
List of Contents

1	Introduction	1
2	The Human Prostate	2
	<i>L. Santamaría, L. Alonso</i>	
2.1	Embryology and Development	2
2.2	Gross Anatomy of the Prostate	3
2.2.1	External Anatomic Relationships	3
2.2.2	Internal Anatomic Relationships	3
2.2.3	Prostate Regions	4
2.2.4	Blood Vessels	5
2.2.5	Innervation	5
2.3	Histology of the Prostate Epithelium	7
2.3.1	Types of Epithelial Cells	8
2.3.1.1	Secretory Cells	8
2.3.1.2	Basal Cells	9
2.3.1.3	Transitional Cells	10
2.3.1.4	Neuroendocrine Cells	10
2.4	Benign Prostate Hyperplasia	10
3	The Neuroendocrine System and the Human Prostate	12
	<i>L. Santamaría, L. Alonso</i>	
3.1	Introduction	12
3.1.1	Systemic Distribution of the Neuroendocrine Cells	13
3.1.2	Embryologic Origin	13
3.1.3	Morphological and Histochemical Features of the Neuroendocrine Cells	13
3.2	Neuroendocrine Cells in the Normal Prostate	15
3.2.1	Distribution	15
3.2.2	Natural History	16
3.2.3	Expression of Androgenic Receptors	16
3.2.4	Expression of Epidermal Growth Factor	17
3.2.5	Physiology of Prostate Neuroendocrine Cells	17
3.2.6	Quantification of Neuroendocrine Cells	17
3.3	Neuroendocrine Markers in the Prostate	22
3.3.1	Nonhormonal Markers	22
3.3.1.1	Chromogranins	22
3.3.1.2	Neuron-Specific Enolase	24
3.3.1.3	Synaptophysin	24
3.3.1.4	Protein Gene Product 9.5	24

3.3.1.5	Serotonin	24
3.3.2	Neuropeptidic Markers	25
3.3.2.1	Calcitonin and Calcitonin Gene-Related Peptide	25
3.3.2.2	Neuropeptide Y	25
3.3.2.3	Vasoactive Intestinal Polypeptide	26
3.3.2.4	Substance P	27
3.3.2.5	Somatostatin	27
3.3.2.6	Peptides Related to Thyrotropin-Releasing Hormone and to Thyrotropin . . .	27
3.3.2.7	Parathyroid Hormone-Related Peptide	28
3.4	Neuroendocrine Cells in Benign Prostate Hyperplasia	28
4	Innervation and Neuroendocrine Cells in Both Normal and Hyperplastic Prostate	29
	<i>L. Santamaría, L. Alonso</i>	
4.1	Neuroendocrine Markers in Normal Prostate and BPH	29
4.1.1	Neuropeptide Innervation in Normal Prostate and BPH. Qualitative Observations	32
4.1.2	Neuropeptide Innervation in Normal Prostate and BPH. Quantitative Observations	33
4.2	Conclusions	37
5	The Prostate of the Rat	38
	<i>I. Ingelmo, L. Santamaría</i>	
5.1	Development of the Rat Prostate	38
5.2	Macroscopic Description of the Rat Prostate	39
5.2.1	Anatomic Relationships of the Prostate	40
5.2.2	Prostate Blood Vessels	40
5.3	Histology of the Rat Prostate	41
5.3.1	Generalities	41
5.3.2	Histology of the Acini	41
5.3.3	Histology of the Glandular Ducts	42
6	Neuroendocrine Cells in the Rat Prostate	42
	<i>R. Rodríguez, J.M. Pozuelo</i>	
6.1	Introduction	42
6.1.1	Neuroendocrine Cells in the Acini of the Rat Prostate	45
6.1.2	Neuroendocrine Cells in the Ductal System of the Rat Prostate	45
6.1.3	Quantitative Changes of Neuroendocrine Cells during Postnatal Development	46
6.2	Hormonal Influences on Neuroendocrine Cells in Rat Prostate	49
7	Innervation of the Rat Prostate	51
	<i>J.M. Pozuelo, R. Rodríguez</i>	
7.1	Generalities	51
7.2	Major Pelvic Ganglion	53
7.3	The Relevance of the Autonomous Nervous System for Rat Prostate Structure	53
7.4	Classic and Peptidergic Innervation	54
7.4.1	Intraprostatic Innervation	55
7.5	Postnatal Evolution of the Peptidergic Innervation of the Rat Prostate	56

7.5.1	Immunohistochemical Findings	56
7.5.2	Quantitative Findings	57
7.6	Hormone Influence and Peptidergic Innervation	62
References		64
Subject Index		79

Neuroendocrine Cells and Peptidergic Innervation in
Human and Rat Prostate

Santamaria, L.; Ingelmo, I.; Alonso, L.; Pozuelo, J.M.;
Rodríguez, R.

2007, XI, 80 p., Softcover

ISBN: 978-3-540-69815-9