CHAPTER V

DISCUSSION

Fastigial nucleus was observed as a group of medium-sized neurons scatterring in the white matter close to the midline and superior to the fourth ventricle. Two other distinct cerebellar deep nuclei, NIP and ND were oberved laterally. The total length of the nucleus is approximately 1,200 um. This was shorter than those of rat and monkey (rat = 1,900 um., monkey 2,500 um.). The precise anatomical position of the fastigial nucleus in the tree shrew was found locating between at p.3.2 to p.4.4. These data was different from those of rat (Pellegrino et al., 1979) and monkey (Snider and Lee, 1961). The interpositus nucleus was observed lateral to the fastigial nucleus from the level P 2.9 to P 4.4. This nucleus is still a single nucleus as seen in the monkey brain (Snider and Lee, 1961).

It is quite obvious that the fastigial nucleus consists of a small population of small and medium - sized neurons which scatterred and dispersed throughout the nucleus. The evidence suggests that this nucleus seems to contain a large number of fibers passing through it. The previous degenerative study had already shown that there are large number of fibers pass into aud out of the fastigial nucleus (Fig. 29.) (Carpenter, 1959).

Sitmulation of W.ant.rFN significantly increased ABP and HR in the area within the boundary of 550 um. anterior to the rostral pole. Similar result was obtained in the nucleus area 640 um. posterior to the rostral pole. However, the response is greater in area 430 um. posterior to the rostral pole. While the lesser response was obtained in area between 430-640 um. from the rostral pole (Fig.30.). Among the three areas, stimulation of W.ant.rFN gave the greatest response

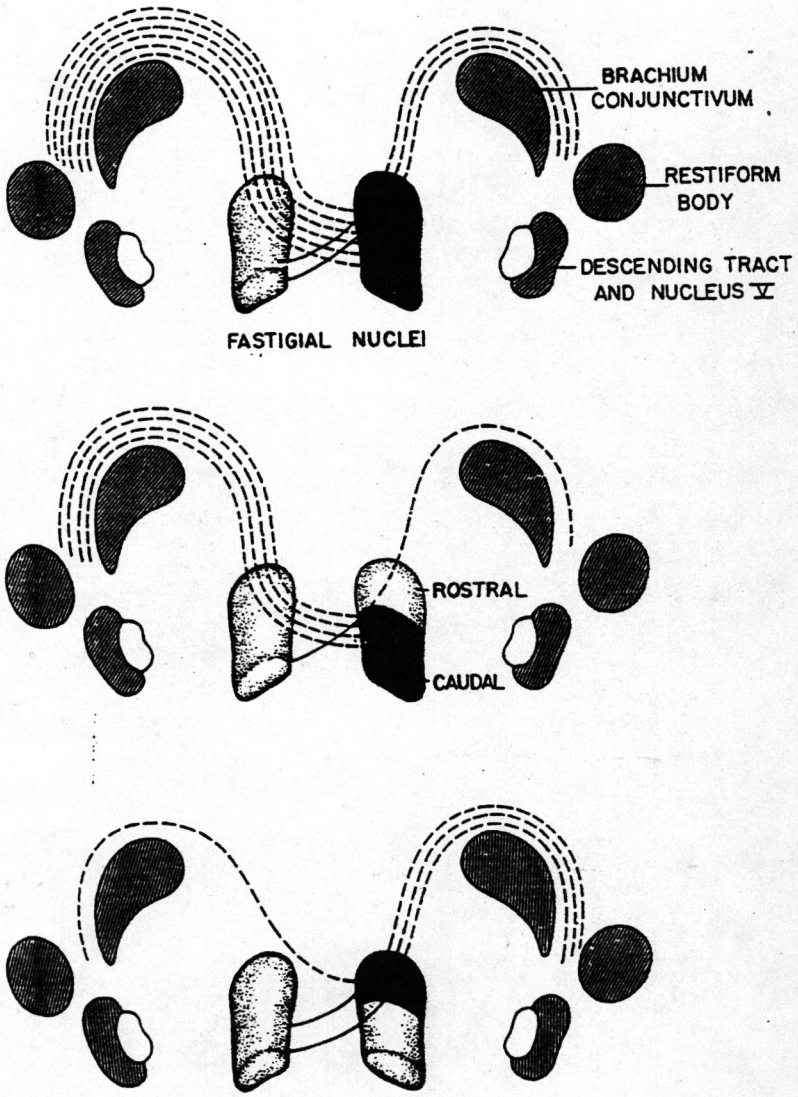

Fig. 29. Schematic diagrams of degeneration resulting from unilateral total and subtotal lesions of the FN in monkey. Complete unilateral destruction of FN (top), destruction of the caudal portions of FN (middle), and lesion confined to the rostral protion of the FN (Bottom) (from Carpenter, 1959).

(Fig.19,20.). The response of SP and DP of these three areas were quite similar. All of them showed parallel an increase together. However, the percentage increase of DP was greater than that of SP. These data was similar from those of mondey (Sudsuang, et al., 1990). The latency for excitation was not significant difference which indicates the location of electrode tip was closely approached in the responsive area in the FN in each of experiments. Hower, in the area of 560 um. anterior to the caudal pole of the nucleus gave no response after electrical stimulation Thus, this area should involve in other function of the nucleus than the cardiovascular function. There are reports of unspecific area in the rostral part of the FN gave the similar response, in cat (Achari and Downman, 1970 ; Miura and Reis, 1971 ; Doba and Reis, 1972 ; Achari, Al-Ubaidy and Downman, 1973 ; Lutherer and Williams, 1986; Bradley, et al., 1987 ; Williams, et al., 1989 ; Huang, peng and Shieh, 1989), dog (Doemer and Stone, 1976 ; Dormer, Foreman and Ohata, 1982 ; Dormer, et al., 1986), rabbit (Bradley, Paton and Spyer, 1986 Bradley, et al.,1987), rat (Del bo, Sved and Reis, 1983 ; Del bo, et al., 1983), and monkey (Sudsuang, et al., 1990).

So far, there is still no report of the detailed study of the functional anatomy of different areas within the fastigial nucleus. The electrical stimalation of the white matter area 550 um. anterior to the rostral pole produce ABP and HR response. When the white matter area close to the rostral pole was destroyed and electrical stimulation within the rostral area (430 um. posterior to the rostral pole) produced no response. These evidences suggest that the positive response obtained after W.ant.rFN stimulation seems related to the stimulation of fiters originated from neurons within the nucleus. There are evidences in previous reports shown no response after perikarya stimulation by glutamate (Bradley, et al.,1987) and positive response was observed after electrical stimulation in the nucleus containing bilateral destruction of perikarya by large dose of kainic acid (Henry and Connor, 1989).

The different response of those three areas may indicated the different number of sensitive fibers in the areas. There are evidences demonstrated that neurons in the rostral area of the FN sent their fibers in two different direction. Majority of them project contralaterally and cross through medial area of the nucleus and cross anteriorly to join the brachium conjunctivum, some of them did not pass through the nucleus at all. The minority of the fibers project anteriorly in the ipsilateral side to join the brachium conjunctivum (Fig.30.) (Carpenter, 1959). This result indicates the higher number of fibers in W.ant.rFN than the rostral area of the nucleus (640 um. posterior to the rostral pole). Likewise number of fibers in area 430 um. posterior to the rostral pole is greater than those in the area between 430 um. to 640 um. posterior to the rostral pole.

The function of the FN in regulating cardiovascular function was confirmed when resting ABP decrease while lesion was made in both W.ant.rFN and in rostral area of the nucleus. However, the ABP will return to normal after lesioning. This evidence suggested compensatic mechanism. However, there is no documentation about effect of the FN lesion on resting ABP , the present experiments indicate that FN is probably served as regulation of important living functions such as the cardiovascular function.

In summary , this study provies the first clear demarcration of a specific region of the FN with an effect on BP and HR. It is posible that the different responses of those three areas seems related to stimulation of the diffrent number of fibers in the area. Moreover, lesion of white matter area close to the rostral pole abolished the FPR, the evidence suggests that the fiher originating in the nucleus projects anteriorly through the nucleus. Such information may be useful in further elucidation of cerebellar mechanisms and the pathways mediating the FPR.

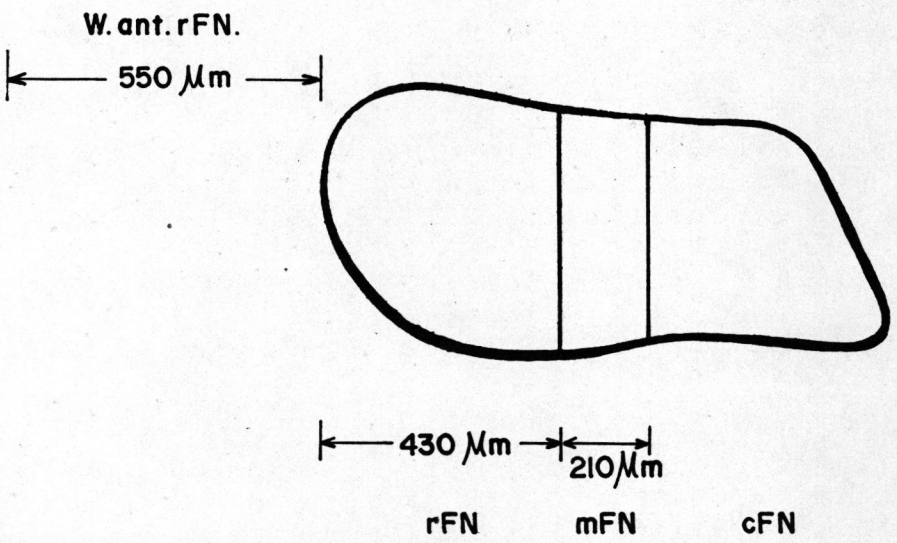

Fig.30. Schematic drawing of specific area within the fastigial nucleus which an effect on ABP and HR.