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Sexual Dimorphism of the Bed Nucleus of the Stria Terminalis and the Amygdala

With 44 Figures and 24 Tables



Springer

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Preface

Sex differences are observed in various physiological, behavioral, and psychic functions, including reproductive behavior, aggression, emotions, and cognition. Such differences are expressed even in early childhood with preferences to definite activities. It has been generally accepted that differences between genders are formed under the influence of biological as well as environmental factors. The existence of sex differences in functions of the central nervous system has suggested that there are also morphological sex differences.

In recent years several reports on sexual dimorphism in the brain of vertebrates have been published. However, the mechanisms of sexual differentiation of the central nervous system remain unclear in most cases. It is often difficult to correlate morphological sex differences to differences in definite function or behavior.

We set out to explore the sexual dimorphism of the limbic system and especially the bed nucleus of the stria terminalis and the amygdala, which are considered generally to be occupied with the control of reproductive behavior and autonomic and complicated psychic functions. Several reports on sexual dimorphism of these structures have been published. Some of them have been directed to the total neuronal number and the volume of the nuclei, while others have concentrated on definite subpopulations of neurons. In many cases the mechanisms of sexual differentiation were tested, but sometimes they could not be established. Several attempts have been made to elucidate the functional significance of sexual dimorphism of these limbic structures, yet it remains unknown for most studies carried out.

The present study confirms the previously reported existence of sex differences in the total neuronal numbers and volumes of the bed nucleus of the stria terminalis and the amygdala, as well as the mechanisms of their generation. Additionally, it provides new evidence for the sexual dimorphism and differentiation of GABAergic, leucine-enkephalin-containing and parvalbumin-immunoreactive neurons in the bed nucleus of the stria terminalis and amygdala of the rat. Together with testing the gender differences, the use of different age groups made it possible to

follow the changes in numbers of neuronal subpopulations, mentioned above, during ageing. Thus, our study contributes with new results to the understanding of the sexual differentiation of the bed nucleus of the stria terminalis and the amygdala. It gives some new insight into the problem of setting a rule for sexual differentiation of the brain. Our results provide morphological and immunocytochemical data that may be used for further studies on sexually dimorphic circuitry and its functional significance. Our study could also be important for understanding sex differences in the pathology of the central nervous system.

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Contents

1	Introduction	1
1.1	Sexual Differentiation of the Brain	1
1.2	Bed Nucleus of the Stria Terminalis	4
1.3	The Amygdala.....	6
1.4	Chemoarchitecture of the BST and the Amygdala.....	7
1.5	Gender-Related Characteristics of the BST and the Amygdala	7
1.6	Mediators of Reproductive Behavior	7
2	Materials and Methods	11
2.1	Experimental Animals.....	11
2.2	Anesthesia	12
2.3	Castrations	12
2.4	Experimental Treatment.....	12
2.5	Fixation	12
2.6	Sectioning	12
2.7	Nissl Staining	13
2.8	Immunocytochemistry	13
2.9	Morphometric Studies and Statistics	14
3	Results	15
3.1	Bed Nucleus of the Stria Terminalis	15
3.1.1	Volume and Neuronal Density	15
3.1.2	GABA-Immunoreactive Neurons.....	16
3.1.3	Leucine-Enkephalin-Immunoreactive Neurons .	21
3.1.4	Parvalbumin-Immunoreactive Neurons	27
3.2	The Amygdala.....	28
3.2.1	Volumes and Neuronal Densities.....	28
3.2.2	GABA-Immunoreactive Neurons.....	36
3.2.3	Leucine-Enkephalin-Immunoreactive Neurons .	40
3.2.4	Parvalbumin-Immunoreactive Neurons	43

4	Discussion	47
4.1	Localization of the Nuclei	49
4.2	Volumes	49
4.3	Total Neuronal Density	51
4.4	GABA-Immunoreactive Neurons	52
4.5	Parvalbumin-Immunoreactive Neurons	56
4.6	Leucine-Enkephalin-Immunoreactive Neurons	57
4.7	Sexual Dimorphism of the CNS	58
5	Summary	63
5.1	The Bed Nucleus of the Stria Terminalis	63
5.2	The Amygdala	64
	References	65
	Subject Index	77