Table of Contents

1 Development, Anatomy, Spatial Compartments and Regions 1
E. Meyer-Breiting, A. Burkhardt

1.1 Development 1
1.2 Postnatal Changes 2
1.3 Anatomy 3
1.3.1 Laryngeal Framework 3
1.3.2 Ligaments and Membranes 4
1.3.3 Muscles 5
1.3.4 Blood Vessels 6
1.3.5 Lymph Drainage 6
1.4 Regional and Spatial Division 8
1.4.1 Spatial Subdivision 9
1.4.2 Regions and Sites 11

2 Particular Problems of Histological Preparation and Assessment: Advanced Methods 13
A. Burkhardt, E. Meyer-Breiting

2.1 Whole-Organ Serial Sections 13
2.2 Histological Evaluation 15
2.2.1 Plane of Section 15
2.2.2 Grading 15
2.3 Advanced Methods in the Evaluation of Precancerous Lesions and Carcinomas 21
2.3.1 Predominantly Morphological Methods 21
2.3.1.1 Exfoliative and Aspiration Cytology 21
2.3.1.2 Quantification of Histopathology 22
2.3.1.3 Histochemistry 23
2.3.1.4 Immunohistochemistry 24
2.3.1.5 In Situ Hybridization 26
2.3.1.6 Electron Microscopy 27
2.3.2 Additional, more Functional Methods 29
2.3.2.1 Cellular Proliferation Studies 29
2.3.2.2 DNA Histograms, Cytophotometry 31
2.3.2.3 Changes in Immune Status 31
2.3.2.4 Analysis of Cell Products in Circulating Blood 32
2.3.2.5 Examination of Living Tissue 32
2.3.2.6 Experimental Models 33
2.3.3 Conclusion 33
2.4 Advanced Methods in the Determination of Tumour Types 33

3 Benign Neoplasms 37
A. Burkhardt, E. Meyer-Breiting

3.1 Definition, Classification, Frequency, General Therapeutic Aspects 37
3.2 Epithelial Tumours 37
3.2.1 Papilloma and Papillomatosis 37
3.2.1.1 Juvenile-Onset Papilloma 38
3.2.1.2 Adult-Onset Papilloma 41
3.2.2 Oxyphilic Adenoma (Oncocytoma) 44
3.2.3 Other Adenomas 45
3.3 Tumours of Soft Tissue 45
3.3.1 Mesenchymal Tumours 45
3.3.1.1 Fibroma, Histiocytoma, Myxoma and Mesenchymoma 45
3.3.1.2 Lipoma 46
3.3.1.3 Angioma 46
3.3.1.4 Leiomyoma 47
3.3.1.5 Rhabdomyoma 48
3.3.2 Tumours of the Peripheral Nervous System 50
3.3.2.1 Neurilemmoma (Schwannoma, Neurinoma) 50
3.3.2.2 Neurofibroma 50
3.3.2.3 Paraganglioma, Chemodectoma 51
3.3.2.4 Granular Cell Tumour 51
3.3.2.5 Ganglioneuroma 53
3.4 Tumours of Cartilaginous and Osseous Tissue 53
3.4.1 Chondroma 53
3.4.2 Osteoma 55
3.4.3 Giant Cell Tumour 55
3.5 Tumours of the Lymphatic and Haematopoietic System 55
3.5.1 Plasmocytoma 55
3.6 Miscellaneous Tumours, Malformations 55

4 General Conditions and Risk Factors of Carcinogenesis, Precancerous Lesions 57
A. Burkhardt, E. Meyer-Breiting

4.1 Incidence, Age, Sex Distribution and Risk Factors 57
4.1.1 Incidence 57
4.1.2 Age, Sex Distribution and Hormonal Factors 57
4.1.3 Endogenous Factors 57
4.1.4 Exogenous Risk Factors: Tobacco and Alcohol 58
4.1.5 Inhaled Noxious Agents 59
4.1.6 Differences in Geographical Distribution-Occupational Risks 59
4.2 Papilloma/Papillomatosis and Viral Infection in Laryngeal Carcinogenesis . 60
4.3 Chronic Laryngitis 61
4.4 Epidermoid Metaplasia 61
4.5 Multitopic (Multicentric) Tumour Growth: Field Cancerization 63
4.6 Precancerous Lesions 64
4.6.1 Macroscopic Clinical Aspects: Leukoplakia, Erythroplakia 64
4.6.2 Histological Assessment and Classification of Dysplasia 66
4.6.2.1 Criteria of Epithelial Hyperplasia and Epithelial Dysplasia 67
4.6.2.2 Grades of Dysplasia 70

4.7 Carcinoma in Situ, Microinvasive Carcinoma 73
4.8 Evaluation of Histological Finding 76
4.9 Therapy of Dysplasia and Carcinoma In Situ of the Larynx 77

5 Squamous Cell Carcinomas 79
E. Meyer-Breiting, A. Burkhardt

5.1 Origin and Spread of Carcinomas 79
5.1.1 Supraglottic Carcinomas 83
5.1.2 Glottic-Supraglottic Boundary 89
5.1.3 Glottic and Subglottic Carcinomas 89
5.1.4 "External Laryngeal Carcinomas" (Hypopharynx, Lower Oropharynx) . 98
5.2 Metastasis 102
5.2.1 Lymphatic Metastasis of Internal and External Laryngeal Carcinomas . 102
5.2.2 Distant Metastasis 104
5.3 TNM Classification of Laryngeal, Hypopharyngeal and Caudal Oropharyngeal Carcinoma 104
5.3.1 Pretherapeutic TNM Classification 105
5.3.1.1 Larynx 106
5.3.1.2 Hypopharynx 106
5.3.1.3 Oropharynx 106
5.3.1.4 Regional Lymph Nodes 106
5.3.1.5 Distant Metastases 107
5.3.2 pTNM Classification 107
5.4 Histology of Squamous Cell Carcinoma 109
5.4.1 Degree of Differentiation 110
5.4.2 Tumour-Host Relationship 112

6 Management of Laryngeal Cancer and Histopathological Inferences . . 115
E. Meyer-Breiting, A. Burkhardt

6.1 Diagnosis and Prevention 115
6.1.1 Diagnostic Procedures, Computerized Tomography 115
6.1.2 Prevention 117
6.2 Surgery 117
6.2.1 Conservative Surgery of Glottic Cancer 117
6.2.1.1 Outline of Techniques 117
6.2.1.2 Results of Different Surgical Procedures 120
6.2.1.3 Comment and Conclusion 122
6.2.2 Conservative Surgery of Supraglottic Cancer 124
6.2.2.1 Techniques 124
6.2.2.2 Surgical Procedures and Results 124
6.2.3 Radical Surgery of Laryngeal and Laryngopharyngeal Cancer 125
6.2.4 Management of Regional Metastasis 126
6.3 Radiation Therapy 127
6.3.1 The Biology of Irradiated Tumours 127
6.3.2 Histological Changes in Irradiated Carcinomas 128
6.3.3 Preoperative Irradiation 133
6.3.3.1 Histological Changes in Preoperatively Irradiated Carcinomas: The Periphery-Basis Gradient 134

6.3.3.2 Regions of Diminished Radiation Effect . . . 135
6.3.3.3 Effect of Irradiation on Lymph Node Metastasis . . . 136
6.3.4 Late Results After Preoperative Irradiation of Squamous Cell Carcinomas of the Larynx . . . 136
6.3.4.1 Local Recurrences . . . 136
6.3.4.2 Regional Recurrences . . . 137
6.3.4.3 Late Distant Metastasis . . . 137
6.3.4.4 Survival Rates . . . 137
6.4 Changes Following Treatment with Cytostatic Agents . . . 138

7 Unusual Malignant Tumours . . . 143
A. Burkhardt, E. Meyer-Breiting

7.1 Unusual Forms of Carcinoma . . . 143
7.1.1 Special Forms of Squamous Cell Carcinoma . . . 143
7.1.1.1 Verrucous Carcinoma . . . 143
7.1.1.2 Spindle Cell Carcinoma and Carcinosarcoma . . . 147
7.1.1.3 Transitional Cell Carcinoma . . . 149
7.1.1.4 Lymphoepithelial Carcinoma . . . 150
7.1.2 Carcinomas of the Adnexa of the Laryngeal Mucosa . . . 151
7.1.2.1 Adenocarcinoma . . . 151
7.1.2.2 Adenoid Cystic Carcinoma . . . 152
7.1.2.3 Mucoepidermoid Carcinoma . . . 153
7.1.3 Other Forms of Carcinoma . . . 153
7.1.4 Metastatic Cancer . . . 154
7.2 Nonepithelial Malignant Tumours . . . 154
7.2.1 Malignant Mesenchymal Tumours (Sarcomas) . . . 154
7.2.1.1 Fibrosarcoma and Malignant Fibrous Histiocytoma . . . 155
7.2.1.2 Chondrosarcoma . . . 157
7.2.1.3 Rhabdomyosarcoma . . . 158
7.2.1.4 Leiomyosarcoma . . . 159
7.2.1.5 Angiosarcoma . . . 159
7.2.1.6 Malignant Lymphoma . . . 159
7.2.1.7 Other Malignant Mesenchymal Neoplasms . . . 160
7.2.2 Malignant Neuroectodermal Tumours . . . 161
7.2.2.1 Malignant Melanoma . . . 161
7.2.2.2 Chemodectoma (Paraganglioma) . . . 162
7.3 Radiogenic Tumours . . . 162

8 Pseudotumours of the Larynx . . . 169
E. Meyer-Breiting, A. Burkhardt

8.1 Inflammatory Pseudotumours . . . 169
8.1.1 Vocal Cord Polyps . . . 169
8.1.2 Vocal Cord Nodules . . . 171
8.1.3 Intubation Granulomas . . . 171
8.1.4 Contact Hyperplasia . . . 172
8.1.5 Infectious Laryngeal Tumours . . . 173
8.1.6 Sarcoidosis . . . 174
8.1.7 Other Granulomas and Granulomatoses . . . 175
8.1.8 Histologically Pseudomalignant Lesions . . . 175

8.2 Laryngeal Cysts and Laryngoceles 175
8.2.1 Laryngeal Cysts 175
8.2.2 Laryngoceles 176
8.3 Metabolically Induced Pseudotumours 177
8.3.1 Amyloid Tumours 177
8.3.2 Gout Tophi 178
8.3.3 Other Metabolically Induced Pseudotumours 178
8.4 Endolaryngeal Thyroid Tissue 178

References 179

Subject Index 215