
Dr. ALM PGIBMS, University of Madras,  
Taramani, Madras - 600 113

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\*Corresponding Author