## The Pancreas

Volume 1

Edited by
Hans G. Beger
Andrew L. Warshaw
Markus W. Büchler
David L. Carr-Locke
John P. Neoptolemos
Christopher Russell
Michael G. Sarr

# 胰腺病学

*b*Blackwell
Science

Chinese Edition



# The Pancreas

PO BOX 267 Shingoon

Oxon OX 14 31 N

(Orders: Tel: 01235 465500

Even 01245 465500

In two volumes/Volume 1

Biscopper Secrete, Inc., Commerce Place \$50 Main Screet Majdep, MA 02148 5018 (Orders, Tel: 800 759 8102 Equ., 781 388 8250

Login Brothers Book Company 324 Saulteaux Crescen Winnipeg, Manitoba R34 372 (Orders, Tel. 204 224-4068)

> ustralia Blackwell Science Pty Ltd 54 University Street Carl (10, VK1011) 3053 (Orders Tel. 3 9347 0300 Event 2047 5001)

For further information on Blackwell Science, visit our websit www.blackwell-science, com Edited by Hans G. Beger

Andrew L. Warshaw Markus W. Büchler David L. Carr-Locke John P. Neoptolemos

Christopher Russell

馆藏专用章

Michael G. Sarr

emonal Ounces:

Snew Mead Oxford OX2 OEL.

John Street, London WCIN 281

Arhelie Place, Edinburgh EH3 664

And 01148 4018, 028

Mad 01148 4018, 028

Victoria 3053, Ansuraha

Other Editorial Offices: sharkwell Wissenschatts V Kurfürstendamm 57 10707 Berlin, Germany

itackweb Science KR. AG Kodenmacho Buikling 1-10 Kodenmache Nihombasu Thuesku, Tokyo 10 k, Japan

The right of the Anthon to be lentified as the Anthon of this w loas been assence in accordance with the Copyright, Besigns and become act 100.8

Rect Lordeddug rest

set by Exect Typesetters. Houghou Printed and bound in Casta Britain at the University Press. Cambridge

**b**Blackwell
Science

ジャのよと版で引 西安·北京·广州·ト海 **陕版出图字 著作权合同登记** 25-1999-037号

## The Pancreas 胰腺病学

by Beger et al.

任卫军 重印责任编辑

必界的出出版而在公司重印发行

(西安市南大街 17号 邮编:710001)

西安七二二六印刷厂印刷

787×1092 毫米 开本 1/16 印张:103.5 字数:3312 千字 1999 年 7 月第 1 次印刷

ISBN 7-5062-2251-5/R・389 Wx2251(全二卷) 定价:(精)630.00元

## 映版出图字 藩作权合同登记 25—1999—037 号 The Pancreas

The Pancreas 腹腺病学

by Beger et al.

任卫军 重印责任编辑

必然仍然是既必要公司重印及行

西安市南大海 17号 邮编:710001

787×1092 磁来 开本 1/16 印张 1/03 5 字裝 : 3312 千字 1999 年 7 月第 1 次 印刷

ISBN 7-5062-2251-5/R・389 Wx2251(全工卷) 定价:(精)630.00元 © 1998 by
Blackwell Science Ltd
Editorial Offices:
Osney Mead, Oxford OX2 0EL
25 John Street, London WC1N 2BL
23 Ainslie Place, Edinburgh EH3 6AJ
350 Main Street, Malden
MA 02148 5018, USA
54 University Street, Carlton
Victoria 3053, Australia
10, rue Casimir Delavigne
75006 Paris, France

Other Editorial Offices: Blackwell Wissenschafts-Verlag GmbH Kurfürstendamm 57 10707 Berlin, Germany

Blackwell Science KK MG Kodenmacho Building 7–10 Kodenmacho Nihombashi Chuo-ku, Tokyo 104, Japan

The right of the Authors to be identified as the Authors of this work has been asserted in accordance with the Copyright, Designs and Patents Act 1988

First published 1998

Set by Excel Typesetters, Hong Kong Printed and bound in Great Britain at the University Press, Cambridge All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, except as permitted by the UK Copyright, Designs and Patents Act 1988, without the prior permission of the copyright owner.

The Blackwell Science logo is a trade mark of Blackwell Science Ltd, registered at the United Kingdom Trade Marks Registry

A catalogue record for this title is available from the British Library ISBN 0-86542-420-9

Library of Congress Cataloging-in-publication Data

The pancreas / edited by Hans G. Beger . . . [et al.].

p. cm. Includes bibliographical references and index. ISBN 0-86542-420-9

1. Pancreas—Diseases. 2. Pancreas.

I. Beger, H. G. (Hans G.)

[DNLM 1. Pancreatic Diseases.

2. Pancreas. WI 800 P18821 1997]

RC857.P282 1997 616.3'7—dc21 DNLM/DLC for Library of Congress

#### DISTRIBUTORS

Marston Book Services Ltd PO Box 269, Abingdon Oxon OX14 4YN

(Orders: Tel: 01235 465500 Fax: 01235 465555)

#### USA

Blackwell Science, Inc. Commerce Place 350 Main Street Malden, MA 02148 5018 (Orders: Tel: 800 759 6102 781 388 8250 Fax: 781 388 8255)

#### Canada

Januar Januar Jaya Saulteaux Crescent Winnipeg, Manitoba R3J 3T2 (Orders: Tel: 204 224-4068)

### Australia

Blackwell Science Pty Ltd 54 University Street Carlton, Victoria 3053 (Orders: Tel: 3 9347 0300 Fax: 3 9347 5001)

For further information on Blackwell Science, visit our website: www. blackwell-science.com

## **List of Contributors**

- **Guido Adler** MD, Professor of Internal Medicine, Chairman of Department of Internal Medicine I, University of Ulm, Robert-Koch-Strasse 8, D-89081 Ulm, Germany
- Paul Ahearne MD, Junior Faculty Associate, MD Anderson Cancer Center, 1515 Holcombe Boulevard, Houston, TX 77030, USA
- **J.H. Alexandre**, Professor and Head, Department of General and Abdominal Surgery, Broussais Hospital, Paris VI University, 96 Rue Didot, 75014 Paris, France
- **Stephen T. Amann** MD, Assistant Professor, Department of Medicine, Division of Gastroenterology, Hepatology and Nutrition, University of Florida College of Medicine, 1600 SW Archer Road, Gainesville, FL 32610, USA
- Åke Andrén-Sandberg MD, PhD, Associate Professor,
  Department of Surgery, Lund University Hospital, S-22185 Lund,
  Sweden
- **Lotta Anveden-Hertzberg** MD, Attending Pediatric Surgeon, Astrid Lindgren's Children's Hospital at The Karolinska Hospital, Stockholm, Sweden
- Rudolf Arnold MD, FRCP, Professor of Internal Medicine, Division of Gastroentrology and Endocrinology, Department of Internal Medicine, Philipps Universität, Baldingerstrasse, D-35033 Marburg, Germany
- **Dennis W. Ashley** Associate Professor of Surgery, Mercer University School of Medicine, Medical Center of Central Georgia, Macon, GA, USA
- **Stanley W. Ashley** MD, Associate Professor of Surgery,
  Department of General Surgery, Brigham and Women's Hospital,
  Harvard Medical School, 75 Francis Street, Boston, MA 02115, USA
- **Louis N. Aurisicchio** MD, Our Lady of Mercy Medical Center, Division of Gastroenterology and Clinical Nutrition, Bronx, NY 10466, USA

- **Pia Lena Bäckman** MD, Department of Surgery, Lund University Hospital, S-22185 Lund, Sweden
- Asser Badawy MD, Lecturer in Surgery, Department of Surgery, Paris IX University, Antoine-Béclère Hospital, 157 rue de la Porte de Trivaux, 92141 Clamart Cedex, France
- John Baillie MB, ChB, Division of Surgery, Duke University Medical Center, Box 3189, Durham, NC 27710, USA
- Kåre E. Bakkevold, MD, PhD, Consultant Surgeon, Department of Surgery, Haugesund Hospital, N-5500 Haugesund, Norway
- **Emil J. Balthazar** MD, Professor of Radiology and Chief of Gastrointestinal Radiology, New York University-Tisch-Bellevue Medical Center, 462 1st Avenue, New York, NY 10016, USA
- **Gianpaolo Balzano** MD, Dipartimento di Chirurgia Generale, Ospedale San Raffaele, Via Olgettina 60, 20132 Milano, Italy
- **Peter A. Banks** MD, Director, Clinical Gastroenterology Service, Brigham and Women's Hospital and Associate Professor of Medicine, Harvard Medical School, Boston, MA 02115, USA
- Clyde F. Barker MD, Professor and Chairman, Department of Surgery, University of Pennsylvania, School of Medicine, 3400 Spruce Street, Philadelphia, PA 19104, USA
- Jamie S. Barkin MD, Professor of Medicine, University of Miami School of Medicine; Chief, Division of GI, Mount Sinai Medical Center, 4300 Alton Road, Miami Beach, FL 33140, USA
- Marc Á.P.M. Barthet MD, Praticien Hospitalier Universitaire, Hôpital Sainte-Marguerite, 270 Boulevard de Sainte-Marguerite, B.P. 29, 13274 Marseille Cedex 09, France
- Claudio Bassi MD, Assistant Professor of Surgery, Clinica Chirurgica, Policlinico di Borgo Roma, 37134 Verona, Italy

- Joyce A. Battle MD, Medical College of Ohio, Department of Radiation Therapy, 3000 Arlington Avenue, Toledo, OH 43614–2598, USA
- Hans G. Beger MD, FACS, Professor of Surgery, Chairman and Head, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Kevin E. Behrns MD, Assistant Professor of Surgery, Department of Surgery, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599–7210, USA
- Scott M. Berry MD, Department of Surgery, University of Cincinnati Medical Center and Cincinnati VAMC, Cincinnati, OH, USA
- **Kenneth F. Binmoeller** MD, Associate Professor of Medicine, Director of Endoscopy, Division of Gastroenterology, UCSD Medical Center, San Diego, CA, USA
- Dieter Birk MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- **Reinhard Bittner** MD, Professor of Surgery, Chairman: Department of Visceral Surgery, Marienhospital Stuttgart, Böheimstrasse 35, D-70199 Stuttgart, Germany
- Dale E. Bockman Php, Professor and Chairman, Department of Cellular Biology and Anatomy, Medical College of Georgia, 1459 Laney-Walker Boulevard, Augusta, GA 30912–2000, USA
- Edward L. Bradley III MD, Professor and Vice Chairman,
  Department of Surgery, State University of New York (Buffalo); Chief
  of Surgery, Buffalo General Hospital, 100 High Street, Buffalo,
  NY 14203, USA
- Hans-Jürgen Brambs MD, Professor and Chairman of Radiological Department, University of Ulm, Steinhövelstrasse 9, 199 D-89075 Ulm, Germany
- Simon Bramhall MD, FRCS, Lecturer in Surgery, Department of Surgery, Queen Elizabeth Hospital, Edgbaston, Birmingham, B15 2TH, UK
- Roy P. Brancatisano MB, BS, FRACS, Department of Surgery,
  Royal Postgraduate Medical School and Hammersmith Hospital,
  London W12 ONN, UK
- Kenneth L. Brayman MD, PhD, Director, Pancreas Transplant Program, Associate Professor of Surgery, University of Pennsylvania, School of Medicine, 3400 Spruce Street, Philadelphia, PA 19104, USA
- Markus W. Büchler MD, Professor of Surgery, Chairman,
  Department of Visceral and Transplantation Surgery, University of
  Bern, Inselspital, CH-3010, Bern, Switzerland

- **Gabriele Bülchmann**, Division of Gastroenterology and Endocrinology, Department of Internal Medicine, Philipps Universität, Baldingerstrasse, D-35043 Marburg, Germany
- **Agustin Burgos** MD, Department of Surgery, Tulane University School of Medicine, 1430 Tulane Avenue, New Orleans, LA 70112, USA
- Mark P. Callery MD, FACS, Associate Professor of Surgery and Cell Biology, Chief, Division of General Surgery, Department of Surgery, University of Massachusetts, Worcester, MA 01655, USA
- John L. Cameron MD, Professor and Chairman, Department of Surgery, The Johns Hopkins University School of Medicine, Richard Starr Ross Research Building, 720 Rutland Avenue, Room 759, Baltimore, MD 21205–2196, USA
- Larry C. Carey MD, FACS, Richard G. Connar Professor,
  Department of Surgery, University of South Florida, 12901 Bruce B.
  Downs Boulevard, M.D.C. Box 16, Tampa, FL 33612, USA
- Valerio di Carlo MD, Professor of Surgery/Chief of Department of General Surgery, University of Milan, Via Olgettina 60, 20132 Milano, Italy
- **David L. Carr-Locke** MD, Director of Endoscopy, Division of Gastroenterology, Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115, USA
- R. Maynard Case PhD, Brackenbury Professor of Physiology, University of Manchester, School of Biological Sciences, G.38 Stopford Building, Oxford Road, Manchester, M13 9PT, UK
- Suresh T. Chari MD, Alexander von Humboldt Fellow,
  Department of Medicine IV (Gastroenterology), University Hospital
  of Heidelberg at Mannheim, Theodor-Kutzer-Ufer, D-68167
  Mannheim, Germany
- Chi Kong Ching MB, ChB, MD (Liverpool), MRCP (UK), FHKCP, FHKAM (Med), Department of Medicine, Queen Mary Hospital, Hong Kong
- Meinhard Classen MD, Professor and Head, Department of Internal Medicine II, Technical University of Munich, Klinikum rechts der Isar, Ismaningerstrasse 22, D-81675 München, Germany
- Gene L. Colborn PhD, Professor of Anatomy and Surgery, Emory University School of Medicine and Medical College of Georgia, 1520 Laney Walker Building, Augusta, GA 30912–2000, USA
- **Lisa M. Colletti** MD, Associate Professor with tenure, Division of Gastrointestinal Surgery, University of Michigan, 2922H Taubman Health Care Center, Box 0331, 1500 East Medical Center Drive, Ann Arbor, MI 48109, USA

- Carolyn C. Compton MD, PhD, Professor of Pathology, Harvard Medical School; Chief of Gastrointestinal Pathology, Warren 2 Pathology, Massachusetts General Hospital, Boston, MA 02114, USA
- Robert E. Condon MD, MS, FACS, 2722 86th Avenue NE, Clyde Hill, WA 98004, USA
- **David Cunningham** MD, FRCP, Consultant Physician and Head of GI and Lymphoma Units, Department of Medicine, Royal Marsden Hospital, Downs Road, Sutton, Surrey, SM2 5PT, UK
- Mark Davenport MBChB, ChM, FRCS(Paeds), FRCS(Eng), FRCPS(Glas), Consultant Paediatric Surgeon, Department of Paediatric Surgery, Kings College Hospital, Denmark Hill, London SE5 9RS, UK
- Steven A. De Jong MD, FACS, Associate Professor of Clinical Surgery and Chief, Section of Endocrine Surgery, Loyola University Medical Center, 2160 South First Avenue, Building 110, Room 3238, Maywood, IL 60153, USA
- Michael J. Demeure MD, Associate Professor of Surgery, Medical College of Wisconsin, Department of General Surgery, 9200 West Wisconsin Avenue, Milwaukee, WI 53226, USA
- Christos Dervenis MD, Department of Surgery,
  Konstantopoulion "AGIA OLGA" Hospital, 14233 Athens, Greece
- Niraj M. Desai MD, Assistant Instructor in Surgery, University of Pennsylvania, School of Medicine, 3400 Spruce Street, Philadelphia, PA 19104, USA
- Clifford W. Deveney MD, Chief, Surgical Service, Portland VA Medical Center, Professor and Vice Chairman, Department of Surgery, Oregon Health Sciences University, PVAMC—112, 3710 Southwest U.S. Veterans Hospital Road, Portland, OR 97201, USA
- **Eugene P. DiMagno** MD, Professor of Medicine, Mayo Medical School; Director, Gastroenterology Research Unit, Mayo Clinic and Mayo Foundation, 200 1st Street SW, Rochester, MN 55905, USA
- Ralph R. Dobelbower MD, PhD, Professor of Radiation Therapy and Neurological Surgery, Medical College of Ohio. C.S #10008, Toledo, OH 43699, USA
- J. Enrique Domínguez-Muñoz MD, Chief, Department of Gastroenterology, University Hospital of Santiago, R/Ramón Baltar s/n, E-15706-Santiago de Compostela, Spain
- Janet A. Dunn MSc, BSc, Senior Statistician, Clinical Trials Unit, CRC Institute for Cancer Studies, The University of Birmingham, Clinical Research Block, Edgbaston, Birmingham, B15 2TA, UK

- Frederic E. Eckhauser MD, Professor of Surgery; Chief, Division of Gastrointestinal Surgery, University of Michigan Medical Center, 2922 Taubman Center, Box 0331, 1500 East Medical Center Drive, Ann Arbor, MI 48109–0331, USA
- Munetomo Enjoji MD, Department of Pathology II, Kyushu University Faculty of Medicine, 3-1-1 Maidashi, Higashi-Ku, Fukuoka, 812–82, Japan
- **Toshifumi Eto** MD, Director, Eto Hospital, 132–1 Onojima, Isahaya City, 854, Japan
- Douglas B. Evans MD, Associate Professor of Surgery, University of Texas, MD Anderson Cancer Center, 1515 Holcombe Boulevard, Box 106, Houston, TX 77030, USA
- Pierre-Louis Fagniez MD, Professor and Chairman of the Department of Digestive Surgery, Centre Hospitalo-Universitaire Henri Mondor, 51 avenue du Maréchal de Lattre de Tassigny, 94010 Créteil cedex, France
- Massimo Falconi MD, Surgical Department Pancreatic Unit, Borgo Roma University Hospital, University of Verona, 32134 Verona, Italy
- Stephanie Falkenreck DDS, Department of General Surgery, University of Ulm, Steinhövelstrasse 9 D-89075 Ulm, Germany
- David V. Feliciano MD, Professor of Surgery, Emory University School of Medicine; Chief of Surgery, Grady Memorial Hospital, 69 Butler Street Southeast, Atlanta, GA 30303, USA
- Carlos Fernández-del Castillo MD, Department of Surgery, Massachusetts General Hospital, Boston, MA 02114, USA
- **Aaron S. Fink** MD, Professor of Surgery, Emory University School of Medicine; Chief, Surgical Service (112), Atlanta VAMC, 1670 Clairmont Road, Decatur, GA 30033, USA
- Ulrich R. Fölsch, Professor of Medicine, Director of Department of Internal Medicine, Christian-Albrechts-University, Schittenhelmstrasse 12, D-24105 Kiel, Germany
- Margareta Frank, Division of Gastroentrology and
  Endocrinology, Department of Internal Medicine, Philipps Division
  Universität, Baldingerstrasse D-35033, Marburg, Germany
- Patrick C. Freeny MD, FACR, Director of Abdominal Imaging,
  Department of Radiology, Box 357115, University of Washington
  Medical Center, 1959 NE Pacific Avenue, Seattle, WA 98195-7115,
  USA
- Charles F. Frey MD, FACS, Professor of Surgery, University of California, Davis, Medical Center, 4301 X Street, Sacramento, CA 95817, USA

- **Jean-Michel Friedrich** MD, Professor of Radiology, Institute of Radiology, Gustav-Adolf Strasse 10, D-97422 Schweinfurt, Germany
- **Helmut Friess**, Department for Visceral and Transplantation Surgery, University of Bern, Inselspital, CH-3010, Bern, Switzerland
- Baptist Gallwitz MD, Division of Gastroenterology, First Department of Internal Medicine, Christian-Albrechts-University, Schittenhelmstrasse 12, D-24105 Kiel, Germany
- Frank Gansauge MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- **Michael Gassmann**, Department for Visceral and Transplantation Surgery, University of Bern, Inselspital, CH-3010, Bern, Switzerland
- Michael W.L. Gauderer MD, FACS, FAAP, Chief, Department of Pediatric Surgery, The Children's Hospital, Greenville Hospital System, 890 West Faris Road, Suite 440, Greenville, SC 29605–4253, USA
- **Joseph E. Geenen** MD, Clinical Professor of Medicine, Medical College of Wisconsin, 2801 West Kinnickinnic River Parkway, Suite #570, Milwaukee, WI 53215, USA
- **Alex Geller** MD, Instructor in Medicine, Division of Gastroenterology and Hepatology, Mayo Clinic, 200 First Street Southwest, Rochester, MN 55905, USA
- Patrick M. Goggin DM, MRCP, Consultant Gastroenterologist, Queen Alexandra Hospital, Cosham, Portsmouth, Hampshire, PO6 9LY, UK
- **Brian W. Goodacre** MD, Associate Professor of Radiology; Residency Program Director, The University of Texas Medical Branch Department of Radiology G-09, 301 University Boulevard, Galveston, TX 77555–0709, USA
- **Christopher J. Gostout** MD, Associate Professor of Medicine, Director of Endoscopy, Division of Gastroenterology and Hepatology, Mayo Clinic, 200 First Street Southwest, Rochester, MN 55905, USA
- David B. Gough MB, MCh, PhD, FRCS(I), Consultant Surgeon, Bon Secours Hospital, College Road, Cork, Ireland
- **Leopoldo Grauer** MD, 2245 North University Drive, Pembroke Pines, FL 33024, USA
- **Thomas M. Gress** MD, Department of Internal Medicine I, University of Ulm, Robert-Koch-Strasse 8, D-89081 Ulm, Germany
- Fujio Hanyu Professor Emeritus, Tokyo Women's Medical University, 8-1 Kawada-cho, Shinjuku-ku, 162–8666 Tokyo, Japan

- Nobuhiko Harada MD, Tokyo Women's Medical University, 8-1 Kawada-cho, Shinjuku-ku, 162–8666 Tokyo, Japan
- Jon A. van Heerden MB, ChB, MS, FRCS, FACS, Hon FRCS (Edin), Hon FRCPS (Glasg), Professor of Surgery, Mayo Medical School; Consultant in Surgery, Mayo Clinic and Mayo Foundation, Department of Surgery, Mayo Clinic, 200 First Street Southwest, Rochester, MN 55905, USA
- **Takehisa Hiraoka** MD, PhD, Associate Professor and Vice Chairman, First Department of Surgery, Kumamoto University School of Medicine, 1-1-1 Honjo, Kumamoto 860–0811, Japan
- Edward R. Howard MS, FRCS(Eng), FRCS(Edin), Professor of Paediatric Hepatobiliary Surgery and Consultant Surgeon, Department of Paediatric Surgery, Kings College Hospital, Denmark Hill, London SE5 9RS, UK
- John M. Howard MD, FACS, FRCS (Edin, Hon), FCS (Hon),
  Professor of Surgery, Emeritus, Medical College of Ohio, Department
  of Surgery, Dowling Hall, 3065 Arlington Avenue, Toledo, OH
  43614–5807, USA
- **Ingemar Ihse** MD PhD, Professor and Chairman, Department of Surgery, University Hospital, S-22185 Lund, Sweden
- **Toshihide Imaizumi** MD, Associate Professor, Tokyo Women's Medical University, 8-1 Kawada-cho, Shinjuku-ku, 162–8666 Tokyo, Japan
- Clement W. Imrie BSc, MB, ChB, FRCS, Consultant Surgeon, Professor, Upper GI Surgical Team, Pancreato-biliary Unit, Department of Surgery, Royal Infirmary, Alexandra Parade, Glasgow, G31 2ER
- Rainer Isenmann MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- **Timothy J. lyeson** MD, MRCP, MacMillan Consultant in Medical Oncology, Wessex Medical Oncology Unit, Royal South Hampshire Hospital, Brintons Terrace, Southampton, SO14 0YG, UK
- Bernard M. Jaffe MD, Professor and Vice Chairman, Department of Surgery, Tulane University School of Medicine, 1,430 Tulane Avenue, New Orleans, LA 70112, USA
- Colin D. Johnson Mchir, FRCS, Reader in Surgery, University Surgical Unit (816), Southampton General Hospital, Southampton, SO16 6YD, UK
- **Keiichiro Kanemitsu** MD, Assistant Professor, First Department of Surgery, Kumamoto University School of Medicine, 1-1-1 Honjo, Kumamoto 860–0811, Japan

- Richard C. Karl MD, FACS, Juan C. Bolivar Professor of Surgical Oncology, Director, Division of Surgical Oncology, H. Lee Moffitt Cancer Center, The University of South Florida, 12902 Magnolia Drive, Suite 2190, Tampa, FL 33612, USA
- Deirdre A. Kelly FRCPI, FRCP, MD, Consultant Paediatric Hepatologist, Birmingham Children's Hospital; Reader in Paediatric Hepatology, University of Birmingham, Edgbaston, Birmingham, B15 2TH, UK
- David J. Kerr MD, DSc, FRCP (Lon), FRCP (Glas), Professor of Clinical Oncology, CRC Institute for Cancer Studies, Clinical Research Block, University of Birmingham, Edgbaston, Birmingham, B15 2TH, UK
- **Ernst Klar** MD, Professor of Surgery, Vice Chief of Surgical Service, Head of the Division of Transplantation Surgery, University of Heidelberg, Im Neuenheimer Feld 110, D-69120 Heidelberg, Germany
- **Günter Klöppel** MD, PhD, Professor of Pathology, Head of Department of Pathology, University of Kiel, Michaelisstrasse 11, D-24105 Kiel, Germany
- Andre A. Konski MD, Medical College of Ohio, C.S. #10008, Toledo, OH 43699, USA
- Richard A. Kozarek MD, Clinical Professor of Medicine.
  University of Washington, Seattle; Chief of Gastroenterology,
  Virginia Mason Medical Center, 11009th Avenue, Seattle, WA 98101,
  USA
- **Reiner Kunz**, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Paul Georg Lankisch MD, Professor and Head of the Department of Medicine, Municipal Hospital of Lüneburg, Bögelstrasse 1, D-21339 Lüneburg, Germany
- Mike Larvin BSc, MD, FRCS, Senior Clinical Lecturer; Consultant Surgeon, Leeds Institute for Minimally Invasive Therapy, 6th Floor Wellcome Wing, Leeds General Infirmary, Leeds, LS1 3EX, UK
- William R. Lees FRCR, Professor of Medical Imaging, Director, Centre for Medical Imaging, University College London, Department of Radiology, The Middlesex Hospital, Mortimer Street, London, W1N 8AA, UK
- **Glen A. Lehman** MD, Professor of Medicine and Radiology; Associate Director of Clinical Affairs, Indiana University Medical Center, 550 North University Boulevard, Suite 2300, Indianapolis, IN 46202–5250, USA

- Nicholas R. Lemoine MBBS, MD, PhD, MRCPath, Professor of Molecular Pathology, IRCF Molecular Oncology Unit, Imperial College School of Medicine at Hammersmith, Hammersmith Hospital. London W12 ONN, UK
- Kent B. Lewandrowski MD, Assistant Professor, Harvard
  Medical School; Associate Director of Clinical Laboratories, Gray 5
  Chemistry, Massachusetts General Hospital, Boston, MA 02114, USA
- **Keith D, Lillemoe** MD, Professor of Surgery, The Johns Hopkins Medical Institutions, Department of Surgery, 600 North Wolfe Street, Blalock 679, Baltimore, MD 21287, USA
- Pamela A. Lipsett MD, FACS, Associate Professor and Attending Surgeon; Codirector of Surgical Intensive Care Unit, The Johns Hopkins Hospital, 600 North Wolfe Street, Blalock 605, Baltimore, MD 21287–4605, USA
- Manfred P. Lutz MD, Attending, Department of Internal Medicine I, University of Ulm, Robert-Koch-Strasse 8, D-89081 Ulm, Germany
- C.S. Frances McCormick MB, BCh, MSc, MRCPath, Clinical Research Fellow, Department of Histopathology, Imperial College School of Medicine at Hammersmith, Hammersmith Hospital, London W12 ONN, UK
- Sandra W. McNees MD, Interventional Radiology Fellow, The University of Texas Medical Branch, Department of Radiology G-09, 301 University Boulevard, Galveston, TX 77555–0709, USA
- Wilhelm Maier MD, Chief of Department of Radiology, Klinikum Lippe-Detmold, Roentgenstrasse 18, D-32756 Detmold, Germany
- **Bernard Maillet** MD, Pathologist, Consultant, Department of Pathology, Academic Hospital, Free University of Brussels, Laarbeeklaan 101, B-1090 Brussels, Belgium
- Peter Malfertheiner MB, Professor of Medicine, Chairman, Department of Gastroenterology, Hepatology and Infectious Diseases, Otto-von-Guericke-Universität, Leipziger Strasse 44, D-39120 Magdeburg, Germany
- Gianpiero Manes MD, Klinik für Gastroenterologie, Otto-von-Guericke-Universität, Leipziger Strasse 44, D-39120 Magdeburg, Germany
- Stuart G. Marcus MD, Assistant Professor of Surgery, New York
  University School of Medicine, 530 1st Avenue, Suite 6B, New York,
  NY 10016, USA
- James F. Markmann MD, PhD, Clinical Instructor and Fellow in Transplantation Surgery, Dumont-UCLA Transplant Center, Los Angeles, CA 90095, USA

- Ronald F. Martin MD, Staff Surgeon, Division of General Surgery, Maine Medical Center and Mercy Hospitals, Portland, Maine; Clinical Associate Professor of Surgery, University of Vermont, Burlington, Vermont. Correspondence: 72 West Street, Portland, ME 04101, USA
- Scot A. Martin MD, Resident, General Surgery, 1804 North West 21st Street, Oklahoma City, OK 73106, USA
- Miguel Martinez Noack MD, Department of Surgery, Tulane University School of Medicine, 1430 Tulane Avenue, New Orleans, LA 70112, USA
- Jens Mayer MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Jennifer B. Meko MD, Resident in Surgery, Department of General Surgery, Washington University Medical Center, St Louis, MO 63110, USA
- Ronald C. Merrell MD, Department of Surgery, Yale University School of Medicine, FMB Room 102, 330 Cedar Street, New Haven, CT 06510, USA
- Alejandro Metzger MD, Research Fellow in Gastroenterology, Mayo Graduate School of Medicine, Rochester, MN, USA
- William C. Meyers MD, FACS, Professor and Chairman,
  Department of Surgery, University of Massachusetts, Worcester, MA
  01655, USA
- Viswanathan Mohan MD, PhD, DSc, Director MV Diabetes Specialities Centre and Madras Diabetes Research Foundation, 35 Conran Smith Road, Gopalapuram, Chennai, India
- Frank G. Moody MD, Denton A. Cooley Professor, Department of Surgery, The University of Texas—Houston Medical School, 6431
- Joachim Mössner MD, Professor of Medicine, Director of Department of Internal Medicine II, University of Leipzig, Philipp-Rosenthal Strasse 27, D-04103 Leipzig, Germany
- **Amy Mostafavi** MD, Harvard Medical School, Massachusetts General Hospital, WHT 506, Fruit Street, Boston, MA 02114, USA
- Ali Naji MD, PhD, Professor of Surgery, University of Pennsylvania, School of Medicine, 3400 Spruce Street, Philadelphia, PA 19104, USA
- **Michael A. Nauck** MD, Leitender Oberarzt, Department of Internal Medicine, University Hospital, Knappschafts-Krankenhaus, In der Schornau 23–25, D-44892, Bochum, Germany
- John P. Neoptolemos MA, MB, BChir, MD, FRCS, Professor of Surgery, Department of Surgery, Royal Liverpool University Hospital, 5th Floor UCD Building, Daulby Street, Liverpool, L69 3GA, UK

- **Michael Neubrand** MD, Department of General Internal Medicine, University of Bonn, Sigmund Freud-Strasse 25, D-53105 Bonn, Germany
- Jeffrey A. Norton MD, Professor and Vice Chairman of Surgery, University of California at San Francisco; Chief of Surgery, San Francisco Veterans Affairs Medical Center, 4150 Clement Street, San Francisco, CA 94121, USA
- Olagunju Ogunbiyi MB, BS, MD, FRCS, Lecturer in Surgery, Academic Department of Surgery, University of Birmingham, Queen Elizabeth Hospital, Birmingham, B15 2TH, UK
- Willis G. Parsons MD, Assistant Professor of Medicine,
  Northwestern University Medical School; Director of Therapeutic
  Endoscopy, Northwestern Memorial Hospital, Lakeside VA Medical
  Center, Chicago, IL, USA
- Ameet G. Patel FRCS, Research Fellow in Surgery, UCLA School of Medicine, 10833 Leconte Avenue, Los Angeles, CA 90024–1729, USA
- **Paolo Pederzoli** MD, Professor of Surgery, Clinica Chirurgica, Policlinico di Borgo Roma, 37134 Verona, Italy
- Bret T. Petersen MD, Division of Gastroenterology, GI Diagnostic Unit, Main Alfred, Mayo Clinic, 200 First Street Southwest, Rochester, MN 55905, USA
- Capecomorin S. Pitchumoni MD, MPH, FRCPC, FACP,
  Professor of Medicine and Community and Preventive Medicine,
  New York Medical College; Director of Medicine, Our Lady of Mercy
  Medical Center, Bronx, NY, USA
- Henry A. Pitt MD, Professor and Chairman, Department of Surgery, Medical College of Wisconsin, 9200 West Wisconsin Avenue, Milwaukee, WI 53226, USA
- **Bertram Poch** MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Parviz M. Pour MD, Professor of Pathology, University of Nebraska, UNMC/Eppley Cancer Center, 600 South 42nd Street, Omaha, NE 68198–6805, USA
- Richard A. Prinz MD, Helen Shedd Keith Professor and Chairman, Department of General Surgery, Rush-Presbyterian-St Luke's Medical Center, 1653 West Congress Parkway, Chicago, IL 60612, USA
- David W. Rattner MD, Associate Professor of Surgery, Harvard Medical School; Visiting Surgeon, Department of Surgery, Massachusetts General Hospital, Boston, MA 02114, USA

- Bettina Rau MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Howard A. Reber MD, Professor and Chief of Gastrointestinal
  Surgery, Division of General Surgery, UCLA School of Medicine,
  10833 LeConte Avenue, Los Angeles, CA 90095, USA
- **Sven N. Reske** MD, PhD, Professor and Chief of Department of Nuclear Medicine, University of Ulm, Robert-Koch-Strasse 8, D-89070 Ulm, Germany
- Jonathan M. Rhodes MA, MD, FRCP, Professor of Medicine (Gastroenterology), Department of Medicine, University of Liverpool, Liverpool, L69 3GA, UK
- James M. Richter MD, MA, Assistant Professor of Medicine, Harvard Medical School; Physician and Medical Director, Massachusetts General Hospital, 15 Parkman Street, Boston, MA 02114, USA
- Jürgen Rode MD, DCP, FRCPath, FRCPA, Professor and Director, Department of Anatomical Pathology, Flinders University/Royal Darwin Hospital, Tiwi, NT 0810, Australia
- **Thomas Rösch** MD, Assistant Professor of Medicine, Director of GI Endoscopy, Department of Internal Medicine II, Technical University of Munich, Klinikum rechts der Isar, Ismaningerstrasse 22, D-81675 München, Germany
- **Christian Rose** MD, Department of Pathology, University of Ulm, Oberer Eselsberg M23, 89081 Ulm/Donau, Germany. *Correspondence*: Department of Dermatology (Dermatopathology), University of Würzburg, Josef-Schneider-Strasse 2, D-97080, Würzburg, Germany
- D. Michael Rose MD, Research Fellow in Surgical Oncology, Vanderbilt University Medical Center, Room 3661 TVC, Nashville, TN 37232–5732, USA
- Ricardo L. Rossi MD, Staff Surgeon, Department of General Surgery, Hospital Clinico; Staff Surgeon, Clinica Alemana; Professor of Surgery, Departmento de Cirugia Digestiva, Facultad de Medicina, Ponitifica Universidad Catolica de Chile, Casilla 114-D, Santiago, Chile
- Nelly Rotman MD, Professor of Surgery, Department of Digestive Surgery, Centre Hospitalo-Universitaire Henri Mondor, 51 avenue du Maréchal de Lattre de Tassigny, 94010 Créteil Cedex, France
- Christopher Russell MS, FRCS, Consultant Surgeon, The Middlesex Hospital, Mortimer Street, London, W1N 8AA, UK
- Farouk Safi MD, Professor of Surgery, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany

- José Sahel MD, Professor of Gastroenterology and Hepatology,
  Chief of Department, Hôpital Sainte-Marguerite, 270 Boulevard de
  Sainte-Marguerite, B.P. 29, 13274 Marseille Cedex 09, France
- Ashok K. Saluja, Department of Surgery, Beth Israel Hospital and Harvard Medical School, Boston, MA 02215, USA
- Michael G. Sarr MD, Professor of Surgery, Chair of Division of GI and General Surgery, Department of Surgery, GI Research Unit, Alfred 2, St Mary's Hospital, Mayo Clinic, Rochester, MN 55902, USA
- **Tilman Sauerbruch** MD, Professor and Chairman, Division of General Internal Medicine, University of Bonn, Sigmund Freud-Strasse 25, D-53105 Bonn, Germany
- **Ulrich Scheurer**, Professor of Gastroenterology and Deputy to Head Physician, GI Unit, University Hospital Inselspital, CH-3010 Bern, Switzerland
- Wolfgang Schlosser MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Michael J. Schmalz MD, FACG, Associate Clinical Professor of Medicine; Chief, Section of Gastroenterology, St Luke's Medical Center, 2801 W Kinnickinnic River Parkway, Suite #570, Milwaukee, WI 53215, USA
- Wolfgang E. Schmidt MD, PhD, Associate Professor of Medicine, Department of Medicine I, Christian-Albrechts-University, Schittenhelmstrasse 12, D-24105 Kiel, Germany
- Michael H. Schoenberg, MD, PhD, Associate Professor of Surgery, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Christian A. Seiler MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Peter Shamamian MD, Assistant Professor of Surgery, Director of General Surgery Research, New York University School of Medicine, 530 1st Avenue, Suite 6B, New York, NY 10016, USA
- **Kenneth W. Sharp** MD, Division of General Surgery, Vanderbilt University Medical Center, Room D5203 MCN, Nashville, TN 37232–2577, USA
- Stuart Sherman MD, Associate Professor of Medicine and Radiology, Division of Gastroenterology/Hepatology; Director of ERCP Services, Indiana University School of Medicine, Indiana University Medical Center, 550 North University Boulevard, Suite 2300, Indianapolis, IN 46202–5250, USA
- Anesthesia and Intensive Care Medicine, University of Berne Inselspital, CH-3010 Berne, Switzerland

- Manfred V. Singer MD, Professor of Medicine, Department of Medicine IV (Gastroenterology), University Hospital of Heidelberg at Mannheim, Theodor-Kutzer-Ufer, D-68167 Mannheim, Germany
- Manjit Singh MD, FRCP(C), Chief, Section of Gastroenterology, VA Medical Center (Downtown Division) and Professor of Medicine, Medical College of Georgia, 1 Freedom Way, Augusta, GA 30904–6248, USA
- John E. Skandalakis MD, PhD, FACS, Senior Attending Surgeon, Piedmont Hospital, Atlanta; Clinical Professor of Surgery, Mercer University School of Medicine, Macon; Clinical Professor of Surgery, The Medical College of Georgia, Augusta; Director, The Centers for Surgical Anatomy and Technique, Chris Carlos Distinguished Professor of Surgical Anatomy and Technique, Clinical Professor of Surgery, Emory University School of Medicine, 1462 Clifton Road NE, Suite 303, Atlanta, GA 30322, USA
- Lee J. Skandalakis MD, FACS, Attending Surgeon, Piedmont Hospital; Clinical Professor of Surgical Anatomy and Technique, Clinical Professor of Surgery, Emory University School of Medicine, 1462 Clifton Road NE, Suite 303, Atlanta, GA 30322, USA
- **Nib Soehendra** MD, Professor and Head, UKE-Department of Endoscopic Surgery, Martinistrasse 52, D-20246 Hamburg, Germany
- **Eric vanSonnenberg** MD, Chairman and Professor of Radiology; Professor of Internal Medicine and Surgery, The University of Texas Medical Branch, Department of Radiology, Route: 0709, 301 University Boulevard, Galveston, TX 77555–0709, USA
- Allan D. Spigelman MB, BS, MD, FRCS, FRACS, Head,
  Discipline of Surgical Science, University of Newcastle, Faculty of
  Medicine and Health Sciences; Chairman, Division of Surgery, John
  Hunter Hospital, Locked Bag No. 1, Hunter Region Mail Centre, NSW
  2310, Australia
- **Bruce E. Stabile** MD, FACS, Professor and Chairman, Department of Surgery, Harbor-UCLA Medical Center, 1000 West Carson Street, Torrance, CA 90509, USA
- Michael L. Steer MD, Professor of Surgery, Department of Surgery, Harvard Medical School and Beth Israel Deaconess Medical Center, Boston, MA 02215, USA
- William M. Steinberg MD, Professor of Medicine (Gastroenterology), The George Washington University Medical Center, 2150 Pennsylvania Avenue NW, Washington, DC 20037, USA
- Werner Swobodnik MD, Professor of Medicine, Department of Internal Medicine, Kreiskrankenhaus Eutin, Janusstrasse 22, D-23701 Eutin, Germany

- Mark A. Talamini MD, Associate Professor, Department of Surgery, Johns Hopkins Medical Institutions, Baltimore, MD, USA
- Christopher J. Taylor MD, FRCP, DCH, Professor in Paediatric Gastroenterology, Department of Paediatrics, The Children's Hospital, Sheffield, S10 2TH, UK
- **Scott M. Tenner** MD, MPH, Associate Professor, State University of New York, Maimonides Medical Center, 925 48th Street, Brooklyn, NY 11219, USA
- **Harald Tomsik** MD, Attending, Department of Internal Medicine Prosper Hospital, Mühlenstrasse 27, D-45659 Recklinghausen, Germany
- **Reinhard Tomczak**, Department of Radiology, University of Ulm, Robert-Koch-Strasse 8, D-89081 Ulm, Germany
- James Toouli MBBS, B(Med)Sci, PhD, FRACS, Professor of Surgery, Head of Gastrointestinal Surgical Unit, Department of Surgery, Flinders Medical Centre, Bedford Park, Adelaide, South Australia 5042, Australia
- Phillip P. Toskes MD, Professor and Chair, Department of Medicine, University of Florida College of Medicine, Box 100277, JHMHC, 1600 SW Archer Road, Gainesville, FL 32610, USA
- Mark T. Toyama MD, Research Fellow and Resident in Surgery, UCLA School of Medicine, 10833 Leconte Avenue, Los Angeles, CA 90024–1729, USA
- Frank Treitschke MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- **Ryoichi Tsuchiya** MD, FACS, Emeritus Professor of Nagasaki University School of Medicine and Shimane Medical University, 20–12 Sumiyoshi-Machi, Nagasaki City, 852–8154, Japan
- **Tsukasa Tsunoda** MD, Professor and Chairman, Department of Gastroenterological Surgery, Kawasaki Medical School, 577 Matsushima, Kurashiki City, 701–0192, Japan
- Robert Udelsman MD, FACS, Richard Bennett Darnall
  Professor of Surgery, Associate Professor of Surgery and Oncology,
  Director of Endocrine and Oncologic Surgery, The Johns Hopkins
  Hospital, 600 North Wolfe Street, Blalock 688, Baltimore, MD 21287,
  USA
- Waldemar Uhl MD, Department of Visceral and Transplantation Surgery, Inselspital, University of Bern, CH-3010 Bern, Switzerland
- Rainer Vogel MD, Department of Visceral and Transplantation
  Surgery, Inselspital, University of Bern, CH-3010 Bern,
  Switzerland

- Andrew L. Warshaw MD, W. Gerald Austen Professor of Surgery, Harvard Medical School; Surgeon-in-Chief and Chairman, Department of Surgery, Massachusetts General Hospital, White 506, Fruit Street, Boston, MA 02114, USA
- Marcus Weber MD, Postdoctoral Research Fellow, University of Pennsylvania, School of Medicine, 3400 Spruce Street, Philadelphia, PA 19104, USA
- **Uwe Widmaier** MD, Department of General Surgery, University of Ulm, Steinhövelstrasse 9, D-89075 Ulm, Germany
- Christopher G. Willett MD, Department of Radiation Oncology, Massachusetts General Hospital, Harvard Medical School, Boston, MA 02114, USA
- Christopher B. Williams, Endoscopy Unit, St Marks Hospital, Watford Road, Harrow, Middlesex, HA1 3UJ, UK
- **Robin C.N. Williamson** MA, MD, MChir, FRCS, Hon. PhD, Professor of Surgery, Department of Gastrointestinal Surgery, Imperial College School of Medicine, Hammersmith Hospital Campus, London WI2 ONN, UK
- Paul G. Wilson MB, ChB, MRCP, Research Registrar, Queen Elizabeth Hospital, University of Birmingham, B15 2TH, UK

- Stuart D. Wilson MD, Professor and Interim Chief, Medical College of Wisconsin, Department of General Surgery, 9200 West Wisconsin Avenue, Milwaukee, WI 53226, USA
- **Helge Worning** MD, Medical Director, Østre Paradisvej 81, DK-2840 Holte, Denmark
- **Koji Yamaguchi** MD, Department of Surgery I, Kyushu University Faculty of Medicine, 3-1-1 Maidashi, Higashi-Ku, Fukuoka, 812–8582, Japan
- Charles J. Yeo MD, FACS, Professor of Surgery and Oncology, The Johns Hopkins University School of Medicine, Blalock 606, 600 N. Wolfe Street, Baltimore, MD 21287—4606, USA
- J. Yan Yiannakou MD, Department of Medicine, University of Liverpool, Liverpool, L69 3GA, UK
- **Alessandro Zerbi** MD, Registrar, Dipartimento di Chirurgia Generale, Ospedale San Raffaele, Via Olgettina 60, 20132 Milano, Italy
- Kaspar Z'graggen MD, Department of Visceral and
  Transplantation Surgery, Inselspital, University of Bern, CH-3010
  Bern, Switzerland

## **Preface**

The Pancreas presents the newest knowledge in the field of pancreatology. At the end of the 20th century there is a growing body of data about functions of the exocrine and endocrine pancreas derived from *in-vitro* cell studies, animal experiments and recently developed new sciences: molecular biology, peptide biochemistry, immunohistology, and from high-resolution imaging techniques and intraductal endoscopic observations.

The "so-called pancreas" was first mentioned by Aristotle in his Historia Animalium, written between 347 and 335 BC, and Wirsung in 1642 described the duct morphology and the connection of the pancreas to the small intestine. Today research in pancreatology has identified subcellular and molecular mechanisms for many of the functions of the pancreas. The increasingly synergistic interaction of surgeons, gastroenterologists, and basic scientists has led naturally to the concept of a book which combines these disciplines and their interfaces to explain diseases of the pancreas and to elucidate their best management.

At the beginning of the 21st century it is no longer appropriate or useful to distinguish between medical and surgical disease of the pancreas. The goal of *The Pancreas* is to produce a comprehensive source for any clinician with the most current synthesis of functional assessment, diagnostic procedures, and treatment options. One-fifth of the contributions to this book are from outstanding basic scientists but the majority of the chapters have been written by internationally recognized gastroenterologists and GI-tract surgeons.

The editors are indebted to all of the authors who have contributed to the genesis of this book. Our thanks are also extended to the staff of Blackwell Science for their competent support and for their patience.

Hans G. Beger, Ulm Andrew L. Warshaw, Boston Markus W. Büchler, Bern David L. Carr-Locke, Boston John P. Neoptolemos, Liverpool Christopher Russell, London Michael G. Sarr, Rochester

## List of Contributors, xiii

Preface, xxiii

## Natural Course of Acute Panerer (13 MUJOVII)

## Part 1: Anatomy of the Pancreas

- Development of the Pancreas and Related Structures, 3 Dale E. Bockman
- 2 An Introduction to Surgical Anatomy and Neuroanatomy, 11 Dale E. Bockman
- Histology and Fine Structure, 19 Dale E. Bockman and Study A to Setud Distribution 14
- 4 Congenital Anomalies and Variations of the Pancreas and Pancreatic and Extrahepatic Bile Ducts, 27 John E. Skandalakis, Lee J. Skandalakis, and Gene L. Colborn

## Part 2: Physiology and Pathophysiology of Pancreatic Functions

- Pancreatic Exocrine Secretion: Mechanisms and Control, 63 mara A. Japov tamas dalla tamashla W R. Maynard Case
- Physiology and Pathophysiology of Endocrine Pancreatic Secretion, 101 Michael A. Nauck
- Sphincter of Oddi: Physiology, 138 James Toouli

Enzymes and Digestion, 147 Alejandro Metzger and Eugene P. DiMagno Каѕрат Z'<mark>дтадде</mark>п, Walaeman

## Part 3: Diagnostic Measures

- Clinical Evaluation, 163 Ergonos Digosobril Paul Georg Lankisch
- 10 Laboratory Diagnosis of Inflammatory Pancreatic Disease, 169 J. Enrique Domínguez-Muñoz, Gianpiero Manes, and Peter Malfertheiner
- Laboratory Measurements: Endocrine-Function Tests, 180 Baptist Gallwitz, Wolfgang E. Schmidt, and Ulrich R. Fölsch
- 12 Laboratory Measurements: Measurements of Inflammation of the Pancreas, 187 Waldemar Uhl, Kaspar Z'graggen, and Markus W. Büchler
- Tumor Marker CA 19-9 Serum Course and Prognosis of Pancreatic Cancer, 193 Farouk Safi, Wolfgang Schlosser, Stephanie Falkenreck, and Hans G. Beger
- 14 Pancreatic Ultrasonography, 199 William R. Lees
- Computed Tomography of the Pancreas, 205 Emil J. Balthazar
- Endoscopic Retrograde Cholangiopancreatography, 231 Willis G. Parsons and David L. Carr-Locke

#### vi Contents

- 17 Magnetic Resonance Imaging of the Pancreas, 247 Jean-Michel Friedrich, Reinhard Tomczak, and Hans-Jürgen Brambs
- 18 Percutaneous Needle Aspiration and Cytology, 260 William R. Lees
- 19 Angiography of the Pancreas, 264 Hans-Jürgen Brambs

## Part 4: Acute Pancreatitis

- 20 Etiology and Epidemiology of Alcohol-Induced Pancreatitis, 275 Manjit Singh
- 21 Acute Postoperative Pancreatitis, 283
  Kaspar Z'graggen, Waldemar Uhl,
  and Markus W. Büchler
- 22 Endoscopic Retrograde Cholangiopancreatography- and Endoscopic Sphincterotomy-Induced Pancreatitis, 291 Stuart Sherman and Glen A. Lehman
- 23 Hyperlipidemia and Acute Pancreatitis, 311 Stephen T. Amann and Phillip P. Toskes
- 24 Hyperparathyroidism and Acute Pancreatitis, 317 Clement W. Imrie
- 25 Infectious Diseases and Acute Pancreatitis, 321 Manfred P. Lutz and Guido Adler
- 26 Drug-Induced Acute Pancreatitis, 331 Scott M. Tenner and William M. Steinberg
- 27 Acute Pancreatitis Associated with Congenital Anomalies, 343 Mark Davenport and Edward R. Howard
- 28 Hereditary Pancreatitis, 355
  Harald Tomsik, Thomas M. Gress, and Guido Adler
- 29 Pancreas Divisum and Pancreatitis, 364

  Andrew L. Warshaw
- 30 Sphincter of Oddi Dysfunction, 375
  Michael J. Schmalz and Joseph E. Geenen
- 31 Pathogenesis and Pathophysiology of Acute Pancreatitis, 383 Michael L. Steer and Ashok K. Saluja

- 32 Biochemical and Metabolic Abnormalities of Acute Pancreatitis, 392

  Kaspar Z'graggen, Waldemar Uhl,
  and Markus W. Büchler
- 33 Hemodynamic Pattern of Acute Pancreatitis, 399
  Rainer Isenmann, Jens Mayer, Bettina Rau,
  and Hans G. Beger
- 34 Histopathology of Acute Pancreatitis, 404 Günter Klöppel and Bernard Maillet
- 35 Clinical Classification of Acute Pancreatitis, 410 Bettina Rau and Hans G. Beger
- 36 Interstitial Edematous Pancreatitis, 416
  Peter Shamamian and Stuart G. Marcus
- 37 Peripancreatic Fluid Collections, 423
  Charles F. Frey
- 38 Natural Course of Acute Pancreatitis: Pancreatic Necrosis, 438 David W. Rattner 159 and 10 vmolen And 1915
- 39 Natural Course of Acute Pancreatitis: Bacterial Infection, 446 Rainer Isenmann, Waldemar Uhl, Kaspar Z'graggen, and Markus W. Büchler
- 40 Natural Course of Acute Pancreatitis: Pseudocysts after Acute Pancreatitis, 453

  Bettina Rau and Hans G. Beger
- 41 Natural Course of Acute Pancreatitis: Pancreatic Abscess, 461 Rainer Isenmann, Michael H. Schoenberg, Bettina Rau, and Hans G. Beger
- 42 Diagnosis of Acute Pancreatitis: Clinical Aspects, 466

  Kaspar Z'graggen, Paul G. Wilson, John P. Neoptolemos, and Markus W. Büchler
- 43 Diagnosis of Acute Pancreatitis: Markers of Pancreatic Necrosis, 472
  Waldemar Uhl, Rainer Vogel, Kaspar Z'graggen, and Markus W. Büchler
- 44 Diagnosis of Acute Pancreatitis: Contrast-Enhanced Computed Tomography, 478 Wilhelm Maier
- 45 Diagnosis of Acute Pancreatitis: Percutaneous Needle Aspiration, 485 Peter A. Banks