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LETTER TO THE EDITOR

CHANGES IN BRAIN CALCIUM CONTENT AND CA^{++}-ATPASE ACTIVITY IN POTASSIUM EMBELATE TREATED RATS

Sir,

(Received on August 10, 1989)

It has been reported that potassium salt of embelin (ex : *Embelia ribes* Burm.) possessed potent non-narcotic analgesic activity in rats and mice when given by oral, i.m. and i.c.v. routes (1). As a part of our investigation concerning the mode of pain inhibition by potassium embelate, we studied the changes of brain calcium content and ATPase activity after the administration of potassium embelate by i.c.v. route in normal rats. The concentration of calcium in rat brain was determined by Atomic Absorption Spectroscopy with an IL (Instrumentation Laboratory Inc, USA) model 951 The Spectrophotometer was adjusted as per IL Analytic Manual and the analysis done according to the method described by Bradbury *et al* (2). Ca^{++}-ATPase activity was determined by the method of Cooper and Stanworth (3).

Study was performed on healthy adult albino rats weighing 150–175 gm. Potassium embelate was made as per the procedure standardized in this Laboratory. The i.c v. administration was made as described previously (1). The doses of potassium embelate ranged from 10–100 μg and times between i.c.v. injection and decapitation was 45 min. Earlier, it was shown that 50 and 75 μg of potassium embelate given i.c.v. produced maximal analgesia during 30–60 min (1). In antagonism experiments 1 mg/kg naloxone–Hcl (Endo Laboratory, USA) was administered 15 min before potassium embelate treatment.

As seen from Table 1, brain calcium concentrations showed non-significant decrease with increasing concentration of potassium embelate. Naloxone did not affect brain calcium levels in potassium embelate-treated rats suggesting a different action of this compound as most narcotic analgesics deplete brain calcium pool which is protected by naloxone (4). On the other hand, brain ATPase activity decreased significantly. This decrease was dependent on dose over the range 10–50 μg, linear over the reported analgesic doses 50 and 75 μg and saturable at doses greater than 75 μg.

The importance of calcium ions in the neuronal activity and its important role in the mechanism of analgesia has been well documented (4). Besides, Ca^{++}-ATPase, a membrane bound enzyme which ordinarily keeps Ca^{++} ions out of the cell, the expenditure of ATP has been shown to be involved in the narcotic analgesia (4). Changes in ATPase activity would result is changes in the intracellular concentration of calcium. Such an event would affect the neuronal membrane function thus directly affecting neurotransmission. It seems logical to speculate that initial disturbances of optimal neuronal calcium associations and membrane ATPase would contribute in part to the observed analgesic effect of potassium embelate. Further studies are being carried out to understand the mechanism of antinociception with reference to potassium embelate.

TABLE I : Brain calcium content and Ca^{++}-ATPase activity in control and potassium embelate-treated rats.

Dose of Potassium embelate (i.c.v.)	*Calcium content (μg/g/wet. tissue)*		*Ca^{++}-ATPase activity (%)*
	Without Naloxone	*With Naloxone*	
0	57.5±1.1*	55.0±7.7	100
10	57.0±1.3	50.0±7.2	83
20	54.0±1.7	51.0±7.3	72
40	51.0±1.3	50.0±1.4	65
50	49.0±1.1	47.0±1.2	61
75	47.0±1.3	48.0±1.2	63
100	40.0±1.2	41.0±1.3	64

*Values are mean±s.e.m., Significance of difference by Students t-test. Each experiment was replicated 3 times. 9-12 animals were used in each experiment.

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