The effect of lysergic acid diethylamide (LSD) on the vas deferens and anococcygeus muscle

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The effects of several adrenergic agonist and blocking drugs on the motor nerve response of the vas deferens are uncharacteristic of adrenergic transmission and on this basis it has been suggested that the motor transmitter is not noradrenaline (Ambache & Zar, 1971). A complicating factor is the nature of the response in the vas which consists of two components, an initial twitch followed by a slow but maintained contraction. The short trains of pulses used by Ambache and colleagues elicit only the initial twitch and it has been suggested by Swedin (1971) that the unusual pharmacological effects observed are confined to this component.

The rat anococcygeus muscle has an adrenergic innervation distributed throughout the muscle comparable to that in the vas deferens, but its response consists of one component only. On this tissue, all drugs we have tested are compatible with an adrenergic motor innervation (Gillespie & McGrath, 1974). One exception to this is lysergic acid diethylamide (LSD) which has been reported to block the motor response both in the vas deferens (Ambache, Dunk, Verney & Zar, 1973) and in the anococcygeus (Ambache, Killick, Srinivasan & Zar, 1973). We have re-examined this effect of LSD on the vas and anococcygeus to see if it is incompatible with an adrenergic motor innervation.

Low concentrations of LSD (10^{-9}-10^{-6} M) produced dose-related, sustained contractions of both the rat and cat anococcygeus and intermittent contraction of the rat vas deferens *in vitro*. In the pithed rat, LSD (200 μg/kg i.v.) caused contraction of the anococcygeus and spontaneous activity in the vas. These contractions in the rat anococcygeus were abolished by phentolamine and absent in tissues from animals pretreated with 6-hydroxydopamine to destroy the adrenergic nerves.

In the vas deferens, LSD (10^{-9}-10^{-6} M) inhibited the initial twitch component of the response to field stimulation but potentiated the secondary, slow contraction. Guanethidine, as has already been reported (Ambache & Zar, 1971; Swedin, 1971), blocked both components of the response. In the rat and cat anococcygeus, these doses of LSD inhibited the motor response with no evidence of a preferential effect on the response to short trains of pulses.

In summary, in the anococcygues LSD has effects similar to guanethidine; it raises tone by an indirect sympathomimetic action and simultaneously diminishes the ability to release transmitter by nerve stimulation. Since there is little doubt of the adrenergic nature of transmission in the anococcygeus these results suggest that the effect of LSD in blocking the response in the vas is consistent with an adrenergic innervation in that tissue.

References

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