

Expert **CONSULT**

Activate at expertconsult.com

**Searchable Full
Text Online**

POLIN • FOX • ABMAN

Fetal and Neonatal Physiology

FOURTH EDITION

VOLUME 2



ELSEVIER
SAUNDERS

SECTION XIV

Physiology of Gastrointestinal Tract in the Fetus and Neonate 1181

- 108** Trophic Factors and Regulation of Gastrointestinal Tract and Liver Development 1181
Douglas G. Burrin
- 109** Organogenesis of the Gastrointestinal Tract 1187
Arthur J. Ross III
- 110** Development of the Enteric Nervous System 1197
Delma L. Broussard and Steven M. Altschuler
- 111** Development of Gastric Secretory Function 1204
Chris J. Dickinson
- 112** Gastrointestinal Motility 1212
Taber I. Omari and Colin D. Rudolph
- 113** Fetal and Neonatal Intestinal Motility 1226
Douglas G. Field and A. Craig Hillemeier
- 114** Development of the Exocrine Pancreas 1230
Steven L. Werlin and Alan N. Mayer
- 115** Digestive-Absorption Functions in Fetuses, Infants, and Children 1240
Josef Neu and Maka Mshvildadze

- 116** Pathophysiology of Gastroesophageal Reflux 1249
Joshua R. Friedman and Chris A. Liacouras
- 117** Pathophysiology and Prevention of Neonatal Necrotizing Enterocolitis 1256
Michael Caplan

SECTION XV

Liver and Bilirubin Metabolism 1262

- 118** Organogenesis and Histologic Development of the Liver 1262
Steven Lobritto
- 119** Bile Acid Metabolism During Development 1266
Elmer S. David, Iona M. Monteiro, and Ronaldo P. Ferraris
- 120** Bile Formation and Cholestasis 1280
Heidi Eigenrauch Karpen and Saul J. Karpen
- 121** Neonatal Bilirubin Metabolism 1291
William J. Cashore
- 122** Mechanisms of Bilirubin-Induced Brain Injury 1295
Thor Willy Ruud-Hansen

SECTION XVI

The Kidney 1307

- 123** Embryogenesis and Anatomic Development of the Kidney 1307
William E. Sweeney, Jr., and Ellis D. Avner
- 124** Functional Development of the Kidney in Utero 1316
Robert L. Chevalier and Victoria Fay Norwood
- 125** Postnatal Maturation of Renal Blood Flow 1323
Michael J. Solbaug and Pedro A. Jose
- 126** Development of the Renin-Angiotensin System 1330
Maria Luisa S. Sequeira Lopez and Roberto Ariel Gomez
- 127** Postnatal Development of Glomerular Filtration Rate in Neonates 1339
Jean-Pierre Guignard
- 128** Renal Transport of Sodium During Early Development 1349
Leonard G. Feld and Howard E. Corey
- 129** Potassium Homeostasis in the Fetus and Neonate 1362
Corinne Benchimol and Lisa M. Satlin
- 130** Role of the Kidney in Calcium and Phosphorus Homeostasis 1371
Juhi Kumar, Craig B. Woda, Robert P. Woroniecki, Susan E. Mulrone, and Frederick J. Kaskel
- 131** Transport of Amino Acids During Early Development 1384
Aaron L. Friedman
- 132** Developmental Aspects of Organic Acid Transport 1388
Deborah P. Jones and F. Bruder Stapleton
- 133** Concentration and Dilution of the Urine 1392
Michael A. Jinsbaw
- 134** Urinary Acidification 1419
Eileen D. Brewer
- 135** Response to Nephron Loss in Early Development 1423
Robert L. Chevalier
- 136** Pathophysiology of Acute Renal Failure in the Neonatal Period 1428
Tracy E. Hunley and Valentina Kon

SECTION XVII

Fluid and Electrolyte Metabolism 1436

- 137** Fluid Distribution in the Fetus and Neonate 1436
Karl Bauer, Robert A. Brace, and Barbara S. Stonestreet
- 138** Fetal and Neonatal Body Water Compartment Volumes With Reference to Growth and Development 1445
John M. Lorenz
- 139** Pathophysiology of Edema 1451
David P. Carlton
- 140** Regulation of Acid-Base Balance in the Fetus and Neonate 1455
Philippe S. Friedlich and Istvan Seri

SECTION XVIII

Developmental Hematopoiesis 1459

- 141** Developmental Biology of Stem Cells: From the Embryo to the Adult 1459
Mervin C. Yoder
- 142** Developmental Biology of the Hematopoietic Growth Factors 1469
Kurt R. Schibler
- 143** Developmental Granulocytopoiesis 1486
Akhil Maheshwari and Robert D. Christensen
- 144** Developmental Erythropoiesis 1495
Robin Kjerstin Obls
- 145** Developmental Megakaryocytopoiesis 1520
Martha Sola-Visner and Brandon S. Poterjoy

SECTION XIX

Hemostasis 1538

- 146** Developmental Hemostasis 1538
Paul Monagle and J. Nathan Hagstrom
- 147** Platelet-Vessel Wall Interactions 1547
Thomas G. Diacovo

SECTION XX

Developmental Immunobiology 1553

- 148** Host Defense Mechanisms Against Bacteria 1553
Timothy R. La Pine and Harry R. Hill
- 149** Host-Fungi Interactions Relevant to the Newborn Infant 1566
László Maródi and Richard B. Johnston, Jr.
- 150** Host Defense Mechanisms Against Viruses 1570
M. Brad Guffey and David Winston Kimberlin
- 151** T-Cell Development 1596
László Maródi and Luigi D. Notarangelo
- 152** B-Cell Development 1604
Sonja E. Johnson and Tucker W. LeBien
- 153** Mononuclear Phagocyte System 1610
Kurt R. Schibler
- 154** Neonatal Neutrophil Normal and Abnormal Physiology 1628
Monica Bhatia, Elvira Parravicini, Carmella van de Ven, and Mitchell S. Cairo
- 155** The Complement System of the Fetus and Newborn 1640
Melvin Berger
- 156** Cytokines and Inflammatory Response in the Fetus and Neonate 1652
Laurie E. Kilpatrick and Mary Catherine Harris
- 157** Integrins and Cell Adhesion Molecules 1671
M. Michele Mariscalco
- 158** Immunology of Human Milk and Host Immunity 1690
Armond S. Goldman, Sathana Chbeda, Susan E. Keeney, and Frank C. Schmalstieg
- 159** Neonatal Pulmonary Host Defense 1701
Kerry McGarr Empey and Jay K. Kolls

SECTION XXI

Neurology 1745

- 160** Development of the Nervous System 1745
Omar S. Khwaja, Scott L. Pomeroy, and Nicole Ullrich

- 161** Development of the Blood-Brain Barrier 1763
Susan S. Cohen, Shadi N. Malaeb, Daniela Virgintino, and Barbara S. Stonestreet
- 162** Development of Neurotransmitters 1774
Michael V. Johnston
- 163** Perinatal Brain Metabolism 1783
Susan J. Vannucci and Robert C. Vannucci
- 164** Electroencephalography in the Premature and Full-Term Infant 1797
Robert Ryan Clancy
- 165** Cerebral Blood Flow in Premature Infants: Regulation, Measurement, and Pathophysiology of Intraventricular Hemorrhage 1820
Jeffrey M. Perlman
- 166** Intraventricular Hemorrhage in the Neonate 1830
Terrie E. Inder and Joseph J. Volpe
- 167** Pathophysiology of Neural Tube Defects 1848
Enrico Danzer, Natalie E. Rintoul, and N. Scott Adzick
- 168** Trophic Factor and Nutritional and Hormonal Regulation of Brain Development 1862
Jeanette Pleasure and David Pleasure
- 169** Developmental Aspects of Pain 1870
Anne M. Ades and Margaret Myers

SECTION XXII

Special Sensory Systems in the Fetus and Neonate 1875

- 170** Retinal Development and the Pathophysiology of Retinopathy of Prematurity 1875
Helen A. Mintz-Hittner
- 171** Early Development of the Human Auditory System 1882
Lynne A. Werner
- 172** Development of Taste and Smell in the Neonate 1899
Beverly J. Cowart, Gary K. Beauchamp, and Julie A. Mennella

SECTION XXIII

Orthopedics 1908

- 173** The Growth Plate: Embryologic Origin, Structure, and Function 1908

*Jennifer Frances, Bulent Erol,
and John P. Dormans*

- 174** Developmental Basis of Congenital Limb Differences 1917

Lee Niswander and Damien Bates

- 175** Ontogenesis of Striated Muscle 1924

Harvey B. Sarnat

SECTION XXIV

Endocrine Function 1948

- 176** Hypothalamus: Neuroendometabolic Center 1948

Adda Grimberg and Jessica Katz Kutikov

- 177** Growth Factor Regulation of Fetal Growth 1958

*J. Nina Ham, Diva D. De León,
and Lorraine E. Levitt Katz*

- 178** Growth Hormone and Prolactin 1969

Peter D. Gluckman and Felicia M. Low

- 179** Luteinizing Hormone and Follicle-Stimulating Hormone Secretion in the Fetus and Newborn 1975

*Sumana Narasimhan, Mark R. Palmert,
and Leona Cuttler*

- 180** Development of the Corticotropin-Releasing Hormone–Corticotropin System in the Mammalian Fetus 1988

James C. Rose, Luke C. Carey, and Jeffrey Schwartz

- 181** Fetal and Neonatal Adrenocortical Physiology 1995

Kristi L. Watterberg

- 182** Fetal and Neonatal Thyroid Physiology 2004

Daniel H. Polk and Delbert A. Fisher

SECTION XXV

Ovary and Testis 2014

- 183** Genetics of Sex Determination and Differentiation 2014

Stan R. Blecher and Robert P. Erickson

- 184** Differentiation of the Ovary 2022

Anne Grete Byskov and Lars Grabow Westergaard

- 185** Testicular Development and Descent 2031

Mary M. Lee