

Review

Hepatitis E Virus: Foodborne, Waterborne and Zoonotic Transmission

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Abstract: Hepatitis E virus (HEV) is responsible for epidemics and endemics of acute hepatitis in humans, mainly through waterborne, foodborne, and zoonotic transmission routes. HEV is a single-stranded, positive-sense RNA virus classified in the family *Hepeviridae* and encompasses four known Genotypes (1–4), at least two new putative genotypes of mammalian HEV, and one floating genus of avian HEV. Genotypes 1 and 2 HEVs only affect humans, while Genotypes 3 and 4 are zoonotic and responsible for sporadic and autochthonous infections in both humans and several other animal species worldwide. HEV has an ever-expanding host range and has been identified in numerous animal species. Swine serve as a reservoir species for HEV transmission to humans; however, it is likely that other animal species may also act as reservoirs. HEV poses an important public health concern with cases of the disease definitively linked to handling of infected pigs, consumption of raw and undercooked animal meats, and animal manure contamination of drinking or irrigation water. Infectious HEV has been identified in numerous sources of concern including animal feces, sewage water, inadequately-treated water, contaminated shellfish and produce, as well as animal meats. Many aspects of HEV pathogenesis, replication, and immunological responses remain unknown, as HEV is an extremely understudied but important human pathogen. This article reviews the current understanding of HEV transmission routes with emphasis on food and environmental sources and the prevalence of HEV in animal species with zoonotic potential in humans.

Hepatitis E Virus Foodborne Waterborne And Zoonotic

**Yashpal Singh Malik,Raj Kumar
Singh,Mahendra Pal Yadav**



Hepatitis E Virus Foodborne Waterborne And Zoonotic:

Hepatitis E Virus Franco Maria Ruggeri, Ilaria Di Bartolo, Fabio Ostanello, Marcello Trevisani, 2013-06-06 Hepatitis E HEV is a viral infectious disease that infects humans and domestic wild and synanthropic animals alike In developing countries the disease often presents as an epidemic transmitted primarily through the fecal oral route In recent years sporadic cases have also been documented in industrial countries including Europe The identification and characterization of animal strains of HEV from pigs wild boar and deer and the demonstrated ability of cross species infection by these animal strains raise potential public health concerns for foodborne and zoonotic transmission of the virus This Brief will provide a thorough overview of HEV It will discuss the epidemiology and pathogenesis of the virus in both humans and animals review detection methods and provide methods for its control and prevention

Hepatitis E Virus Youchun Wang, 2023-05-24 This book systematically and comprehensively discusses the biological epidemiological and clinical characteristics of the hepatitis E virus HEV It presents current knowledge of HEV and explores experimental methods treatment and prevention of HEV First identified in the 1980s and cloned in 1990 HEV is the causative agent of hepatitis E which mainly occurs in developing regions such as Southeast Asia the Middle East and Africa and significantly affects the health of the people in these areas It is estimated that a third of the world's population has been infected with HEV which is transmitted via the fecal oral route and can infect both humans and animals In the second edition new chapters are added to demonstrate the lifecycle morphogenesis and stem cell culture of hepatitis E virus Although research on hepatitis E virus has made progress recently there are still some problems that have not been solved Those problems are discussed in this edition which would be helpful for researchers to understand the problems on hepatitis E virus that they have faced Meanwhile the epidemiology transmission genetic evolution animal models treatment and others in the related chapters of the first version were also updated according to the most recent research progress The book provides an overview of HEV from benchside to bedside It is a valuable resource for researchers in the field and those in the pharmaceutical industry developing HEV vaccines as well as physicians involved in identifying and treating those infected with the virus

Handbook of Foodborne Diseases Dongyou Liu, 2018-10-29 Clearly linked to consumption of foods beverages and drinking water that contain pathogenic microbes toxins or other toxic agents foodborne diseases have undergone a remarkable change of fortune in recent decades from once rare and insignificant malaises to headline grabbing and deadly outbreaks Unquestionably several factors have combined to make this happen These include a prevailing demand for the convenience of ready to eat or heat and eat manufactured food products that allow ready entry and survival of some robust temperature insensitive microorganisms a drastic reduction in the costs of air sea and road transportation that has taken some pathogenic microorganisms to where they were absent previously an expanding world population that has stretched the boundary of human activity and an ageing population whose weakened immune functions provide a fertile ground for opportunistic pathogens to invade and thrive

Given the diversity of causative agents ranging from viruses bacteria yeasts filamentous fungi protozoa helminthes toxins to toxic agents and the ingenuity of pathogenic microbes to evolve through genetic reassortment horizontal gene transfer and or random genetic mutation it has become an enormous challenge to understand how foodborne agents are able to evade host immune defenses and induce diseases and also to develop and apply innovative approaches for improved diagnosis treatment and prevention of foodborne diseases Handbook of Foodborne Diseases summarizes the latest findings on more than 100 foodborne diseases and their causative agents With contributions from international experts on foodborne pathogens toxins and toxic agents research this volume provides state of the art overviews on foodborne diseases in relation to their etiology biology epidemiology clinical presentation pathogenesis diagnosis treatment and prevention Apart from offering a comprehensive textbook for undergraduate and postgraduate students in food medical and veterinary microbiology this volume constitutes a valuable reference on foodborne diseases for medical professionals and health authorities and forms an informative educational resource for the general public

Laboratory Models for Foodborne Infections

Dongyou Liu,2017-03-16 Resulting from ingestion of inappropriately prepared or stored foods containing pathogenic viruses bacteria fungi and parasites foodborne infections have become a significant source of human morbidity and mortality worldwide in recent decades This may be largely attributable to the remarkable popularity of convenient ready to eat food products the dramatic expansion of international food trades and the continuing growth of immuno suppressed population groups Although anti microbial treatments have played a crucial part in the control of foodborne infections in the past the emergence and spread of anti microbial resistance render the existing treatments ineffective Additionally our limited understanding of the molecular mechanisms of foodborne infections has thwarted our efforts in the development of efficacious vaccines for foodborne pathogens Given the obvious benefits of laboratory models in foodborne disease research a great number of experiments have been conducted toward the elucidation of host pathogen interactions in and pathogenic mechanisms of foodborne infections Forming part of the Food Microbiology series Laboratory Models for Foodborne Infections presents a state of the art review of laboratory models that have proven valuable in deciphering the life cycle epidemiology immunobiology and other key aspects of foodborne pathogens Written by scientists with respective expertise in foodborne pathogen research each chapter includes a contemporary summary of a particular foodborne viral bacterial fungal or parasitic infection in relation to its life cycle epidemiology clinical features pathogenesis host pathogen interactions and other related aspects Besides providing a trustworthy source of information for undergraduates and postgraduates in food microbiology Laboratory Models for Foodborne Infections offers an invaluable guide for scientists and food microbiologists with interest in exploiting laboratory models for detailed study of foodborne infections

Viral Hepatitis: Acute Hepatitis

Resat Ozaras,Joop E. Arends,2019-02-01 This book presents up to date practically oriented information on major topics in acute hepatitis The coverage encompasses epidemiology diagnosis including molecular methods treatment and challenges

and the management of co infections The book opens by examining the local and global epidemiology of acute hepatitis Detailed attention is then paid to each of acute hepatitis A acute hepatitis B acute hepatitis C hepatitis D co infection and hepatitis E Acute Hepatitis will be of high value for general practitioners and specialists in gastroenterology infectious diseases and internal medicine It will be international in scope in terms of both authorship and appeal

Emerging and Transboundary Animal Viruses Yashpal Singh Malik,Raj Kumar Singh,Mahendra Pal Yadav,2020-02-22 This book which is the first volume of the book series Livestock Diseases and Management summarizes the prominence and implications of the emerging and transboundary animal viruses Although the livestock plays an important role in the economy of many countries the emerging and transboundary animal viral diseases possess a serious risk to the animal agriculture sector and food security globally The book describes the precise and up to date information on animal viral diseases which have emerged in the recent past or are re emerging due to various environmental factors and those which are not bounded in restricted national boundaries and attained the transboundary status The chapters summarize the recent advancements in the molecular state of art tools towards the development of diagnostics prophylactics and therapeutics of these viruses It also explicitly describes the challenges imposed by the emerging and transboundary viral infections and our preparedness to counter them

Clinical Epidemiology of Chronic Liver Diseases Robert J. Wong,Robert G. Gish,2018-10-24 This book emphasizes the clinical epidemiology of chronic liver diseases with a specific focus on the methodology of the discussed studies The whole spectrum of liver diseases is covered from chronic hepatitis B and C to hepatocellular carcinoma alcoholic and non alcoholic fatty liver diseases and autoimmune and cholestatic liver diseases Readers will find the most up to date information on clinical epidemiology of hepatology and will also be able to learn about important methodology and biostatistics information Each chapter contains a summary table at the end of each chapter that highlights the most relevant landmark studies their main outcomes and the unique features of the methodology The book will appeal to both practicing clinicians as well as clinical research investigators In addition this would likely be of interest to medical school or public health school students to learn about hepatology epidemiology but also some specific fundamentals of clinical research and clinical epidemiology

Food Preservation and Safety of Natural Products Helen N. Onyeaka,Ozioma F. Nwabor,2022-06-15 Food Preservation and Safety of Natural Products addresses the most common causes of food spoilage that create significant loss to global food production while also discussing how food serves as a vehicle for the transmission of pathogenic microorganisms responsible for mild to debilitating health conditions in humans The book provides essential information for food safety professionals on issues relating to foodborne diseases and offers potential solutions by presenting various methods of incorporating natural products in food production to prevent the spread of foodborne pathogenic organisms The demand for green consumerism and consumers general distaste for synthetic food additives poses a serious challenge to food safety and preservation Natural products are used as green and sustainable source of bioactive compounds

that can be applied in various fields including food The use of plant and other natural products in food preservation is on the rise hence this book reviews microbial mediated food spoilage foodborne pathogens and food contamination and offers applications of natural products in food preservation Provides important information on microbial metabolic by products natural enzymatic processes to prevent food spoilage or deterioration Includes molecular techniques for antimicrobial and antioxidant applications in food food packaging and edible films Presents the latest evidence based science on the natural products used as additives in food

Natural Food Preservation: Controlling Loss, Advancing Safety Slavica Veskovc, 2025-03-26 Controlling food spoilage is critical not only to maintaining public health but also to minimizing food loss which in turn has broad impacts on the economy and the environment Consumers today concerned with both human and ecological health are adamant that the elimination of risk for foodborne disease need not come at the cost of nutritional quality or ecological considerations Moreover a large factor towards the continued threat of foodborne illness is the fact that the responsible bacteria are increasingly resistant to conventional antibiotics Considering that nature provides abundant antimicrobial compounds it is salutary to assess the role that these compounds can play in fighting foodborne pathogens As a result of these demands and considerations natural antimicrobials are beginning to gain ground over their synthetic counterparts in industrial food safety processes The success of these antimicrobial agents in individual settings has demonstrated that safe food does not have to mean highly processed or less sensorially satisfying food Natural Preservation Safety Losses and Protection will discuss the economic and ecological benefits of a food industry moving away from dependence on synthetic chemicals and preservatives and illustrate the impact that the extension of shelf life for the minimization of food waste can have on food insecurity across the globe Readers can expect an overview of safety that considers economic as well as ecological interests and assesses each stage of the food processing chain for its role in improving the nutritional physicochemical and sensory values of the product This includes a discussion of lactic acid bacteria LAB and their secondary metabolic products bacteriocins and how their application to fermentation processes can expand the possibilities for natural approaches to food safety with major implications for global health and ecology This volume demonstrates the integral role bio protectors can play in production processes promoting their potential while also outlining the necessity for appropriate laboratory industrial and medical evaluations to ensure their efficacy and win their approval by regulatory bodies The perspectives offered will be valuable to researchers policymakers and industry professionals with investments in building a more sustainable and more equitable food system

The Liver Irwin M. Arias, Harvey J. Alter, James L. Boyer, David E. Cohen, David A. Shafritz, Snorri S. Thorgeirsson, Allan W. Wolkoff, 2020-01-22 Bridging the gap between basic scientific advances and the understanding of liver disease the extensively revised new edition of the premier text in the field The latest edition of *The Liver Biology and Pathobiology* remains a definitive volume in the field of hepatology relating advances in biomedical sciences and engineering to understanding of liver structure function and disease pathology

and treatment Contributions from leading researchers examine the cell biology of the liver the pathobiology of liver disease the liver's growth regeneration metabolic functions and more Now in its sixth edition this classic text has been exhaustively revised to reflect new discoveries in biology and their influence on diagnosing managing and preventing liver disease Seventy new chapters including substantial original sections on liver cancer and groundbreaking advances that will have significant impact on hepatology provide comprehensive fully up to date coverage of both the current state and future direction of hepatology Topics include liver RNA structure and function gene editing single cell and single molecule genomic analyses the molecular biology of hepatitis drug interactions and engineered drug design and liver disease mechanisms and therapies Edited by globally recognized experts in the field this authoritative volume Relates molecular physiology to understanding disease pathology and treatment Links the science and pathology of the liver to practical clinical applications Features 16 new Horizons chapters that explore new and emerging science and technology Includes plentiful full color illustrations and figures The Liver Biology and Pathobiology Sixth Edition is an indispensable resource for practicing and trainee hepatologists gastroenterologists hepatobiliary and liver transplant surgeons and researchers and scientists in areas including hepatology cell and molecular biology virology and drug metabolism Emerging Zoonoses I. W. Fong, 2017-02-06 The book begins with a review of zoonotic pandemics of the past the Black Death or bubonic plague of the Middle Ages the Spanish Influenza pandemic derived from avian influenza of the early 20th century to the more modern pandemic of AIDS HIV infection which originated in Africa from primates However the majority of chapters focus on more recent zoonoses which have been recognized since the late 20th century to the present SARS and MERS coronaviruses New avian influenza viruses The tick borne Hantaan fever virus from China The tick borne Heartland virus from the United States Recently recognized bacterial pathogens such as *Streptococcus suis* from pigs In addition reemergence of established zoonoses that have expanded their niche are reviewed such as the spread of Zika virus and Chikungunya virus to the Western Hemisphere and the emergence and spread of Ebola virus infection in Africa A chapter is also devoted to an overview of the mechanisms and various types of animals involved in the transmission of diseases to humans and the potential means of control and prevention Many endemic and sporadic diseases are still transmitted by animals through either direct or indirect contact and zoonoses are estimated to account for about 75% of all new and emerging infectious diseases It is predicted by public health experts that the next major pandemic of infectious disease will be of animal origin making Emerging Zoonoses A Worldwide Perspective a crucial resource to all health care specialists by providing them with much needed information on these zoonotic diseases iv **The Transformative Development of Postcolonial Africa** Annie Sylvie Beya Wakata, Siméon Fogue Kouam, Rosemary Tonjock Kinge, Téléphore Benoît Nguélefack, Aloysius Ngefac, 2024-04-15 This book provides an opportunity for the voices of pure and natural scientists to be heard on what can be done to pull Africa from its current developmental quagmire and bring about its transformative development characterized by hallmarks that challenge the

traditional definition of development The following research questions and many more are answered in this book Which development vision addresses the multidimensional problems and crises plaguing postcolonial Africa Which context specific approaches and paradigms tackle some of the problems and re write the development story of Africa What is the role of pure and natural sciences in the project of rethinking and remaking Africa Transdisciplinary reflections from development experts and authors of different disciplines provide answers to these questions among others *Food Microbial and Molecular Biology* Saher Islam,Devarajan Thangadurai,Jeyabalan Sangeetha,Zaira Zaman Chowdhury,2023-09-08 The ever increasing globalization of the food industry demands new interventions and prevention technologies to improve the safety and quality of food This multidisciplinary new book presents advanced systems for identifying analyzing tracking and monitoring microbial contaminants in food Key features Highlights emerging and re emerging foodborne microorganisms and their virulence characteristics Includes recent approaches for food quality assurance and risk management Describes the practicality of molecular biology and microbial technologies for effectual control of foodborne infections Presents a detailed overview of the utilization of recent molecular techniques in food microbiology With expert contributions from experienced academics involved in food microbiology and molecular biology research this book offers indispensable guidance and a contemporary update of the latest developments in food microbial and molecular biology **Foodborne Diseases** Jan Mei Soon,Louise Manning,Carol A. Wallace,2016-04-06 Foodborne Diseases Case Studies of Outbreaks in the Agri Food Industries defines the context of foodborne disease across a range of food sectors It provides insight into the causes and management of outbreaks along with practical lessons about foodborne disease prevention strategies relevant to stakeholders throughout the food supply chain **AIIA 2022: Biosystems Engineering Towards the Green Deal** Vito Ferro,Giuseppe Giordano,Santo Orlando,Mariangela Vallone,Giovanni Cascone,Simona M. C. Porto,2023-06-30 This volume gathers the latest advances innovations and applications in the field of biosystems engineering as presented at the 12th Conference of the Italian Association of Agricultural Engineering AIIA held in Palermo Italy on September 19 22 2022 Focusing on the challenges of improving the resilience of agriculture forestry and food systems in the post Covid era it shows how the research has addressed the following topics Monitoring and modelling hydraulic and hydrological processes in agriculture and forestry systems Challenges in stream rehabilitation and soil conservation strategies Sustainable water resource management under climate change scenarios Planning safe healthy and resilient territorial built and green systems Cultural heritage preservation and rural landscape protection planning and management Plant and livestock production processes and technologies Healthy and Organic farming Animal welfare Energy waste and by products smart use Post harvest logistics and food chain structures technology Applications and experiences in smart agriculture and forestry One Health management and standardization for agriculture and forestry machinery and structures Big data machine learning and data hub in biosystems engineering The contributions were selected by a rigorous peer review process and offer an

extensive and multidisciplinary overview of the research in the field of biosystems engineering for sustainable agriculture

Applications of Plant Molecular Farming Chittaranjan Kole, Anurag Chaurasia, Kathleen L. Hefferon, Jogeswar Panigrahi, 2024-04-18 This edited book is a comprehensive compilation of applications of plant molecular farming in various fields including agriculture industry and medicine using different plant crop systems as bioreactors for the bulk production of products of interest The book places special emphasis on plant molecular farming being utilized for the bulk production of biologics industrial enzymes vaccines drugs and recombinant pharmaceutical proteins Plant molecular farming PMF is an upcoming promising interdisciplinary subject and therefore the book contains contributions from experts across the disciplines The utilization of plant viral vectors to produce biologics virus like particles and antimicrobial peptides via PMF have been highlighted Molecular farming for the bulk production of recombinant pharmaceutical proteins and various types of human and veterinary vaccines in different crops plants and genetically modified seeds has been included The process of scaling up to manufacturing capacity product formation by bioprocessing of plant cell suspension culture and bioreactor engineering have been incorporated Lastly the book provides special coverage on utilizing PMF made products to control neglected tropical diseases and plant made antigens as immunotherapies for allergic and autoimmune diseases The book has chapters from leading experts on the subject making it equally beneficial for researchers policy planners industrialists medical professionals entrepreneurs and students of various related disciplines

Genomes of Foodborne and Waterborne Pathogens Pina Fratamico, Yanhong Liu, Sophia Kathariou, 2010-12-20 Detailed interpretation of the environmental consequences of the latest findings from genome sequencing studies presenting both scientific and public health opportunities Explains how understanding pathogen genomics can help ensure the safety of global food and water supplies Focuses on specific food and waterborne pathogens that represent major public health threats Examines how global trends such as climate change increasing human populations and rising levels of pollution are stressing the ecosystems that food and waterborne pathogens encounter forcing them to adapt Serves as an excellent text for microbiology and genomics researchers public health officials regulators food scientists and other applicable professionals

Foodborne Viral Pathogens Peter A. White, Natalie E. Netzler, Grant S. Hansman, 2016-11-25 Viral transmission through contaminated food and water claims hundreds of thousands of lives every year particularly affecting children in developing nations Foodborne viral pathogens are associated with gastroenteritis and hepatitis causing widespread epidemics that affect all populations and demographics worldwide Foodborne Viral Pathogens comprehensively covers the predominant etiological viral agents of foodborne disease including norovirus hepatitis A virus hepatitis E virus astrovirus sapovirus and rotavirus and several emerging viruses and prions By improving food safety awareness and viral detection and through promotion of global food safety standards our ability to cope with and control foodborne disease will be enhanced Foodborne Viral Pathogens includes a detailed review of the molecular biology potential vaccines and available antiviral treatments of all major foodborne viral

pathogens and prions Written by specialists and leading virologists this book features techniques used for typing viral detection strategies for control and viral risk assessments This book is intended as a detailed handbook for food microbiology and medical applications and will be a useful guide for anyone with an interest in foodborne disease *Research Anthology on Improving Health Literacy Through Patient Communication and Mass Media* Management Association, Information Resources,2021-07-16 Increasing health literacy among patients is a difficult task as medical jargon and healthcare directions can be overwhelming and difficult to comprehend In today s digital world people are more connected than ever before and have the ability to find healthcare information in a way that was not possible in recent years Mass media and social media have become particularly influential in conveying health information to the public With the amount of misinformation being spread coupled with poor health literacy skills it is imperative that new strategies and policies are undertaken to ensure that patients and the general public receive accurate information and are appropriately educated in order to provide them with the best possible knowledge and care The *Research Anthology on Improving Health Literacy Through Patient Communication and Mass Media* provides an overview of the importance of health literacy and the various means to achieve health literacy for patients using several strategies and elements such as patient communication and mass media The book covers health awareness challenges that have been faced recently and historically and pushes for better patient provider communication The book also examines the use of social media virtual support groups and technological tools that aid in the facilitation of health knowledge Covering a range of key topics such as patient safety health illiteracy and eHealth this anthology is crucial for healthcare professionals researchers academicians students and those interested in understanding the importance of health literacy and how it connects to media and communication **Emerging and Reemerging Viral Pathogens** Moulay Mustapha Ennaji,2019-09-27 *Emerging and Reemerging Viral Pathogens* Fundamental and Basic Virology Aspects of Human Animal and Plant Pathogens Volume One presents new research information on viruses and their impact on the scientific community It provides a reference book on certain viruses in humans animals and vegetal along with a comprehensive discussion on interspecies interactions The book then looks at the drug vaccine and bioinformatical strategies that can be used against these viruses giving the reader a clear understanding of transmission The book s end goal is to create awareness that the appearance of newly transmissible pathogens is a global risk that requires shared adoptable policies for prevention and control Covers most emerging viral disease in humans animals and plants Provides the most advanced tools and techniques in molecular virology and the modeling of viruses Creates awareness that the appearance of new transmissible pathogens is a global risk Highlights the need to adopt shared policies for the prevention and control of infectious diseases

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