noradrenaline turnover will be necessary to determine whether the fall in tissue noradrenaline reflects increased or decreased activity of these central neurones.

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The action of amino acids on evoked responses in the frog optic tectum

J.A. MILSON & J.F. MITCHELL

Department of Pharmacology, University of Bristol, Bristol BS8 1TD

The frog has a relatively simple and accessible visual system which has been subject to detailed physiological studies (Scalia, Knapp, Halpern & Riss, 1968; Gaze, 1958). The morphology of the nerve fibres within the optic tectum and their response to light falling on the retina are also documented (Potter, 1969; Maturana, Lettvin, McCulloch & Pitts, 1960), but despite this information, little is known of the synaptic transmitters involved in the anuran optic tectum. We are therefore investigating the pharmacology of the tectal response in frogs to optic nerve stimulation in the hope that this may provide information relevant to the less accessible visual pathways of mammals.

Decerebrate *Rana temporaria*, paralyzed with (+)-tubocurarine (0.2 mg i.p.) and cooled to 10°C were used. The optic nerve was electrically stimulated (0.8 ms square waves, 0.3 Hz) and the field potentials evoked in the contralateral tectum were recorded with surface electrodes and displayed on an oscilloscope and analogue pen recorder before and after averaging. The field potential complex consists of two negative waves (amplitudes 0.2–1.4 mV) with modal latencies of 12 and 30 milliseconds. The effects of possible neurotransmitter and related compounds perfused across the tectal surface on the amplitudes of these negative waves were investigated as a basis for subsequent experiments in which unitary responses will be studied.

Classified by their effect on the tectal field potentials, amino acids were found to fall into three groups:

1. no effect up to a concentration of 5 mM;
2. depression of the first wave and potentiation of the second wave;
3. depression of the entire field potential complex.

No amino acid was found which potentiated the first wave. α-amino n-butyrate and α-amino isobutyrate had no effect. Glycine (400 μM), taurine (400 μM) and β-alanine, the latter at high concentration (2 mM), clearly fell into the second category. The responses to glycine and taurine (400 μM) but not GABA (1 mM) were abolished by 0.1 μM strychnine. GABA caused depression of both waves of the field potential and the response was antagonised by 0.3 μM picrotoxin. Glutamate (200 μM), aspartate (200 μM) and L-homocysteate (10 μM) caused a profound, long lasting depression of the evoked tectal response with slow recovery, consistent with a non-specific excitatory action of these compounds (van Harreveld, 1959).

The relative potencies of the amino acids used may reflect the effectiveness of drug penetration or of individual uptake systems but the differential action of glycine and taurine on the two waves of the field potential response must reflect fundamental differences in the mechanism of production of the two evoked waves. As GABA equally depresses both waves, these experiments suggest that GABA may have a widespread inhibitory role in the tectum whereas glycine and taurine have selective roles at only a limited number of synapses.

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