

Contents

<i>Preface to the Second Edition</i>	v
<i>Preface to the First Edition</i>	vi
<i>eSmartQuiz – Online MCQ Test</i>	xiv
<i>Concept of Functional Histology</i>	xvii
<i>Highlighted Topics of Histology</i>	xviii

Section I: Introduction to Histology

1. **Microscope** 3
Reviewer: Dr Anjali Jain
Cristian Medical College, Ludhiana, Punjab

2. **Orientation to Histological Techniques** 8
Reviewer: Dr Saleena N Ali
Government TD Medical College,
Alappuzha, Kerala

3. **Cell and Tissue** 12
Reviewer: Dr R Sarah
AIIMS, Madurai

Section II: General Histology

4. **Epithelial Tissue** 27
Reviewer: Dr Aparna Muralidharan
PIMS, Puducherry
Competency: AN65.1

5. **Cell Surface Projections and Cell Junctions** 39
Reviewer: Dr Payal Kasat
Dr BC Roy Institute of Medical Sciences & Research,
IIT, Khargpur, West Bengal
Competency: AN65.2

6. **Glands** 47
Reviewer: Dr Rohini Motwani
AIIMS, Bibinagar
Competency: AN70.1

7. **General Connective Tissue** 56
Reviewer: Dr Gayatri Muthiyar
AIIMS, Nagpur
Competencies: AN66.1, AN66.2

8. **Cartilage** 74
Reviewer: Dr Jolly Agrawal
Government Medical College,
Dehradun, Uttarakhand
Competency: AN71.2

9. **Bone** 83
Reviewer: Dr Hitant Vohra
Dayanand Medical College and Hospital,
Ludhiana, Punjab
Competency: AN71.1

10. **Muscle Tissue** 98
Reviewer: Dr Prajakta Kishve
Employees State Insurance Corporation
Medical College, Hyderabad, Telangana
Competencies: AN67.1, AN67.2, AN67.3

11. **Lymphoid Tissue** 113
Reviewer: Dr Nidhi Puri
AIIMS, Bilaspur, Himachal Pradesh
Competencies: AN43.2, AN70.2

12. **Nervous Tissue** 130
Reviewer: Dr Anjali Sabnis
MGM Medical College,
Navi Mumbai
Competencies: AN68.1, AN68.2, AN68.3

13. **Cardiovascular Tissue** 145
Reviewer: Dr Prabhakaran K
Nootan Medical College,
Ahmedabad, Gujarat
Competencies: AN69.1, AN69.2, AN69.3

14. **Skin and its Appendages** 161
Reviewer: Dr Jahira T Banu
JIPMER, Puducherry
Competency: AN72.1

Section III: Systemic Histology

- | | |
|--|--|
| <p>15. Respiratory System 177
 <i>Reviewer: Dr Bertha AD Rathinam</i>
 AIIMS, Bhopal
 Competencies: AN25.1, AN43.2, AN43.3</p> | <p>22. Male Reproductive System II: Accessory Sex Glands and Penis 276
 <i>Reviewer: Dr Simmi Mehra</i>
 All India Institute of Medical Sciences, Rajkot, Gujarat
 Competency: AN52.2</p> |
| <p>16. Digestive System I: Oral Cavity and Associated Structures
 (Lip, Tooth, Tongue, and Salivary Glands) 195
 <i>Reviewer: Dr Saleena N Ali</i>
 Government TD Medical College, Alappuzha, Kerala
 Competencies: AN43.2, AN43.3</p> | <p>23. Female Reproductive System I: Ovary, Uterus, and Vagina 284
 <i>Reviewer: Dr Deepti Shastri</i>
 VMKV Medical College and Hospitals, Salem, Tamil Nadu
 Competencies: AN52.2, AN52.3</p> |
| <p>17. Digestive System II: Esophagus and Stomach 209
 <i>Reviewer: Dr Sheela Sivam</i>
 MES Medical College, Perinthalmanna, Malappuram, Kerala
 Competencies: AN52.1, AN52.3</p> | <p>24. Female Reproductive System II: Mammary Gland, Placenta, and Umbilical Cord 299
 <i>Reviewer: Dr Swati Bansal</i>
 Kalpana Chawla Medical College, Karnal, Haryana
 Competency: AN52.2</p> |
| <p>18. Digestive System III: Small and Large Intestines 223
 <i>Reviewer: Dr Sushant Das</i>
 AIIMS, Bilaspur, Himachal Pradesh
 Competency: AN52.1</p> | <p>25. Endocrine System 311
 <i>Reviewer: Dr J Sreevidya</i>
 Madras Medical College, Chennai, Tamil Nadu
 Competencies: AN43.2, AN52.1</p> |
| <p>19. Liver, Gallbladder, and Pancreas 238
 <i>Reviewer: Dr Shibanee Jena</i>
 Shri Jagannath Medical College and Hospital, Puri, Odisha
 Competency: AN52.1</p> | <p>26. Nervous System 329
 <i>Reviewer: Dr Ujwala Bhanarkar</i>
 AIIMS, Kalyani, West Bengal
 Competency: AN64.1</p> |
| <p>20. Urinary System 252
 <i>Reviewer: Dr Rakesh Verma</i>
 KGMU, Lucknow Uttar Pradesh
 Competency: AN52.2</p> | <p>27. Special Senses I: Eye 339
 <i>Reviewer: Dr Bashir Ahmad Shah</i>
 Govt Medical College, Srinagar, Jammu and Kashmir
 Competency: AN43.2</p> |
| <p>21. Male Reproductive System I: Testis, Epididymis, and Ductus Deferens 265
 <i>Reviewer: Dr R Sarah</i>
 AIIMS, Madurai, Tamil Nadu
 Competency: AN52.2</p> | <p>28. Special Senses II: Ear 353
 <i>Reviewer: Dr Anitha V</i>
 Professor and Head, Government Medical College, Kanyakumari, Tamil Nadu
 Competency: AN43.3</p> |
| | <p>Index 361</p> |

Concept of Functional Histology

With time, the concepts of histology teaching are changing. The students should focus more on functional histology to understand the microscopic structures and functions of the tissues and organs. Hence, in this edition, more significance is given toward the functional correlation along with basic histology. It will help in laying the foundation for histopathology and increase the focus on the practical application of the fundamentals.

For functional correlation of the following structures, refer the indicated pages.

<ul style="list-style-type: none">• Plasma membrane 14• Rough endoplasmic reticulum 16• Smooth endoplasmic reticulum 16• Golgi complex 17• Mitochondria 18• Ribosomes 18• Lysosomes 19• Microtubules 20• Actin filaments 20• Intermediate filaments 20• Centrioles 22• Nucleolus 24• Epithelium 27• Simple squamous epithelium 29• Simple cuboidal epithelium 30• Simple columnar epithelium 31• Pseudostratified columnar epithelium 32• Keratinized stratified squamous epithelium 33• Transitional epithelium 36• Basement membrane 38• Desmosomes 40• Zonula adherens 40• Fascia adherens 40• Tight junctions 41• Gap junctions 42• Microvilli 43• Steriocilia 44• Cilia 45• Ground substance 63• Myofibroblasts 65• Brown fat 65• Macrophages 65• Mast cells 66• Plasma cells 66• Dense irregular connective tissue 70• Dense regular connective tissue 70• Yellow adipose tissue 72	<ul style="list-style-type: none">• Brown adipose tissue 73• Hyaline cartilage 77• Elastic cartilage 79• Fibrocartilage 80• Osteoprogenitor cells 85• Osteoblasts 86• Osteocytes 86• Osteoclasts 86• T-tubules 103• Muscle spindle 106• Lymph node 119• Thymus 122• Spleen 126• Tonsil 127• Astrocytes 133• Oligodendrocytes 134• Microglia 134• Ependymal cells 135• Satellite cells 135• Myelin sheath 136• Endothelium 146• Tunica intima 148• Tunica media 148• Elastic arteries 149• Arterioles 154• AV shunts 157• Arrector pili muscles 172• Sebaceous glands 173• Modified apocrine sweat glands 175• Clara cells 191• Type II pneumocytes 193• Intercalated ducts 203• Striated ducts 204• Intestinal epithelium 210• Muscularis mucosae 211• Submucosa 211• Functional correlation muscularis externa 211• Esophagus 213	<ul style="list-style-type: none">• Chief cells 218• Parietal cells 219• Enteroendocrine cells 220• Enterocytes 224• Paneth cells 225• M cells 226• Brunner's glands 226• Kidney 252• Mesangial cells 256• Proximal convoluted tubules 258• Distal convoluted tubules 258• Plaques of urinary bladder 263• Sertoli cells 267• Leydig cells 268• Epididymis 273• Blood-testis barrier 273• Vas deferens 275• Seminal vesicle 278• Prostate 280• Mechanism of erection 283• Fallopian tube 292• Mode of milk secretion 302• Placental barrier 305• Placenta 307• Neurohypophysis 316• Thyroid gland 319• Parathyroid gland 321• Zona glomerulosa 323• Zona fasciculata 324• Zona reticularis 325• Suprarenal medulla 326• Pinealocytes 327• Pineal gland 327• Corneal epithelium 341• Bowman's membrane 342• Corneal endothelium 342• Retinal pigmented epithelium 344• Macula 358• Ampullary crest 359
---	---	---

Highlighted Topics of Histology

Learning histology is supported with the specially focused topics in boxes. They will be helpful for understanding the concepts, giving importance to the topics and for preparation of examinations. These are included in boxes as follows.

Box 2.1: Hematoxylin and eosin staining 9	Box 15.4: Blood-air barrier 193
Box 2.2: Decalcification 9	Box 16.1: Taste buds 200
Box 3.1: Lysosomal storage diseases 19	Box 18.1: Peyer's patches 232
Box 3.2: Inclusions 22	Box 19.1: Concept of liver lobules 239
Box 4.1: Histological practical aspects 28	Box 19.2: Liver sinusoids 240
Box 4.2: Goblet cells 32	Box 19.3: Intrahepatic biliary tree 242
Box 6.1: Goblet cell—as a gland 54	Box 19.4: Santorini 247
Box 7.1: Marfan syndrome 61	Box 20.1: Types of nephrons 253
Box 7.2: Mononuclear phagocytic system 66	Box 20.2: Filtration apparatus of kidney 254
Box 9.1: Sharpey's fibers 84	Box 20.3: Mesangium 256
Box 9.2: Paget's disease/osteitis deformans 88	Box 20.4: Juxtaglomerular apparatus 256
Box 9.3: Preparation of ground section of bone 92	Box 21.1: Blood-testis barrier (Sertoli cell barrier) 273
Box 9.4: Zones of epiphyseal cartilage 96	Box 22.1: Benign prostatic hypertrophy 280
Box 10.1: Sarcoplasmic reticulum and T-tubules 103	Box 22.2: Cowper's/bulbourethral gland 280
Box 10.2: Muscle spindle 106	Box 23.1: Endometrium in menstrual cycle 293
Box 10.3: Intercalated disc 108	Box 24.1: Milk ejection reflex 302
Box 11.1: Epithelioreticular cells 122	Box 25.1: Hypothalamo-hypophyseal portal system 312
Box 13.1: Functional correlation of arteriovenous (AV) shunts/anastomosis 157	Box 25.2: Hypothalamic control over anterior pituitary 316
Box 14.1: Panniculus carnosus 166	Box 25.3: Follicular cells and activity of thyroid gland 319
Box 14.2: Functional correlation of melanin 167	Box 25.4: Chromaffin reaction 326
Box 14.3: Sensory receptors of skin 169	Box 26.1: Regional characteristics of spinal cord 331
Box 14.4: Arrector pili muscle 172	Box 26.2: Afferent fibers of cerebellum 334
Box 14.5: Nail clubbing 176	Box 26.3: Connective tissue of central nervous system 338
Box 15.1: Bronchial tree 187	Box 27.1: Vitreous body 349
Box 15.2: Asthma 191	Box 28.1: Tympanic membrane 354
Box 15.3: Alveolar macrophages 193	Box 28.2: Macula 358
	Box 28.3: Ampullary crests 358