

Contents



| | |
|--|-----------|
| 1. Introduction to the Developing Human | 1 |
| Developmental Periods 2 | |
| Significance of Embryology 8 | |
| Historical Gleanings 9 | |
| Descriptive Terms in Embryology 14 | |
| <i>Clinically Oriented Problems</i> 14 | |
| 2. The Beginning of Human Development: The First Week | 17 |
| Gametogenesis 18 | |
| Uterus, Uterine Tubes, and Ovaries 24 | |
| Female Reproductive Cycles 27 | |
| Transportation of Gametes 32 | |
| Maturation of Sperms 33 | |
| Viability of Gametes 34 | |
| Fertilization 34 | |
| Formation of Blastocyst (Blastogenesis) 41 | |
| Summary of the First Week of Development 43 | |
| <i>Clinically Oriented Problems</i> 45 | |
| 3. Formation of Bilaminar Embryonic Disc and Chorionic Sac: | |
| The Second Week | 47 |
| Completion of Implantation and Continuation of Embryonic Development 48 | |
| Development of the Chorionic Sac 51 | |
| Implantation Sites of the Blastocyst 54 | |
| Summary of Implantation of the Blastocyst 58 | |
| Summary of the Second Week of Development 58 | |
| <i>Clinically Oriented Problems</i> 59 | |
| 4. Formation of Germ Layers and Early Tissue and Organ Differentiation: The Third Week..... | 63 |
| Gastrulation: Formation of Germ Layers 64 | |
| Neurulation: Formation of Neural Tube 72 | |
| Development of Somites 72 | |
| Development of Intraembryonic Coelom 74 | |
| Early Development of Cardiovascular System 75 | |
| Further Development of Chorionic Villi 77 | |
| Summary of the Third Week of Development 79 | |
| <i>Clinically Oriented Problems</i> 80 | |
| 5. Organogenetic Period: The Fourth to Eighth Weeks..... | 83 |
| Phases of Embryonic Development 85 | |
| Folding of the Embryo 85 | |

| | |
|--|------------|
| Germ Layer Derivatives | 87 |
| Control of Embryonic Development | 89 |
| Highlights of the Fourth to Eighth Weeks | 90 |
| Estimation of Embryonic Age | 103 |
| Summary of the Fourth to Eighth Weeks of Development | 104 |
| <i>Clinically Oriented Problems</i> | 104 |
| 6. The Fetal Period: Ninth Week to Birth | 107 |
| Estimation of Fetal Age | 109 |
| Highlights of the Fetal Period | 110 |
| Expected Date of Delivery | 118 |
| Factors Influencing Fetal Growth | 119 |
| Procedures for Assessing Fetal Status | 120 |
| Summary of Fetal Period | 123 |
| <i>Clinically Oriented Problems</i> | 125 |
| 7. Placenta and Fetal Membranes | 129 |
| The Placenta | 131 |
| Parturition (Childbirth) | 140 |
| Amnion and Amniotic Fluid | 150 |
| Yolk Sac | 154 |
| Allantois | 154 |
| Multiple Pregnancies | 154 |
| Summary of Placenta and Fetal Membranes | 162 |
| <i>Clinically Oriented Problems</i> | 164 |
| 8. Human Birth Defects | 167 |
| Teratology — Study of Abnormal Development | 168 |
| Anomalies Caused by Genetic Factors | 169 |
| Anomalies Caused by Environmental Factors | 181 |
| Anomalies Caused by Multifactorial Inheritance | 195 |
| Summary of Human Birth Defects | 195 |
| <i>Clinically Oriented Problems</i> | 196 |
| 9. Body Cavities, Mesenteries, and Diaphragm | 201 |
| The Embryonic Body Cavity | 203 |
| Development of the Diaphragm | 206 |
| Congenital Diaphragmatic Hernia | 209 |
| Summary of Development of Body Cavities | 212 |
| <i>Clinically Oriented Problems</i> | 213 |
| 10. The Pharyngeal (Branchial) Apparatus | 215 |
| Pharyngeal Arches | 217 |
| Pharyngeal Pouches | 222 |
| Pharyngeal Grooves | 225 |
| Pharyngeal Membranes | 227 |
| Development of the Thyroid Gland | 230 |
| Development of the Tongue | 233 |
| Development of the Salivary Glands | 235 |



| | | |
|--|-----|------------|
| Development of the Face | 236 | |
| Development of the Nasal Cavities | 242 | |
| Development of the Palate | 245 | |
| Summary of the Pharyngeal Apparatus | 253 | |
| <i>Clinically Oriented Problems</i> | 254 | |
| 11. The Respiratory System | | 257 |
| Development of the Larynx | 259 | |
| Development of the Trachea | 261 | |
| Development of the Bronchi and Lungs | 262 | |
| Summary of the Respiratory System | 268 | |
| <i>Clinically Oriented Problems</i> | 269 | |
| 12. The Digestive System | | 271 |
| The Foregut | 272 | |
| Development of the Spleen | 283 | |
| The Midgut | 283 | |
| The Hindgut | 293 | |
| Summary of the Digestive System | 298 | |
| <i>Clinically Oriented Problems</i> | 300 | |
| 13. The Urogenital System | | 303 |
| Development of the Urinary System | 305 | |
| Development of the Suprarenal Glands | 319 | |
| Development of the Genital System | 323 | |
| Development of the Inguinal Canals | 341 | |
| Summary of the Urogenital System | 344 | |
| <i>Clinically Oriented Problems</i> | 345 | |
| 14. The Cardiovascular System | | 349 |
| Early Development of the Heart and Vessels | 350 | |
| Final Prenatal Development of the Heart | 358 | |
| Anomalies of the Heart and Great Vessels | 372 | |
| Aortic Arch Derivatives | 384 | |
| Aortic Arch Anomalies | 389 | |
| Fetal and Neonatal Circulation | 394 | |
| Development of the Lymphatic System | 398 | |
| Summary of the Cardiovascular System | 401 | |
| <i>Clinically Oriented Problems</i> | 401 | |
| 15. The Skeletal System | | 405 |
| Development of Bone and Cartilage | 407 | |
| Development of Joints | 411 | |
| Development of Axial Skeleton | 412 | |
| Development of Appendicular Skeleton | 420 | |
| Summary of the Skeletal System | 422 | |
| <i>Clinically Oriented Problems</i> | 422 | |

| | |
|---|------------|
| 16. The Muscular System | 425 |
| Development of Skeletal Muscle | 426 |
| Development of Smooth Muscle | 428 |
| Development of Cardiac Muscle | 428 |
| Summary of the Muscular System | 430 |
| <i>Clinically Oriented Problems</i> | 430 |
| 17. The Limbs..... | 433 |
| Early Stages of Limb Development | 434 |
| Final Stages of Limb Development | 437 |
| Dermatomes and Cutaneous Innervation of Limbs | 437 |
| Blood Supply to the Limbs | 442 |
| Anomalies of Limbs | 444 |
| Summary of Limb Development | 448 |
| <i>Clinically Oriented Problems</i> | 449 |
| 18. The Nervous System..... | 451 |
| Origin of the Nervous System | 453 |
| Development of the Spinal Cord | 455 |
| Congenital Anomalies of the Spinal Cord | 461 |
| Development of the Brain | 465 |
| Congenital Anomalies of the Brain | 477 |
| Development of the Peripheral Nervous System | 483 |
| Development of the Autonomic Nervous System | 486 |
| Summary of the Nervous System | 487 |
| <i>Clinically Oriented Problems</i> | 488 |
| 19. The Eye and Ear..... | 491 |
| Development of the Eye | 492 |
| Development of the Ear | 503 |
| Summary of Development of the Eye | 510 |
| Summary of Development of the Ear | 510 |
| <i>Clinically Oriented Problems</i> | 511 |
| 20. The Integumentary System..... | 513 |
| Development of Skin | 514 |
| Development of Hair | 517 |
| Development of Nails | 519 |
| Development of Mammary Glands | 520 |
| Development of Teeth | 522 |
| Summary of the Integumentary System | 528 |
| <i>Clinically Oriented Problems</i> | 529 |
| Discussion of Clinically Oriented Problems..... | 531 |
| Appendices..... | 543 |
| Timetable of Human Prenatal Development — 1 to 6 weeks | 544 |
| Timetable of Human Prenatal Development — 7 to 38 weeks | 546 |
| Critical Periods in Human Development | 548 |
| Index..... | 549 |