

Fluorescence Imaging for Surgeons

Concepts and
Applications

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 Springer

Fluorescence Imaging For Surgeons Concepts And Applications

Alberto Vannelli

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Fluorescence Imaging For Surgeons Concepts And Applications:

Fluorescence Imaging for Surgeons Fernando D. Dip,Takeaki Ishizawa,Norihiro Kokudo,Raul J. Rosenthal,2015-07-21

This text presents the experiences of leading researchers and surgeons with different fluorescence methods Chapters range from basic science of fluorescence to current clinical applications and new horizons The first few chapters describe the historical evolution and physical principles of fluorescence and provide the foundation for the reader to understand the current scope and limits of its use in surgery The second section focuses on the clinical applications of intraoperative fluorescence imaging including subsections on fluorescence cholangiography applications to hepatectomy lymph node navigation applications to GI tract and pelvic surgery and identification of cancer tissues The third section focuses on new frontiers including fluorescence probes imaging systems and applications to photodynamic therapy Authored by leaders in the development of fluorescent methods worldwide *Fluorescence Imaging for Surgeons Concepts and Applications* will have an impact on numerous medical specialists including general surgeons colorectal and minimally invasive surgeons and surgical oncologists Researchers will find the book to be an invaluable resource on the latest advances in the utilization of nanoparticles and fluorescent probes

Video Atlas of Intraoperative Applications of Near Infrared Fluorescence Imaging Essa M. Aleassa, Kevin M. El-Hayek, 2020-03-24 This book represents a head to toe guide for clinicians who are interested in applying real time near infrared NIR imaging for their patients Expert surgeons from around the globe share their experience with NIR imaging most commonly performed using indocyanine green ICG fluorescence The chapters are structured to include a brief background indications for use followed by a technical description of the procedure Each chapter is also accompanied by video examples and detailed information about necessary equipment drug dosing and alternative techniques A pitfalls section serves as a lessons learned segment to bookend each chapter Authors represent a comprehensive list of surgical subspecialties ranging from neurosurgery to plastic surgery While it is not meant to serve as an exhaustive summary of ICG use in surgery the goal is to highlight the successful use of this technology in a number of settings As the technology and applications continue to expand *Video Atlas of Intraoperative Applications of Near Infrared Fluorescence Imaging* serves as a foundation upon which to build

The SAGES Manual of Fluorescence-Guided Surgery Nova Szoka, David Renton, Santiago Horgan, 2023-11-27 Fluorescence guided surgery FGS is defined as a medical imaging technique that uses a fluorescent dye or a near infrared emitting light source to identify anatomic structures during surgical procedures In 2020 alone over 1200 academic articles were published on the topic of fluorescence guidance surgery a sign that this modality is making significant inroads into surgical practice The use of near infrared imaging and FGS is a rapidly growing modality allowing surgeons to see more intraoperatively enhance surgical precision and improve surgical decision making and patient outcomes This manual provides a comprehensive state of the art review of this field and will serve as a valuable resource for clinicians surgeons and researchers with an interest in fluorescence guided surgery guiding

patient management and stimulating investigative efforts After initial chapters discussing the history of FGS and the current platforms and devices it presents the most up to date data regarding the use of FGS in multiple surgical fields colorectal hepatic endocrine reconstructive pediatric among others as well as in the treatment of specific conditions such as burns Chapters are generously illustrated with full color figures and intraoperative photographs and selected chapters include video segments Access to a comprehensive resource such as this is currently limited by the relatively new inroads that fluorescence guided technology has made into surgery The SAGES Manual of Fluorescence Guided Surgery fills this gap in the literature

Scrub Nurse in Minimally Invasive and Robotic General Surgery Marco Milone, Ferdinando Agresta, Mario Guerrieri, Wanda Petz, Alberto Arezzo, Salvatore Casarano, 2024-04-13 This comprehensive book provides an excellent overview on the role of the scrub and circulating nurse during minimally invasive procedures and a detailed description of the specific instruments adopted during surgical procedures in each subspecialty areas as esophago gastric colorectal endocrino metabolic hepato biliary spleno pancreatic and abdominal wall surgery The concept that laparoscopy now allows everyone to actively see all the surgical steps and therefore to be no longer just a simple another man woman in the theatre but an active actor The need therefore for all the nurses and above all the scrub ones to know and to have the knowledge and therefore to have in a sort of parallelism thanks to this manual the purely medical surgical steps with the corresponding and parallel nursing ones an added value in the training and preparation of the all the people involved in surgery This practical book correlated by images guides scrub nurse in all operative phases The Scrub Nurse in Minimally Invasive and Robotic General Surgery also explores the legal aspects in the scrub nursing The Italian Society of Endoscopic and Laparoscopic Surgery New technologies and the Italian Association of Scrub Nurses endorse this book

Fischer's Mastery of Surgery E. Christopher Ellison, Gilbert R. Upchurch, Jr., 2023-09-12 For 40 years Fischer's Mastery of Surgery has provided expert highly illustrated coverage of the procedures that general surgeons and trainees need to know The fully revised eighth edition under the editorial leadership of Drs E Christopher Ellison Gilbert R Upchurch Jr Philip A Efron Steven D Wexner Nancy D Perrier V Suzanne Klimberg John H Stewart IV Valerie W Rusch Jon C Gould Susan Galandiuk Timothy M Pawlik William C Chapman Benjamin K Poulouse Peter K Henke Alicia M Mohr Saleem Islam Anne M R Agur Carol Scott Conner and David Renton continues the tradition of excellence with two full color volumes that include the essentials of diagnosis anatomy and pre operative planning while maintaining a focus on clear step by step depictions and descriptions of procedures

Colorectal Cancer Alberto Vannelli, 2021-07-14 Colorectal cancer is the third most common cancer diagnosed in both men and women worldwide This book examines state of the art research relating to the etiology diagnosis prevention and treatment of colorectal cancer It emphasizes the importance of a multidisciplinary approach involving multiple specialties including surgery gastroenterology radiology biology oncology radiotherapy nuclear medicine and physiotherapy

Applications of Fluorescence in Surgery and Interventional Diagnostics Mark Preul, Evgenii

Belykh, David Leslie Carr-Locke, Quyen Nguyen, 2021-06-04 *Strategies for Curative Fluorescence-Guided Surgery of Cancer* Robert Hoffman, Michael Bouvet, 2020-05-27 Strategies for Curative Fluorescence Guided Surgery of Cancer is the first book to discuss how fluorescence guided surgery can be successfully used during surgeries with several tumor types FGS is one of the most exciting emerging modalities of surgery especially cancer surgery as it potentially allows the surgeon to visualize the actual margin of the tumor thus greatly increasing the possibility of curative resection The book discusses the applicability of FGS for several types of cancer such as pancreatic cancer liver metastasis soft tissue sarcoma glioma melanoma and breast and lung cancer This book is a valuable resource for cancer surgeons cancer researchers and members of several other areas in the biomedical field who are interested in understanding this powerful technique Presents an overview of fluorescence guided surgery Explains general strategies for curative fluorescence guided surgery and their applicability for each major tumor type Discusses the current and future achievements of FGS as a precise technique for cancer surgeries **Application of Near-infrared Fluorescence Imaging in Cancer Surgery** Guo-Jun Zhang, Jia-Hong Dong, Li Liu, Jing-Wen Bai, 2025-07-05 This book provides a comprehensive introduction to the development and application of near infrared fluorescence NIRF in cancer surgery It thoroughly examines the history principles agents functions and devices associated with NIRF along with the latest preclinical research and clinical applications Special emphasis is placed on the advancements in the second NIRF window and its global implementation in cancer surgery including innovative molecular imaging technologies in clinical translation Additionally the book explores the limitations and potential solutions of NIRF offering insights into its future trends and perspectives It serves as a valuable resource for university researchers surgeons radiologists and both undergraduate and graduate students in medicine *Handbook of Robotic Surgery* Stênio de Cássio Zequi, Hongliang Ren, 2024-10-02 Handbook of Robotic Surgery serves as a primer covering the main areas of knowledge in robotic surgery This comprehensive book provides essential information on all aspects related to robotic surgery from the present up to the future The discussion presented in sections ranges from the historical background of robotic surgery up to more recent and future technological innovations such as remote controls surgically distant collaboration simulators modern surgical robotics fluorescence guided surgery and virtual reality The book also contains sections dedicated to the safety conditions in surgery and patient protection which will be suitable for surgeons health professionals biomedical engineering professionals healthcare administrators and students There are specific chapters for all areas in which robotic surgery has been used in daily clinical practice or is under development Written by doctors engineers and nurses thus eliminating communication barriers and making it accessible for health and engineering professionals Provides initial literature offering a broad overview of all aspects of robotic surgery that will serve as a solid theoretical base for future developments in robotic subfields Analyzes cost effectiveness of robotic surgery discussing its use in developing countries ethics medical legal aspects education training mentorship leadership certification of professionals and credentialing of robotic centers Contributed to by

key opinion leaders from several nations and continents taking into account different socioeconomic and cultural regional realities which can influence the widespread use of robotic surgery in the world

ICG Fluorescence Imaging and Navigation Surgery Mitsuo Kusano, Norihiro Kokudo, Masakazu Toi, Masaki Kaibori, 2016-03-11 This book presents a comprehensive overview and outlook for the future of indocyanine green ICG fluorescence navigation surgery which is attracting clinical interest as a safe and less invasive procedure not only in detecting cerebral vessels coronary arteries and biliary trees but also in identifying sentinel lymph nodes in cancer The book starts with the characteristics of ICG and photodynamic cameras endoscopes followed by detailed descriptions of the applications of ICG fluorescence imaging in various areas such as ocular surgery neurosurgery cardiovascular surgery and plastic surgery It also covers identifying sentinel lymph nodes in breast cancer as well as cancers of the gastrointestinal tract and provides valuable information for hepato biliary pancreatic surgeons such as identifying tattooing of liver segments and bile leakage Written entirely by experts in their respective areas ICG Fluorescence Imaging and Navigation Surgery offers an essential resource for surgeons operating on cancers and vascular disorders in the brain and cardiovascular systems and in plastic surgery

Encyclopedia Of Medical Robotics, The (In 4 Volumes) , 2018-08-28 The Encyclopedia of Medical Robotics combines contributions in four distinct areas of Medical robotics namely Minimally Invasive Surgical Robotics Micro and Nano Robotics in Medicine Image guided Surgical Procedures and Interventions and Rehabilitation Robotics The volume on Minimally Invasive Surgical Robotics focuses on robotic technologies geared towards challenges and opportunities in minimally invasive surgery and the research design implementation and clinical use of minimally invasive robotic systems The volume on Micro and Nano robotics in Medicine is dedicated to research activities in an area of emerging interdisciplinary technology that is raising new scientific challenges and promising revolutionary advancement in applications such as medicine and biology The size and range of these systems are at or below the micrometer scale and comprise assemblies of micro and nanoscale components The volume on Image guided Surgical Procedures and Interventions focuses primarily on the use of image guidance during surgical procedures and the challenges posed by various imaging environments and how they related to the design and development of robotic systems as well as their clinical applications This volume also has significant contributions from the clinical viewpoint on some of the challenges in the domain of image guided interventions Finally the volume on Rehabilitation Robotics is dedicated to the state of the art of an emerging interdisciplinary field where robotics sensors and feedback are used in novel ways to re learn improve or restore functional movements in humans

Volume 1 Minimally Invasive Surgical Robotics focuses on an area of robotic applications that was established in the late 1990s after the first robotics assisted minimally invasive surgical procedure This area has since received significant attention from industry and researchers The teleoperated and ergonomic features of these robotic systems for minimally invasive surgery MIS have been able to reduce or eliminate most of the drawbacks of conventional laparoscopic MIS Robotics assisted MIS procedures have been conducted on

over 3 million patients to date primarily in the areas of urology gynecology and general surgery using the FDA approved da Vinci surgical system The significant commercial and clinical success of the da Vinci system has resulted in substantial research activity in recent years to reduce invasiveness increase dexterity provide additional features such as image guidance and haptic feedback reduce size and cost increase portability and address specific clinical procedures The area of robotic MIS is therefore in a state of rapid growth fueled by new developments in technologies such as continuum robotics smart materials sensing and actuation and haptics and teleoperation An important need arising from the incorporation of robotic technology for surgery is that of training in the appropriate use of the technology and in the assessment of acquired skills This volume covers the topics mentioned above in four sections The first section gives an overview of the evolution and current state the da Vinci system and clinical perspectives from three groups who use it on a regular basis The second focuses on the research and describes a number of new developments in surgical robotics that are likely to be the basis for the next generation of robotic MIS systems The third deals with two important aspects of surgical robotic systems teleoperation and haptics the sense of touch Technology for implementing the latter in a clinical setting is still very much at the research stage The fourth section focuses on surgical training and skills assessment necessitated by the novelty and complexity of the technologies involved and the need to provide reliable and efficient training and objective assessment in the use of robotic MIS systems In Volume 2 Micro and Nano Robotics in Medicine a brief historical overview of the field of medical nanorobotics as well as the state of the art in the field is presented in the introductory chapter It covers the various types of nanorobotic systems their applications and future directions in this field The volume is divided into three themes related to medical applications The first theme describes the main challenges of microrobotic design for propulsion in vascular media Such nanoscale robotic agents are envisioned to revolutionize medicine by enabling minimally invasive diagnostic and therapeutic procedures To be useful nanorobots must be operated in complex biological fluids and tissues which are often difficult to penetrate In this section a collection of four papers review the potential medical applications of motile nanorobots catalytic based propelling agents biologically inspired microrobots and nanoscale bacteria enabled autonomous drug delivery systems The second theme relates to the use of micro and nanorobots inside the body for drug delivery and surgical applications A collection of six chapters is presented in this segment The first chapter reviews the different robot structures for three different types of surgery namely laparoscopy catheterization and ophthalmic surgery It highlights the progress of surgical microrobotics toward intracorporeally navigated mechanisms for ultra minimally invasive interventions Then the design of different magnetic actuation platforms used in micro and nanorobotics are described An overview of magnetic actuation based control methods for microrobots with eventually biomedical applications is also covered in this segment The third theme discusses the various nanomanipulation strategies that are currently used in biomedicine for cell characterization injection fusion and engineering In vitro 3D cell culture has received increasing

attention since it has been discovered to provide a better simulation environment of in vivo cell growth. Nowadays the rapid progress of robotic technology paves a new path for the highly controllable and flexible 3D cell assembly. One chapter in this segment discusses the applications of micro nano robotic techniques for 3D cell culture using engineering approaches. Because cell fusion is important in numerous biological events and applications such as tissue regeneration and cell reprogramming, a chapter on robotic tweezers cell manipulation system to achieve precise laser induced cell fusion using optical trapping has been included in this volume. Finally the segment ends with a chapter on the use of novel MEMS based characterization of micro scale tissues instead of mechanical characterization for cell lines studies.

Volume 3 Image guided Surgical Procedures and Interventions focuses on several aspects ranging from understanding the challenges and opportunities in this domain to imaging technologies to image guided robotic systems for clinical applications. The volume includes several contributions in the area of imaging in the areas of X Ray fluoroscopy CT PET MR Imaging Ultrasound imaging and optical coherence tomography. Ultrasound based diagnostics and therapeutics as well as ultrasound guided planning and navigation are also included in this volume in addition to multi modal imaging techniques and its applications to surgery and various interventions. The application of multi modal imaging and fusion in the area of prostate biopsy is also covered. Imaging modality compatible robotic systems sensors and actuator technologies for use in the MRI environment are also included in this work as is the development of the framework incorporating image guided modeling for surgery and intervention. Finally there are several chapters in the clinical applications domain covering cochlear implant surgery neurosurgery breast biopsy prostate cancer treatment endovascular interventions neurovascular interventions robotic capsule endoscopy and MRI guided neurosurgical procedures and interventions.

Volume 4 Rehabilitation Robotics is dedicated to the state of the art of an emerging interdisciplinary field where robotics sensors and feedback are used in novel ways to relearn improve or restore functional movements in humans. This volume attempts to cover a number of topics relevant to the field. The first section addresses an important activity in our daily lives walking where the neuromuscular system orchestrates the gait posture and balance. Conditions such as stroke vestibular deficits or old age impair this important activity. Three chapters on robotic training gait rehabilitation and cooperative orthoses describe the current works in the field to address this issue. The second section covers the significant advances in and novel designs of soft actuators and wearable systems that have emerged in the area of prosthetic lower limbs and ankles in recent years which offer potential for both rehabilitation and human augmentation. These are described in two chapters. The next section addresses an important emphasis in the field of medicine today that strives to bring rehabilitation out from the clinic into the home environment so that these medical aids are more readily available to users. The current state of the art in this field is described in a chapter. The last section focuses on rehab devices for the pediatric population. Their impairments are life long and rehabilitation robotics can have an even bigger impact during their lifespan. In recent years a number of new developments have been

made to promote mobility socialization and rehabilitation among the very young the infants and toddlers These aspects are summarized in two chapters of this volume

Current Concepts in the Management of Pathologic Conditions, An Issue of Oral and Maxillofacial Surgery Clinics John H. Campbell,2013-02-28 Guest Editor John Campbell presents a comprehensive look at pathologic conditions The issue will cover tumors of the tongue base and hypopharynx keratocystic odontogenic tumors third molar pathology sinus grafting oral cancer burning tongue parotid pathology verrucous hyperkeratosis and verrucous carcinoma osteonecrosis fluorescent intraoperative angiography neuropathic pain and more

Intraoperative Fluorescence Imaging and Diagnosis in Central and Peripheral Nervous System Tumors: Established Applications and Future Perspectives Francesco Acerbi,Constantinos G. Hadjipanayis,Karl-Michael Schebesch,Morgan Broggi,Talat Kiris,2022-03-30

Handbook of Photomedicine Michael R. Hamblin,Yingying Huang,2013-10-22 Providing the most comprehensive up to date coverage of this exciting biomedical field Handbook of Photomedicine gathers together a large team of international experts to give you a complete account of the application of light in healthcare and medical science The book progresses logically from the history and fundamentals of photomedicine to di

Bailey & Love's Essential Operations in Hepatobiliary and Pancreatic Surgery Ashley Dennison,Guy Maddern,Jia Fan,2024-11-15 Bailey Love s Essential Operations in Hepatobiliary and Pancreatic Surgery provides step by step explanations of both the core operations and more complex procedures Written by acknowledged experts and trainers from around the world and with abundant diagrams and figures to explain the operative steps this new resource will enable hepatobiliary and pancreatic surgeons to increase their skills in this demanding and technically challenging field Over 70 easy to read chapters cover the entire range of HPB surgery Essential management principles and technical points are included preferred operative techniques are described and alternative options discussed The practice of HPB surgery requires familiarity and expertise with a wide range of technologies and these are described and integrated within the text The text is enhanced by clear colour images ensuring that best practice in HPB surgery is made clear and accessible for a global audience As surgical trainees around the world continue to be faced with the reduction in training time surgical skills need to be increasingly codified so that trainees can reach a high level of proficiency as quickly as possible This manual ensures that surgeons will be able to access the core information that they need quickly and with ease and in the process increase their clinical judgement their experience and their technical skills

Advances in Image-Guided Urologic Surgery Joseph C. Liao,Li-Ming Su,2014-11-18 This book provides an overview of the current state of art in combining advances in biomedical imaging with intraoperative navigation and preoperative planning for urologic surgery These advances hold great promise in improving diagnostic and therapeutic urologic interventions to improve patient outcomes Leading experts in this exciting emerging field covers early clinical and pre clinical applications of optical ultrasound cross sectional and computer assisted imaging in urologic surgery Advances in Image Guided Urologic Surgery provides a unique and valuable resource for audience with clinical and research interest in

minimally invasive surgery endourology urologic oncology imaging and biomedical engineering **Perforator Flaps for Head and Neck Reconstruction, An Issue of Oral and Maxillofacial Surgery Clinics of North America** Susana Heredero,2024-10-03 In this issue of Oral and Maxillofacial Surgery Clinics guest editor Dr Susana Heredero brings her considerable expertise to the topic of Perforator Flaps for Head and Neck Reconstruction Top experts in the field discuss every major local and regional flap technique including articles on functional perspectives in tongue reconstruction based on perforator free flap the ALT flap in head and neck reconstruction the evolution of imaging on reconstructive microsurgery for perforator flaps harvesting the role of CTA in perforator flap planning and more Contains 15 relevant practice oriented topics including chimeric scapula tip free flap with TDAP the role of DIEP and TDAP in head and neck reconstruction the PAP flap in head and neck reconstruction the SCIP flap for head and neck reconstruction thin superthin ultrathin perforator flaps for head and neck reconstruction perforator flaps and robotic surgery for head and neck reconstruction and more Provides in depth clinical reviews on perforator flaps for head and neck reconstruction offering actionable insights for clinical practice Presents the latest information on this timely focused topic under the leadership of experienced editors in the field Authors synthesize and distill the latest research and practice guidelines to create clinically significant topic based reviews

Molecular Medicines for Cancer Deepak Chitkara,Anupama Mittal,Ram I. Mahato,2018-09-03 The field of molecular medicine covers the medical interventions targeting molecular structures and mechanisms that are involved in disease progression In cancer several molecular mechanisms have been shown to impact its progression aggressiveness and chemoresistance Increasing evidence demonstrates the role of nanotechnology and outcome of molecular therapy Several books have discussed molecular biology and mechanisms involved in cancer but this text gives an account of molecular therapeutics in cancer relating to advancements of nanotechnology It provides a description of the multidisciplinary field of molecular medicines and its targeted delivery to cancer using nanotechnology Key Features Provides current information in the multidisciplinary field of molecular medicines and its targeted delivery to cancer using nanotechnology Presents important aspects of nanotechnology in the site specific delivery of anticancer agents Includes up to date information on oligonucleotide and gene based therapies in cancer Describes small targeted molecules antibodies and oligonucleotides which have shown to selectively target the molecular structures thereby influencing signal transduction Facilitates discussion between researchers involved in cancer therapy and nanoscientists **Digital Surgery** Sam Atallah,2020-07-31 This book provides a trove of insightful perspectives on the current state and the realization of digital surgery Digital surgery entails the application of artificial intelligence and machine learning toward automation in robotic assisted surgery More generally the objective is to digitally define the patient the surgical field and the surgical problem or task at hand to operate based on information rather than based on anatomic planes alone But digital surgery has shapeshifted into other equally intriguing faces many of which are exemplified by topics throughout this book Digital surgery is fundamental to 3D printed

organs mind controlled limbs image guided navigation and tele mentoring It is the key that unlocks the metaphorical doorway to surgical access thereby creating a global framework for surgical training education planning and much more This text provides methods of measurement and perception outside of the human umwelt including the ability to visualize fields beyond the visible light spectrum via near infrared fluorescent organic dyes which are rapidly being bioengineered to target specific tumors as well as native anatomic structures of interest Written by experts in the field Digital Surgery is designed to help surgeons operate with an enriched understanding of an individual s specific attributes including the human phenome physiome microbiome genome and epigenome It also aids surgeons in harnessing the power and fluidity of the cloud which is emerging as a significant resource for surgeons both regionally and globally

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