

LETTERS TO THE EDITOR

The effect of intrahypothalamic infusion of prostaglandin F_{2α} on body temperature and behaviour in chicks

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Intraventricular prostaglandin F_{2α} (PGF_{2α}) administered at various ambient temperatures lowered body temperature in sheep (Hales, Bennett & others, 1973) but was without effects in cats and rabbits at thermoneutrality (Milton & Wendlandt, 1971). In non-anaesthetized chicks PGF_{2α} infused into the hypothalamus has markedly different effects on body temperature and behaviour from those of other prostaglandins infused into the hypothalamus (see Artunkal & Marley, 1974; Nisticò, 1976). PGF_{2α} is thought to be a normal constituent of the fowl's brain (Horton & Main, 1965). Large doses of PGF_{2α} given intravenously to chicks lowered body temperature (Horton & Main, 1965). In the present experiments a low dose of PGF_{2α} was hypothermic when infused at three different temperatures into the hypothalamus.

In 35 chicks tested, an infusion cannula was implanted stereotactically into the hypothalamus (Marley & Stephenson, 1972) under halothane anaesthesia (Marley & Payne, 1964) and a temperature bead planted subcutaneously (Allen & Marley, 1967). The chicks were tested in a controlled environment chamber (Stephenson, 1971 at least 24 h after recovery). Chicks aged 14–16 days were studied at 31° and 24°; those of 20–24 days were tested at 31° and 20°. These temperatures are the extremes of the thermoneutral ranges for chicks of such ages. After a control period in the environmental chambers of at least 1 h PGF_{2α} tromethamine salt dissolved in ethanol (10 mg ml⁻¹) and diluted to 1 mg ml⁻¹ with 0.9% w/v saline containing sodium carbonate, 0.2 mg ml⁻¹ (Bennett & Posner, 1971) was infused in 1 μl volumes. Cannulae positions were verified histologically post-mortem.

Ten chicks were studied at 31°, PGF_{2α} (14.3 nmol) infused into the hypothalamus lowered the temperature by 1 ± 0.26° the lowest temperature occurred after 9 ± 6.4 min with recovery 30 ± 7 min later, followed by an elevation of 0.75 ± 0.23° lasting about 50 min. All 10 chicks remained alert throughout the experiment. At 24° (21 chicks) PGF_{2α}, 14.3 nmol, infused into the hypothalamus initially lowered body temperature 1.4 ± 0.3°, the low point being reached after 24 ± 7.3 min with recovery to control values after 40–50 min; subsequently the temperature rose 0.89 ± 0.23° for 80–90 min. Chicks remained alert throughout the experiment. In the two chicks given solvent (1 μl) intrahypothalamically, as controls, body temperature and behaviour were unaffected. In 4 chicks aged 20–24 days at 20°, the effects of infused PGF_{2α} (14.3 nmol) were similar to those obtained in younger chicks at 24° (fall of 0.8 ± 0.26 after 21.6 ± 5.3 min with rise of 0.65 ± 0.75 35 ± 2.5 min later).

Infusion of PGF_{2α} into the hypothalamus of chicks thus produced a biphasic change (initial fall, followed by a rise) in body temperature regardless of the ambient temperature. This compares with an elevation of body temperature and induction of sleep by infusion of PGE₁, PGE₂ or PGA₂ into the chick hypothalamus (Artunkal & Marley 1974; Nisticò & Marley, 1976).

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