The effect of Δ^1-tetrahydrocannabinol on the noradrenaline and dopamine content of the brain and heart of the rat

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Female Wistar rats weighing 250 to 300 g were treated with either an aqueous solution of Tween 80 (25 mg/kg, orally) or Δ^1-THC (10 mg/kg) in Tween 80, 60 min before being killed. The brain and heart were quickly removed, washed free of blood and transferred to liquid nitrogen. The noradrenaline (NA) and dopamine (DA) contents were assayed by the photofluorimetric methods of Haggendal (1963) and Carlsson & Waldeck (1958) respectively and expressed as ng/g wet wt of tissue.

Oral Tween 80 caused a reduction ($P < 0.01$) in the NA content of the whole brain as did the combination of Δ^1-THC and Tween 80 ($P < 0.001$). The effects of the two treatments were not significantly different. Neither Tween 80 nor Δ^1-THC in Tween 80 had an effect on the NA content of the whole heart. Tween 80 alone caused a significant reduction ($P < 0.05$) in the DA content of the heart, but a non-significant reduction in the brain. However, the combination of Δ^1-THC and Tween 80 produced marked decreases in the DA level in both heart and brain ($P < 0.001$) and the difference between Tween 80 and Δ^1-THC in Tween 80 is significant ($P < 0.01$). These results indicate that Δ^1-THC reduced the net DA levels of the heart and brain.

Δ^1-THC caused a concentration-related inhibition of [^{3}H]-(−)-noradrenaline ([^{3}H]-NA) uptake in the isolated perfused heart of the rat (Graham, Lewis & Li, 1974a). The amount of tritium released upon transmural stimulation of the rat vas deferens pre-incubated with [^{3}H]-NA was also reduced in a dose-dependent fashion by Δ^1-THC (Graham, Lewis & Li, 1974b). The failure of Δ^1-THC to alter net NA levels in the heart does not exclude alterations in turnover.

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Table 1 Effects of orally administered Tween 80 (25 μg/kg) and Δ^1-THC (10 mg/kg) in Tween 80 on the noradrenaline (NA) and dopamine (DA) content of the brain and heart of the rat, expressed as ng/g tissue ± s.e. mean; *n*, number of rats used

Tissue		*Control*	n	*Tween 80*	n	*Δ^1-THC + Tween 80*	n
Brain	NA	286 ± 12	12	184 ± 26 Tw < C**	10	186 ± 15 THC < C*	11
	DA	499 ± 4	12	444 ± 24	10	344 ± 17 THC < C*	11
Heart	NA	506 ± 32	15	487 ± 72	12	477 ± 34	12
	DA	468 ± 34	13	311 ± 60 Tw < C***	11	26 ± 2 THC < C* THC < Tw*	12

Student's *t* test, comparison of control values (c) with Tween 80 (Tw) and with Δ^1-THC in Tween 80 (THC); also of Tw v. THC.
* $P < 0.001$; ** $P < 0.01$; *** $P < 0.05$.

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