Archives Italiennes de Biologie, 134: 57-64, 1995.

INTRACELLULAR *IN VIVO* RECORDING OF INFERIOR COLLICULUS AUDITORY NEURONS FROM AWAKE GUINEA-PIGS

P. TORTEROLO*, M. PEDEMONTE AND R. A. VELLUTI

*Neurofisiología, Departamento de Fisiología, Facultad de Medicina and *Facultad de Ciencias, Universidad de la Republica, Gral. Flores 2125, 11800 Montevideo, Uruguay*

INTRODUCTION

The state of arousal is an obvious important condition for sensory signal processing. Thus, e. g., receptive fields can vary their size in relation to the arousal level and perhaps to sleep phases. Moreover, cortical receptive fields have been shown to be reduced with the increasing depth of anesthesia (1). Behaviorally related shifts in the unitary activity of auditory subcortical nuclei have been reported in guinea-pigs, without any drug. Dramatic changes in firing rate and pattern of discharge were observed with extracellular recordings, associated with waking and sleep phases as reported in the cochlear nucleus by Peña *et al.* (8) and in the lateral superior olive by Pedemonte *et al.* (7).

The inferior colliculus central nucleus (ICc) is a major auditory integrative center where ascending as well as descending information converges to be processed. The dorsal IC and external nuclei are the first synaptic stations directly reached by corticofugal fibers, thus indirectly connecting to the ICc, although direct terminals in the central nucleus in the monkey have also been reported (2).

An ICc extracellular study, during the sleep-waking cycle, has been reported (4) showing striking neuronal firing shifts and changes in the pattern of discharge, parallel to the behavioral shifts. A more difficult task, the intracellular recording of ICc cells in *in vivo* awake restrained guinea-pigs was our target to settle the physiological cellular basis for the auditory sensory processes.

MATERIAL AND METHODS

Guinea-pigs were chronically implanted (n=10) and prepared for waking state monitoring with in-dwelling nichrome electrodes to record the parietal cortex electrocorticogram, under pentobarbital anesthesia (35 mg/kg, i.p.).

The head was stereotaxically supported and a hole on the skull over the inferior colliculus (IC) region was opened for micropipettes penetration according to Rapisarda and Bachelli (10) atlas (A 0.5, L 1, H 3-6). Two light metal bars to hold the animal and reproduce the stereotaxic position were cemented to the animal's skull in order to facilitate painless recording during natural behavior after a week of recovery. The animal's head was thus firmly held, with the body supported by a canvas sheet leaving the legs free.

The glass micropipettes, with impedances between 50-80 MΩ, were fílled with 3MΩ potas-