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CORTICAL AND PONTINE VARIATIONS OCCURRING IN THE VOLTAMMETRIC NO SIGNAL THROUGHOUT THE SLEEP-WAKE CYCLE IN THE RAT

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INTRODUCTION

Studies related to the endothelium-derived relaxing factor (10) initiated researches that led to the discovery of a biological paracrine messenger identified as nitric oxide (NO) (15). It is now also currently reported that the synthesis of this gaseous messenger is achieved, from L-arginine, by NO-synthases (NOS: neuronal, endothelial and inducible isoforms) and that it lasts in an equimolar production of NO and L-citrulline (2, 17, 27). To date, the implication of NO has been documented for three main functional aspects, i.e. anti-microbial and anti-tumoral activities in immune responses, vasodilatation and neurotransmission (2, 26, 29). Regarding neurotransmission, it appears that NOS is colocalised in the brain systems involved in the sleep-wake states genesis and/or regulation (11, 20, 21), at least, with neurotransmitters like serotonin, acetylcholine or somatostatin (1, 23, 28). Moreover, on the basis of pharmacological approaches, it is now also reported that NO contained in neurons of the pontine tegmentum facilitates mainly PS (3, 4, 9,14). This is particularly true for the nucleus raphe dorsalis (nRD) where local injections of either NOS inhibitors or NO donors inhibit or facilitate PS respectively (7).

RESULTS AND DISCUSSION

In order to further specify the results as yet reported on the basis of local microphamacology, in the present approach we investigated the modalities through which the spontaneous release of NO occurs within the nRD using a voltammetric NO sensor. The frontal cortex (Cx), where the axon processes coming from the nRD serotoninergic perikarya arise, was also analysed in the same manner.

For this study, OFA male rats (250 g; IFFA CREDO, France) were used in compliance with the relevant decree of the French Agriculture Ministry (N°: 03-505). For polygraphic measures, animals were chronically implanted (chloral hydrate anaesthesia, 400 mg/kg, i.p., Merck), with cortical electroencephalographic (EEG) and neck muscle (EMG) electrodes as previously described (4). They were also equipped with reference (Ag/AgCI wire) and auxiliary (Tungsten wire) electrodes

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