

# Contents

|          |                                                                                                                 |     |
|----------|-----------------------------------------------------------------------------------------------------------------|-----|
| <b>1</b> | <b>Introduction</b>                                                                                             | 1   |
| 1.1      | Background and Objectives                                                                                       | 1   |
| 1.2      | Three-dimensional Coordinate Systems for the Localization of Brain Structures                                   | 4   |
| 1.3      | Intravital and Post-mortem Neuroanatomy                                                                         | 11  |
| 1.4      | Terminology and References                                                                                      | 11  |
| 1.5      | Abbreviations and Notes for the Reader                                                                          | 13  |
| <b>2</b> | <b>Neuroimaging and Guideline Structures</b>                                                                    | 15  |
| 2.1      | Computed Tomography                                                                                             | 15  |
| 2.2      | Magnetic Resonance Imaging                                                                                      | 16  |
| 2.3      | Emission Computed Tomography                                                                                    | 17  |
| 2.4      | Ultrasound Techniques                                                                                           | 18  |
| 2.5      | Guideline Structures in Imaging Procedures                                                                      | 19  |
| 2.5.1    | Facial Skeleton                                                                                                 | 19  |
| 2.5.2    | Head and Neck Region                                                                                            | 20  |
| 2.5.3    | Cranial Cavity                                                                                                  | 20  |
| 2.5.4    | Cisterns and the Ventricular System                                                                             | 21  |
| 2.5.5    | Blood Vessels                                                                                                   | 21  |
| 2.5.6    | Dural Structures                                                                                                | 22  |
| 2.6      | Clinical Value of the New Imaging Techniques                                                                    | 22  |
| <b>3</b> | <b>Topography of the Facial Skeleton and its Cavities in Multiplanar Parallel Slices</b>                        | 146 |
| 3.1      | Facial Skeleton                                                                                                 | 146 |
| 3.2      | Nasal Cavity and Paranasal Sinuses                                                                              | 153 |
| 3.3      | Orbit                                                                                                           | 160 |
| 3.4      | Oral Cavity                                                                                                     | 163 |
| 3.5      | Masticatory Apparatus                                                                                           | 165 |
| 3.6      | Lateral Facial Region                                                                                           | 165 |
| <b>4</b> | <b>Topography of the Pharynx and Craniocervical Junction in Multiplanar Parallel Slices</b>                     | 167 |
| 4.1      | Pharynx and Parapharyngeal Space                                                                                | 167 |
| 4.2      | Craniocervical Junction                                                                                         | 168 |
| 4.3      | Blood Vessels in the Head and Neck                                                                              | 171 |
| <b>5</b> | <b>Topography of the Neurocranium and its Intracranial Spaces and Structures in Multiplanar Parallel Slices</b> | 173 |
| 5.1      | Neurocranium                                                                                                    | 173 |
| 5.2      | Cranial Cavity                                                                                                  | 175 |
| 5.3      | Cerebrospinal Fluid-containing Spaces                                                                           | 177 |
| 5.4      | Arteries of the Brain and their Vascular Territories                                                            | 191 |
| 5.5      | Veins of the Brain                                                                                              | 213 |
| 5.6      | Cranial Nerves                                                                                                  | 216 |
| 5.7      | Subdivisions of the Brain                                                                                       | 218 |
| 5.7.1    | Medulla oblongata and Pons                                                                                      | 220 |
| 5.7.2    | Mesencephalon                                                                                                   | 228 |
| 5.7.3    | Cerebellum                                                                                                      | 234 |
| 5.7.4    | Diencephalon and Hypophysis                                                                                     | 234 |
| 5.7.5    | Telencephalon                                                                                                   | 237 |

---

|           |                                              |     |
|-----------|----------------------------------------------|-----|
| <b>6</b>  | <b>Neurofunctional Systems</b>               | 254 |
| 6.1       | General Sensory Systems                      | 255 |
| 6.1.1     | Anterolateral System                         | 255 |
| 6.1.2     | Medial Lemniscus System                      | 260 |
| 6.1.3     | Trigeminal System                            | 266 |
| 6.1.4     | Topography of Sensory Disorders              | 270 |
| 6.2       | Gustatory System                             | 273 |
| 6.3       | Ascending Reticular System                   | 276 |
| 6.4       | Vestibular System                            | 276 |
| 6.5       | Auditory System                              | 283 |
| 6.6       | Visual System                                | 289 |
| 6.7       | Olfactory System                             | 300 |
| 6.8       | Motor Systems                                | 303 |
| 6.8.1     | Pyramidal System                             | 303 |
| 6.8.2     | Motor Systems of the Basal Ganglia           | 311 |
| 6.8.3     | Oculomotor System                            | 316 |
| 6.9       | Cerebellar Systems                           | 322 |
| 6.10      | Language Areas                               | 328 |
| 6.11      | Limbic System                                | 332 |
| 6.12      | Autonomic Nervous System                     | 340 |
| <b>7</b>  | <b>Neurotransmitters and Neuromodulators</b> | 343 |
| 7.1       | Catecholaminergic Neurons                    | 344 |
| 7.1.1     | Dopaminergic Neurons                         | 344 |
| 7.1.2     | Noradrenergic Neurons                        | 345 |
| 7.1.3     | Adrenergic Neurons                           | 345 |
| 7.2       | Serotonergic Neurons                         | 345 |
| 7.3       | Histaminergic Neurons                        | 346 |
| 7.4       | Cholinergic Neurons                          | 347 |
| 7.5       | GABAergic Neurons                            | 347 |
| 7.6       | Glutamatergic and Aspartatergic Neurons      | 347 |
| 7.7       | Peptidergic Neurons                          | 348 |
| 7.7.1     | Substance P-containing Neurons               | 348 |
| 7.7.2     | VIP-containing Neurons                       | 348 |
| 7.7.3     | $\beta$ -Endorphin-containing Neurons        | 348 |
| 7.7.4     | Enkephalinergic Neurons                      | 349 |
| <b>8</b>  | <b>Material and Methods</b>                  | 350 |
| <b>9</b>  | <b>References</b>                            | 352 |
| <b>10</b> | <b>Index for Text and Illustrations</b>      | 363 |