Evidence *in vitro* for a 5-HT link in dopaminergic neurotransmission in the anterior hypothalamic region of the rat: demonstration of a 5-HT link in dopaminergic thermoregulation?

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Both dopamine (DA) (Cox, Kerwin & Lee, 1978) and 5-hydroxytryptamine (5-HT) (Lin, 1978) may have a physiological role in heat loss mechanisms in the rat. Furthermore it has been suggested that DA-dependent heat loss mechanisms are mediated through a 5-HT link in the rat hypothalamus (Maj, 1977). We have investigated this interaction *in vitro* using two approaches. Firstly we have studied the effect of dopamine and the dopamine receptor agonist apomorphine, in combination with various neuroleptic drugs, on the efflux of radioactivity from superfused anterior hypothalamic slices (0.2 × 0.2 mm) prelabelled with 10^{-7} M [^{3}H]-5-HT. The methods have been described in detail elsewhere (Kerwin & Pycock, 1979). Secondly, we have investigated the DA-sensitive adenylate cyclase in crude membranes prepared from the anterior hypothalamic region of rats which one week previously had received either a bilateral stereotaxic injection of the 5-HT neurotoxin, 5,6-dihydroxytryptamine (5,6-DHT, 10 μg/2 μl) or 2 μl of 0.1% ascorbic acid into the anterior hypothalamus.

In release studies a depolarizing stimulus (50 mM KCl) stimulated the efflux of radioactivity from superfused slices of hypothalamic tissue preloaded with [^{3}H]-5-HT: this effect was reduced in the absence of calcium (2 mM $MgCl_2$). Moreover the hypothalamic slices accumulated [^{3}H]-5-HT with apparent high affinity (K_m = 1.37 μM, 5 mg tissue, 10 min incubation, 0.2–2 μM [^{3}H]-5-HT); suggesting that the tissue slices contain functionally intact terminals for 5-HT. Both DA (>50 μM) and apomorphine (>200 μM) stimulated the spontaneous efflux of [^{3}H]-5-HT. The effects of DA (500 and 250 μM) and apomorphine (300 and 600 μM) were abolished in the presence of haloperidol (2 μM). Furthermore (+)-butaclamol but not (−)-butaclamol (both at 1 μM) abolished the effects of DA (250 μM) and apomorphine (300 μM). As a regional control, similar experiments were performed in hippocampal slices which possess 5-HT but not DA containing terminals (Ungerstedt, 1971). [^{3}H]-5-HT was released by 50 mM KCl in a calcium dependent fashion, but apomorphine and DA (both up to 500 μM) were without effect.

When incubated with crude membrane preparations from anterior hypothalamus DA (5–50 μM) stimulated adenylate cyclase activity in vehicle injected rats but was without significant effect in 5,6-DHT lesioned rats. This lesion was associated with a 65% reduction in high affinity uptake of [^{3}H]-5-HT.

These results suggest that within the rat hypothalamus, DA receptors are present on 5-HT neurones, activation of which stimulates the release of 5-HT within this region, thus providing a correlation *in vitro* to the behavioural demonstration of a 5-HT link in dopaminergic thermoregulation in the rat.

R.W.K. is an M.R.C. student.

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Effects of some amino acids on K^+-induced release of [^{3}H]-DA from rat striatal tissue

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A number of studies in the literature have described the effects of amino acids on striatal dopamine (DA) release, sometimes with conflicting results. In particular, reports of the action of GABA on DA release from striatal slices have varied from no effect (Stoof & Mulder, 1977) to facilitation of basal or K^+-induced DA release (Giourgueff, Kemel, Glowinski & Besson, 1978; Kerwin & Pycock, 1979; Starr, 1977). Effects of other amino acids such as glycine and glutamate have also been described (Kerwin & Pycock 1979; Anderson & Roberts, 1978). We have investi-