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*LETTER TO THE EDITOR*

# ROLE OF NOREPINEPHRINE (NE) IN THERMOREGULATORY MECHANISMS IN NORMOTHERMIC AND CONSTITUTIONALLY HYPOTHERMIC RATS

Sir,

**( Received on November 2, 1989 )**

It is well known that intrahypothalmic injections of norepinephrine cause hypothermia on exposure to low ambient temperatures (22 ± 2°C) in normothermic rats (1,2). Ambient temperature, dosage and site of administration etc. are all known to influence the thermo-regulatory responses (3). However, not much has been mentioned regarding the basal body temperature itself which may also influence the response to norepinephrine, the present communication deals with the same.

While studying the effect of norepinephrine and its alpha and beta blockers in relation to their influence on basal body temperature, the authors came across this finding that the response to norepinephrine was also influenced by the basal body temperature of that animal.

Six male albino rats (200 - 250 g) were used for the study. Their basal body temperature was recorded. The electrodes were implanted in the anterior hypotholamus according to the co-ordinates of Paxinos and Watson (4). After a recovery period of 5 days, basal body temperature was recorded again in all the animals. The temperature recorded in all the six rats was almost the same as pre-implantation temperature. It was observed that two of the six rats had constitutional hypothermia with no other abnormality. The animals were henceforth divided into two groups. Group I aninfals, those with a normal basal body temperature (Normothermic) and Group II animals with a constitutional hypothermia. All the animals were given an injection of NE (1 µl = 1 µg) and kept at an ambient temperature of 22 ± 2°C for four hours. The animals were free moving within their cages. Rectal temperature was recorded after every half-an-hour. The same procedure was repeated for three days.

To confirm the position of the canula the brain was fixed by 10% formalin and the brain sections processed by conventional histological procedure.

It was observed that in Group I animals injections of NE caused hypothermia whereas in case of Group II animals an increase in body temperature was observed from the basal leavels (Table I). The results in both cases are statistically significant.

TABLE I : (Group I - Normothermic)

| *Day* | *Treatment* | *Basal Body* Temperature α | *Rectal Temperature* (Mean ± S.E.) 30' | 60' | 90' | 120' | 150' | 180' | 210' | 240' | *'P' value* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (Mean ± S.E.) | | | | | | | | | |
| 1. | NE (n = 4) | 37.46 ± 0.513 | 37.4 ±1.27 | 36.4 ±.83 | 36.5 ±.132 | 35.7 ±.48 | 34.6 ±.32 | 34.2 ±.56 | 34.8 ±56 | 35 ±.22 | between basal & 240' |
| 2. | NE (n = 4) | 36.9 ± .294 | 36.8 ±.53 | 35.32 ±.36 | 34.8 ±.46 | 34.2 ±.28 | 34.20 ±.44 | 34 ±.32 | 34 ±.42 | 34.4 ±.32 | <.01 |
| 3. | NE (n = 4) | 37.2 ±.2333 | 37.2 ±.24 | 37 ±.42 | 36.2 ±.22 | 35.5 ±.42 | 35 ±.32 | 34.4 ±.42 | 34.6 ±.22 | 34.8 ±.34 | |
| | | | (GROUP II - Hypothermic) | | | | | | | | |
| 1. | NE (n = 2) | 31 ± .25 | 31.2 ±.48 | 31.6 ±.32 | 32.4 ±.22 | 33 ±.82 | 33.8 ±.52 | 34.5 ±.48 | 34.8 ±.52 | 35 ±.66 | between basal & 240 |
| 2. | NE (n = 2) | 31.8 ±.42 | 31 ±.54 | 31.8 ±.44 | 33 ±.54 | 33.6 ±.42 | 34.2 ±.89 | 34.8 ±.89 | 34.6 ±.82 | 34.8 ±.42 | <.01 |
| 3. | NE (n = 2) | 31.4 ± .38 | 31.8 ±.42 | 32.4 ±.32 | 33.6 ±.42 | 34.2 ±.54 | 34.4 ±.32 | 35 ±.68 | 35 ±.42 | 35.2 ±.34 | |

Dose of NE = 1 µg (1 µl)

Hypothermia with central applications of catecholamines has been observed (2) as also hyperthermia (5,6) in normothermic animals. Avery (7) has suggested that slight differences in injection procedure as well as ambient temperature contribute to the type of response produced. NE is known to play a role in both heat loss as well as heat production pathways (6). Hyperthermia observed in Group II animals may be explainable on these basis. Possibly the peripheral thermal drive arising from the differences in temperature between the body and the ambient air may be an important factor for determining the type of the thermo-regulatory response to a chemical substance. (8). Evidently, by the end of three hours the temperature in two groups became almost the same. Hence, it appears that basal body temperature also influences the response to centrally administered NE. The finding of constitutionally hypothermic rats was purely accidental and hence the observations available are only few. However the opposite response in two groups is an interesting finding which needs further investigation.

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