

SHORT COMMUNICATION

EFFECT OF PENTOBARBITAL AND THIOPENTAL ON THE ACETYLCHOLINE CONTENT OF THE HEART AND BRAIN

By

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Acetylcholine content of the heart is altered by drugs which affect the rate and rhythm of the heart (6, 10). Pentobarbital suppresses cardiac arrhythmias (3) while thiopental provokes arrhythmias (9). Hence, it is of interest to study changes in the acetylcholine level of the heart in rats treated with these two barbiturates. Further, since there are many similarities in the fundamental mechanisms of excitation between the nervous and cardiac tissues (4), changes in the acetylcholine content of the brain have also been determined in some of the experiments.

MATERIALS AND METHODS

52 albino rats of both sexes, weighing between 80 and 200 gm were divided into 3 groups. First group served as controls and received normal saline intraperitoneally. The second and third groups were given intraperitoneal injection of 30 mg/kg of pentobarbital sodium and thiopental sodium respectively. This resulted in the loss of righting reflex within 15 to 20 minutes. The animals were stunned and sacrificed. The heart and brain were removed quickly and kept in dry ice for 10 minutes. The atria, ventricles and cerebral cortex were dissected out. Acetylcholine content of the cardiac tissue was determined by the method of Anand *et al.* (1) and that of the brain by the method of Bose *et al.* (2).

RESULTS

The results, as summarized in Table I, indicate that pentobarbital produces a significant decrease in the acetylcholine content of the atria and ventricles while thiopental causes a significant increase in the acetylcholine content of the atria without any significant change in that of the ventricles. Acetylcholine level of the cerebral cortex is significantly increased by pentobarbital while it remains essentially unchanged by thiopental.

DISCUSSION

Acetylcholine increases the permeability of the cardiac cell membrane (12). Quinidine, in common with other antiarrhythmic drugs, stabilizes the cardiac cell membrane leading to electrophysiological changes which are conducive to the termination of an arrhythmia (11). Since these drugs reduce the acetylcholine content of the heart, it has been suggested that their antiarrhythmic

TABLE I

Acetylcholine content of rat's brain and heart in mcg/gm of fresh tissue

Groups	Procedure	Cerebral Cortex			Atrium			Ventricle		
		No. of rats	Mean \pm S.E.	P-value	No. of rats	Mean \pm S.E.	P-value	Mean \pm S.E.	P-value	
I	Control	11	1.06 0.17	..	31	7.4 0.87	..	2.4 0.46	..	
II	Thiopental sodium	8	1.36 0.41	>0.05	12	10.3 0.53	<0.001	2.2 0.41	>0.05	
III	Pentobarbital sodium	6	2.6 0.60	<0.02	9	3.8 0.90	<0.001	1.3 0.53	<0.05	

activity is mediated through an interference with the acetylcholine system (6,8). Further support is lent to this viewpoint by the present observation that pentobarbital, an antiarrhythmic agent (3), reduces the acetylcholine content of the heart. It is of interest that thiopental, which favours the production of arrhythmias (9), increases the acetylcholine level of the atria as has also been observed previously for another arrhythmogenic agent, desacetyl lanatoside (7). No explanation can be offered for the inability of thiopental to produce any significant change in the acetylcholine content of the ventricle.

Acetylcholine level of the cerebral cortex is increased following the administration of pentobarbital and it remains unchanged by thiopental. It indicates that biochemical mechanisms in cardiac and nervous tissues in respect of acetylcholine are not influenced in a similar manner by the same drugs.

It has been postulated that drug-induced decrease in the activity of central nervous system is associated with elevation of acetylcholine content of the brain (5). However, the present findings are not in corroboration of this viewpoint since thiopental in doses in which it causes loss of righting reflex does not increase the acetylcholine level of cerebral cortex.

SUMMARY

1. Pentobarbital reduces the acetylcholine content of the rat's atria and ventricles while thiopental causes an increase in that of the atria.
2. Acetylcholine level of the brain remains unaffected by thiopental while it is increased by pentobarbital.

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