CHAPTER I

INTRODUCTION

The vestibular system is important in the maintenance of the body posture and movement. This system also provides information on the spatial, orientation and movement of the head (Fukushima et al.,1985). In addition, afferent discharges from the vestibular organs influence reflex centers responsible for maintenance of a stable retina image by controlling neck muscles and octracular eye muscles (Tarlov, 1970; Gutheir and Versher, 1990; Buisseret-Delmas et al., 1990).

Although, the anatomical devision and physiological pathways through the vestibular nuclei are well established (Brodal and Pompeiano, 1957; Walberg et al., 1958; Ito, Hongo and Okada, 1969; Wilson, 1972; Ito,1984), the information about the transmitter at the primary sensory vestibular synapse is still incomplete. Considerable data have provided strong evidence suggesting that glutamate and/or similar substance are the most likely neurotransmitter of vestibular afferent system (Dememes, Raymond and Sans, 1984; Raymond et al., 1984; Sangchantra 1986; Cochran et al., 1987; Lewis, Gallagher and Shinnick-Gallagher, 1987; Warunee, 1987; Touati, Raymond and Dememes, 1989; Lewis et al., 1989; Doi, Tsumoto and Matsunaga, 1990). However, most studies were performed on *in vitro* tissue slices preparation in which the structural identification of neurotransmitter at this synapse cannot be determined and the

continuity of the afferent pathway cannot usually be preserved when the slices are prepared.

In order to obtain a measurement directly related to synaptic transmission it would be appropiate to sample specifically the content of the extracellular space of interest which contains the neurotransmitter. In the past, several techniques have been created to allow dynamic studies of the chemistry of the extracellular space and the dominating *in vivo* technique has been perfusions with push-pull cannula, but this techniques has its limitations. With recent advances in neuroscience technology: the microdialysis technique has been invented which is rapidly becoming a vary popular bioanalytical sampling tool in brain research. When combined with highly sensitive liquid chromatography (HPLC) methods it is possible to perform continuous chemical studies in discrete brain regions. Such a technique have several potential advantages over conventional push-pull perfusion method, including prepurification of the sample, and reduced incidence of tissue damage (Johnson and Justice, 1983; Ungerstedt, 1984; Tossman and Ungerstedt, 1986; Beviniste and Huttemeier, 1990)

In the present study, microdialysis technique was used in combination with HPLC and fluorescence detection to measure endogenous release of amino acid transmitters in the vestibular nuclei during resting situation, potassium depolarization and electrical stimulation of vestibular nerve. Furthermore, the

effects of a vestibular nerve lesion on the release of endogenous amino acids were also investigated.