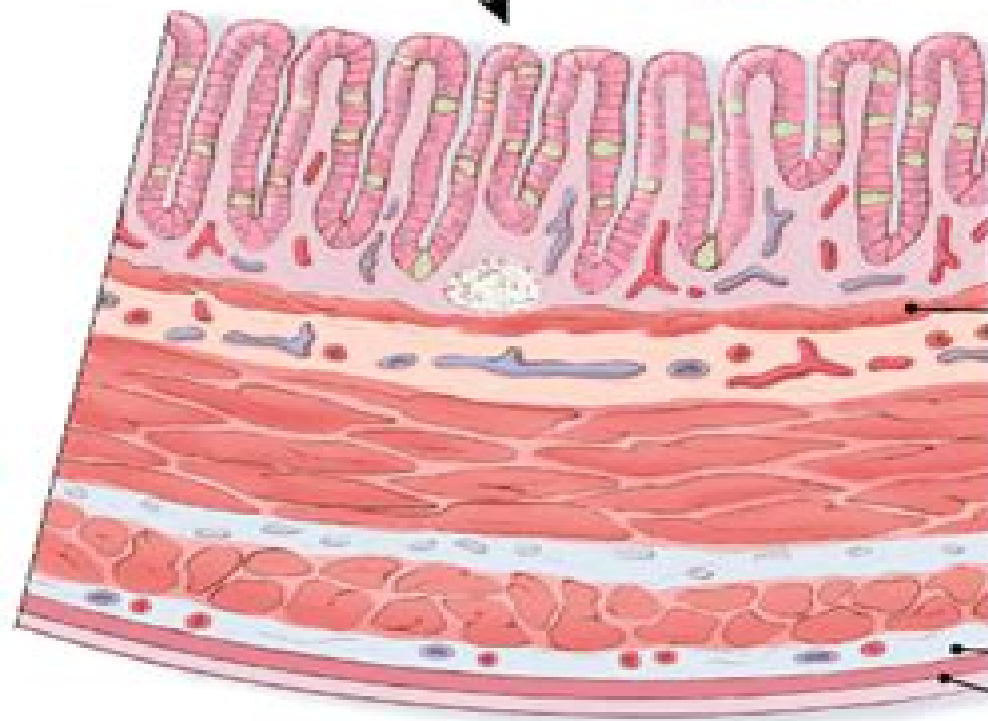


Normal intestinal  
tissue (cross section  
of digestive tract)



Epithelium

Connective tissue

Thin muscle layer

Submucosa

Thick muscle  
layers

Subserosa

Serosa

Mucosa

# Gastrointestinal Microcirculation

**John L. Wallace**



## **Gastrointestinal Microcirculation:**

*The Gastrointestinal Circulation* Peter R. Kvietys, 2010 The microcirculation of the gastrointestinal tract is under the control of both myogenic and metabolic regulatory systems The myogenic mechanism contributes to basal vascular tone and the regulation of transmural pressure while the metabolic mechanism is responsible for maintaining an appropriate balance between O<sub>2</sub> demand and O<sub>2</sub> delivery In the postprandial state hydrolytic products of food digestion elicit a hyperemia which serves to meet the increased O<sub>2</sub> demand of nutrient assimilation Metabolically linked factors e g tissue pO<sub>2</sub> adenosine are primarily responsible for this functional hyperemia The fenestrated capillaries of the gastrointestinal mucosa are relatively permeable to small hydrolytic products of food digestion e g glucose yet restrict the transcapillary movement of larger molecules e g albumin This allows for the absorption of hydrolytic products of food digestion without compromising the oncotic pressure gradient governing transcapillary fluid movement and edema formation The gastrointestinal microcirculation is also an important component of the mucosal defense system whose function is to prevent and rapidly repair inadvertent epithelial injury by potentially noxious constituents of chyme Two pathological conditions in which the gastrointestinal circulation plays an important role are ischemia reperfusion and chronic portal hypertension Ischemia reperfusion results in mucosal edema and disruption of the epithelium due in part to an inflammatory response e g increase in capillary permeability to macromolecules and neutrophil infiltration Chronic portal hypertension results in an increase in gastrointestinal blood flow due to an imbalance in vasodilator and vasoconstrictor influences on the microcirculation Table of Contents Introduction Anatomy Regulation of Vascular Tone and Oxygenation Extrinsic Vasoregulation Neural and Humoral Postprandial Hyperemia Transcapillary Solute Exchange Transcapillary Fluid Exchange Interaction of Capillary and Interstitial Forces Gastrointestinal Circulation and Mucosal Defense Gastrointestinal Circulation and Mucosal Pathology I Ischemia Reperfusion Gastrointestinal Circulation and Mucosal Pathology II Chronic Portal Hypertension Summary and Conclusions References Author Biography Physiology of the Gastrointestinal Tract Kim E. Barrett, Faye K.

Ghishan, Juanita L. Merchant, Hamid M. Said, Jackie D. Wood, 2006-05-10 FROM THE PREFACE The original purpose of the First Edition of *Physiology of the Gastrointestinal Tract* to collect in one set of volumes the most current and comprehensive knowledge in our field was also the driving force for the Fourth Edition The explosion of information at the cellular level made possible in part by the continued emergence of powerful molecular and cellular techniques has resulted in a greater degree of revision than that of any other edition The first section now titled Basic Cell Physiology and Growth of the GI Tract contains numerous new chapters on topics such as transcriptional regulation signaling networks in development apoptosis and mechanisms in malignancies Most of the chapters in this section were edited by Juanita L Merchant Section II has been renamed Neural Gastroenterology and Motility and has been expanded from seven chapters with rather classic titles to more than twenty chapters encompassing not only the movement of the various parts of the digestive tract but also cell physiology

neural regulation stress and the regulation of food intake Almost all of the chapters were recruited and edited by Jackie D Wood The third section is entirely new and contains chapters on Immunology and Inflammation which were edited by Kim E Barrett The fourth section on the Physiology of Secretion consists of chapters with familiar titles but with completely updated information to reflect the advances in our understanding of the cellular processes involved in secretion The last section on Digestion and Absorption contains new chapters on the intestinal barrier protein sorting and ion channels along with those focusing on the uptake of specific nutrients These chapters were recruited and edited by Hamid M Said and Fayez K Ghishan Collected in one set the most current and comprehensive coverage of gastrointestinal physiology Information presented in a style that is both readable and understandable Valuable to the specialized researcher the clinical gastroenterologist the teacher and the student Features an entirely new section on Immunology and Inflammation Each section edited by the preeminent scientist in the field     *Immune Dysfunction: An Update of New Immune Cell Subsets and Cytokines in Sepsis*

Yong Ming Yao, Marcin Filip Osuchowski, Zhixing Kevin Pan, Jiang Huai Wang, 2022-01-31     **Gastrointestinal Microcirculation** K. Messmer, F. Hammersen, 1991-01-18     Gastrointestinal Mucosal Defense System Peter R.

Kvietys, Ahmed Yaqinuddin, Wael Al Kattan, 2014-11-01 The gastrointestinal mucosal defense system serves to minimize mucosal injury by either ingested or endogenously produced noxious substances The mucosal defense system is stratified into pre epithelial alkaline mucus epithelial dynamic epithelial lining and post epithelial microcirculation components The mucus lining the epithelial surface presents a diffusional barrier to ingested material e g lipids and also serves as an unstirred layer in which a pH gradient can be established to prevent acid induced injury The epithelial lining prevents entrance of any toxic material to the interstitium and should it be damaged it is rapidly resealed by migration of adjacent viable epithelial cells to cover the defect Any acid or other material that has entered the interstitium is washed out by an intense neurogenic hyperemia In general the mucosal defense system is quite effective and any adverse gastrointestinal effects associated with the normal course of nutrient assimilation are minimal However there are two situations in which the mucosal defense system is known to be ineffective and result in gastric mucosal injury inadvertent ingestion of H pylori or intentional ingestion of NSAIDs H pylori can penetrate the mucus layers and cause epithelial injury and inflammation while at the same time preventing its clearance by the host immune system NSAIDs weaken the mucus layer and cause epithelial cell injury Table of Contents Acknowledgments Introduction The Mucus Layer Epithelial Lining Gastrointestinal Circulation Integration of Mucosal Defense Mucosal Defense System Physiologic Mucosal Defense System H pylori Mucosal Defense System Nonsteroidal Anti Inflammatory Drugs NSAIDs Overall Summary and Conclusions References Author Biographies

**Endogenous Mediators of Gastrointestinal Damage** John L. Wallace, 1989-09-30 This text helps the reader determine whether or not the gastrointestinal mucosa ulcerates can be viewed as a balance between aggressive factors present in the lumen and the mucosal defence system Several of these aggressive factors such as acid bile and pepsin are endogenous

substances Similarly several endogenous substances exert control over mucosal blood flow and secretion and thus are important mediators of mucosal defence In this volume experts in this field have contributed chapters on some of the most important of these endogenous mediators including histamine prostaglandins leukotrienes and platelet activating factor The potential contribution of these mediators to gastrointestinal disease has been assessed Also discussed is the role these mediators play in gastrointestinal side effects of drugs i e non steroidal anti inflammatory drugs Also covered are the mechanisms of action of endogenous mediators relative to the the drugs used clinically for the treatment of maladies of the digestive system This volume will be of interest to the basic scientist the clinical investigator and to students of pathophysiology and medicine

**Lymph Node Metastasis in Gastrointestinal Cancer** Shoji Natsugoe,2019-01-23 This book provides the most comprehensive and up to date knowledge of lymph node micrometastasis LMM and sentinel node navigation surgery SNNS in gastrointestinal cancers Lymph node metastasis is a critically important prognostic factor in gastrointestinal tract cancers such as tumors of the esophagus stomach and colorectum An understanding of the basic aspects of lymphatics and lymph nodes including anatomy histology physiology immunology and molecular biology is fundamental for physicians who are involved in cancer treatment Furthermore owing to the development of molecular and biological methodology the precise recognition of LMM and its clinical significance have been clarified recently At the same time SNNS has actually been anticipated in treatment of breast tumors and it is now being introduced in gastrointestinal tract cancer For the application of SNNS the detection of lymph node metastasis including LMM is extremely significant because the presence of LMM determines the direction for surgery and chemo and or radiation therapy With these considerations in mind the expert contributors to this book review basic and clinical approaches for LMM and SNNS including methodology for gastrointestinal cancers Thus this volume benefits not only surgeons who treat gastrointestinal cancers but also clinical oncologists and medical scientists such as physiologists and pathologists

**Immunopharmacology of the Gastrointestinal System** John L. Wallace,1993-03-01 Diseases of the digestive system have a higher morbidity rate than any other group of disorder There is a growing body of evidence that the immune system participates in the pathogenesis of a wide range of these diseases including peptic ulcer disease and the gastropathy induced by nonsteroidal anti inflammatory drugs NSAIDS For these reasons efforts to develop novel therapies for digestive diseases are increasingly focused on the immune system This volume reviews the immunopharmacology of the gastrointestinal tract at four distinct levels Immunomodulation at a cellular level Cellular targets for immunomodulating drugs Specific classes of inflammatory mediators Utility and mechanisms of action of glucocorticoids in the treatment of diseases of the gastrointestinal tract

*Regulatory Mechanisms in Gastrointestinal Function (1995)* Timothy S. Gaginella,2017-11-22

Regulatory Mechanisms in Gastrointestinal Function includes a collection of contemporary topics in gastrointestinal research The control of gastroduodenal electrolyte transport and the influence of drugs on bicarbonate secretion are reviewed in

detail The importance of the interactions between calcium and cyclic AMP in intestinal secretion is emphasized in a comprehensive chapter that systematically addresses each link in the mechanisms that regulate chloride secretion Other important topics included in the book are neural reflex modulation of intestinal epithelial transport the influence of the microcirculation on intestinal secretion and nitric oxide as a mediator of physiologic and pathophysiologic secretion The expertise of the authors has resulted in a breadth of important contemporary topics covered in depth

**Physiology of the Gastrointestinal Tract, Two Volume Set** Hamid M. Said, 2012-07-04 Physiology of the Gastrointestinal Tract Fifth Edition winner of a 2013 Highly Commended BMA Medical Book Award for Internal Medicine covers the study of the mechanical physical and biochemical functions of the GI Tract while linking the clinical disease or disorder bridging the gap between clinical and laboratory medicine The gastrointestinal system is responsible for the breakdown and absorption of various foods and liquids needed to sustain life Other diseases and disorders treated by clinicians in this area include food allergies constipation chronic liver disease and cirrhosis gallstones gastritis GERD hemorrhoids IBS lactose intolerance pancreatic appendicitis celiac disease Crohn s disease peptic ulcer stomach ulcer viral hepatitis colorectal cancer and liver transplants The new edition is a highly referenced and useful resource for gastroenterologists physiologists internists professional researchers and instructors teaching courses for clinical and research students 2013 Highly Commended BMA Medical Book Award for Internal Medicine Discusses the multiple processes governing gastrointestinal function Each section edited by preeminent scientist in the field Updated four color illustrations

[Research Awards Index](#), 1978 [National Library of Medicine Current Catalog](#) National Library of Medicine (U.S.), 1991

*Miller's Anesthesia E-Book* Ronald D. Miller, Lars I. Eriksson, Lee A Fleisher, Jeanine P. Wiener-Kronish, Neal H Cohen, William L. Young, 2014-10-20 From fundamental principles to advanced subspecialty procedures Miller s Anesthesia covers the full scope of contemporary anesthesia practice This go to medical reference book offers masterful guidance on the technical scientific and clinical challenges you face each day in addition to providing the most up to date information available for effective board preparation Consult this title on your favorite e reader conduct rapid searches and adjust font sizes for optimal readability Address the unique needs of pediatric patients with guidance from an entire section on pediatric anesthesia View more than 1 500 full color illustrations for enhanced visual clarity Access step by step instructions for patient management as well as an in depth analysis of ancillary responsibilities and problems Quickly reference important concepts with Key Points boxes integrated into every chapter Stay current on today s most recent anesthetic drugs and guidelines protocols for anesthetic practice and patient safety and access expanded coverage on new techniques such as TEE and other monitoring procedures Take advantage of the unique international perspectives of prominent anesthesiologists from all over the world including the UK Australia India Brazil and Germany Remain at the forefront of new developments in anesthesia with coverage of hot topics including Non OR Anesthesia Role of the Anesthesiologist in Disasters Sleep Medicine in Anesthesia Perioperative and Anesthesia related

Neurotoxicity Anesthetic Implications of Complementary and Alternative Medicine and Robotics Study brand new chapters on Perioperative Fluid Management Extracorporeal Support Therapies Anesthesia for Organ Donation Procurement and Malignant Hyperthermia and other Genetic Disorders **Ascites and Renal Dysfunction in Liver Disease** Pere Ginés, Vicente Arroyo, Juan Rodés, Robert W. Schrier, 2008-04-15 There has been very little written on the interaction of the liver and kidney This book addresses the increasing incidence and significance of diseases such as ascites renal dysfunction cirrhosis and hypertension where both organs are involved This textbook is essential even for confirmed practitioners and contains current information regarding treatment and therapy for patients with cirrhosis and ascites clearly and effectively presented by the top international experts within this field The second edition is entirely revised and updated and places greater emphasis on therapy **Anesthesia and Perioperative Care of the High-Risk Patient** Ian

McConachie, 2014-09-04 A concise summary of perioperative management of high risk surgical patients bridging the gap between the operating theatre and ICU *Innervation of the Gastrointestinal Tract* Simon Brookes, Marcello Costa, 2002-06-27 The long tube that makes up the gastrointestinal tract is composed of a variety of tissue types and is the largest internal organ of the body Its main function is to digest food and absorb the released nutrients Furthermore it is subdivided into functionally distinct regions that each mediate one of a variety of actions upon the food consumed i

**Yamada's Textbook of Gastroenterology** Daniel K. Podolsky, Michael Camilleri, J. Gregory Fitz, Anthony N. Kalloo, Fergus Shanahan, Timothy C. Wang, 2015-10-22 Seit 20 Jahren ist Yamada's Textbook of Gastroenterology das umfassendste und weltweit anerkannte Lehrwerk für das Fachgebiet und vereint in Form einer Enzyklopädie die wissenschaftlichen Grundlagen von Magen Darm und Lebererkrankungen mit den neuesten klinischen Erkenntnissen vor allem Entwicklungen in den Bereichen Diagnose und Therapie Zu dem Herausgeberteam unter der Leitung von Tachi Yamada einer der weltweit führenden Forscher des Fachgebiets gehören schon immer herausragende Namen Gleiches gilt für die Autoren vieler Beiträge die zu den Experten ihres Fachbereichs gehören Mit dem neuen Chefherausgeber Dan Podolsky Professor für Innere Medizin an dem Southwestern Medical Center der University of Texas wurde die 6. Auflage dieses führenden Lehrbuchs aktualisiert und in vielerlei Hinsicht verbessert Jetzt beim Kauf der Printversion mit kostenlosem Zugriff auf die digitale Ausgabe mit umfassenden Suchfunktionen Einheitliche Darstellung der einzelnen Themenabschnitte unterteilt in wissenschaftliche Grundlagen Krankheiten und deren Symptome und damit eine Vereinheitlichung in Aufbau Inhalt und Länge Neuer Abschnitt Principles of Clinical Gastroenterology mit Schwerpunkt auf klinische Aspekte In 14 Kapiteln wird auf die jeweiligen Krankheitssymptome eingegangen Ärzte können so ihre Patienten in der Klinik noch besser beurteilen und behandeln Wichtige Themen werden noch ausführlicher erläutert autoimmune Pankreatitis fäkale Biomarker Genetik chronisch entzündliche Darmerkrankungen systemische IgG4-assoziierte Erkrankungen Morbus Crohn Colitis ulcerosa und eosinophile Colitis Podcasts international führender Experten zu aktuellen Themen Starker Schwerpunkt

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Infection Control in the Intensive Care Unit Hendrick K.F. van Saene, Luciano Silvestri, Miguel A. de la Cal, Antonino Gullo, 2011-12-26 Intensive care is a rapidly changing area of medicine and after four years from the 2nd edition the volume editors and authors have deemed necessary to update it In the recent years in fact five new randomised controlled trials and five new meta analyses demonstrate that selective decontamination of the digestive tract SDD is an antimicrobial prophylaxis to prevent severe infections of not only lower airways but also of blood Additionally SDD has been shown to reduce inflammation including multiple organ failure and mortality An intriguing observation is the evidence that SDD using parenteral and enteral antimicrobials reduces rather than increases antimicrobial resistance Moreover a new chapter on microcirculation had been added The volume will be an invaluable tool for all those requiring in depth knowledge in the ever expanding field of infection control

*Microvascular Perfusion and Transport in Health and Disease* P. F. McDonagh, 1987-01-02

*Gut Dysfunction in Critical Illness* J.L. Rombeau, J. Takala, 2012-12-06 Dysfunction of the gastrointestinal tract in critically ill patients has recently become a focus of intensive research This book the first one on this topic is a comprehensive overview of what is currently known about the role of the gut in patients requiring intensive care The definitions and pathogenesis of intestinal dysfunction are critically evaluated Currently available and potential new ways to monitor intestinal function in the intensive care setting are presented Emphasis has been placed on the evaluation of therapeutic strategies in the prevention and treatment of gut dysfunction Options for monitoring and treating gut dysfunction in critically ill patients are rapidly evolving This volume provides state of the art information for both clinicians and clinical researchers

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In an era characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its power to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Gastrointestinal Microcirculation**," a mesmerizing literary creation penned by way of a celebrated wordsmith, readers attempt an enlightening odyssey, unraveling the intricate significance of language and its enduring impact on our lives. In this appraisal, we shall explore the book's central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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