

Interspecies Transmission of Swine Influenza A Viruses and Human Seasonal Vaccine-Mediated Protection Investigated in Ferret Model

Pauline M. van Diemen, Alexander M.P. Byrne, Andrew M. Ramsay, Samantha Watson, Alejandro Nunez, Ana v Moreno, Chiara Chiapponi, Emanuela Foni, Ian H. Brown, Sharon M. Brookes, Helen E. Everett

We investigated the infection dynamics of 2 influenza A(H1N1) virus isolates from the swine 1A.3.3.2 (pandemic 2009) and 1C (Eurasian, avian-like) lineages. The 1C-lineage virus, A/Pavia/65/2016, although phylogenetically related to swine-origin viruses, was isolated from a human clinical case. This strain infected ferrets, a human influenza model species, and could be transmitted by direct contact and, less efficiently, by airborne exposure. Infecting ferrets and pigs (the natural host) resulted in mild or inapparent clinical signs comparable to those observed with 1A.3.3.2-lineage swine-origin viruses. Both H1N1 viruses could infect pigs and were transmitted to cohoused ferrets. Ferrets vaccinated with a human 2016–17 seasonal influenza vaccine were protected against infection with the antigenically matched 1A pandemic 2009 virus but not against the swine-lineage 1C virus. Our results reaffirm the need for continuous influenza A virus surveillance in pigs and identification of candidate human vaccine viruses.

Influenza A viruses (IAVs) have pandemic potential and remain a threat to human and animal health, mainly owing to their intrinsic ability to continually diversify and infect a broad range of host species. Genetic heterogeneity in the 8-segmented IAV genome arises from the gradual accumulation of mutations (drift) owing to the low fidelity of the viral RNA polymerase. In addition, sporadic

IAV gene segment exchange (shift) events can lead to the emergence of reassortant viruses with novel gene constellations and functional attributes. IAVs are characterized antigenically based on the hemagglutinin (HA) and neuraminidase (NA) envelope glycoproteins; HA incorporates the major epitopes conferring protective immunity (1–3).

Pigs are a key intermediate host species for IAV diversification; their susceptibility to IAVs originating from numerous mammalian (including human) and avian hosts enables virus reassortment and contributes to the expanding genetic heterogeneity of circulating swine IAV (swIAV) lineages (2,4,5). Because of this genetic heterogeneity, swIAVs are categorized according to HA phylogeny (6). Predominant viruses detected globally in swine populations belong to 3 main H1 genetic lineages (1A, 1B, and 1C) and multiple H3 clades, although antigenic and genetic differences might occur within these groupings according to geographic location (6,7). In Europe, the Eurasian avian-like H1 1C lineage (formerly termed the H1avN1 clade) has been enzootic in swine since the 1970s; phylogenetic evidence suggests direct incursion of an avian (duck)-origin virus into pigs (8). Subsequent reassortment with human-origin viruses produced the human-like H1 1B lineage (formerly known as the H1huN2 clade) and human-like H3N2 clades that cocirculated in pig populations in Europe as antigenically distinct IAV lineages until the introduction of the H1 1A.3.3.2 pandemic H1N1 (H1pdmN1) lineage in 2009 (9–12). The 1A.3.3.2 lineage continues to circulate and adapt in both pig and human populations globally and, in the swine reservoir, genetic mutation together with reassortment with

Author affiliations: Animal and Plant Health Agency, Addlestone, UK (P.M. van Diemen, A.M.P. Byrne, A.M. Ramsay, S. Watson, A. Nunez, I.H. Brown, S.M. Brookes, H.E. Everett); Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna, Brescia, Italy (C. Chiapponi, E. Foni, A. Moreno).

DOI: <https://doi.org/10.3201/eid2909.230066>

About Swine Influenza From Animal To Human

David E. Swayne



About Swine Influenza From Animal To Human:

About Swine Influenza Town Chehabi, 2014-12-25 Swine influenza virus is common throughout pig populations world wide Transmission of the virus from pigs to humans is not common and does not always lead to human flu often resulting only in the production of antibodies in the blood If transmission does cause human flu it is called zoonotic swine flu This book comes in handy and talks about the symptoms and measures to be taken when people affected due to this disease Insight into Influenza Viruses of Animals and Humans Sanjay Kapoor, Kuldeep Dhama, 2014-03-31 This book provides salient information on all aspects of influenza flu viruses affecting animals and humans It specifically reviews the properties and replication of influenza viruses their evolution and emergence epidemiology role of migratory birds in disease transmission clinical signs in humans animals and poultry pathogenesis and pathogenicity public health importance and potential threats diagnosis prevention and control measures and pandemic preparedness Influenza flu viruses evolve continuously and jump species causing epidemics as well as pandemics in both human and animals During the past 150 years various strains of influenza virus like the Spanish flu Asian flu Hong Kong flu bird flu and swine flu were responsible for high mortality in humans as well as birds High mutation rates antigenic shifts drifts reassortment phenomena and the development of antiviral drug resistance all contribute to ineffective chemotherapy and vaccines against influenza viruses Due to their devastating nature high zoonotic implications and high mortality in humans and poultry they have a severe impact on the socioeconomic status of countries Disease awareness rapid and accurate diagnosis surveillance strict biosecurity timely adoption of appropriate preventive and control measures and pandemic preparedness are crucial to help reduce virus transmission thus reducing clinical cases deaths and pandemic threats **One Health: The Human-Animal-Environment Interfaces in Emerging Infectious Diseases** John S. Mackenzie, Martyn Jeggo, Peter Daszak, Juergen A. Richt, 2013-11-22 One Health is an emerging concept that aims to bring together human animal and environmental health Achieving harmonized approaches for disease detection and prevention is difficult because traditional boundaries of medical and veterinary practice must be crossed In the 19th and early 20th centuries this was not the case then researchers like Louis Pasteur and Robert Koch and physicians like William Osler and Rudolph Virchow crossed the boundaries between animal and human health More recently Calvin Schwabe revised the concept of One Medicine This was critical for the advancement of the field of epidemiology especially as applied to zoonotic diseases The future of One Health is at a crossroads with a need to more clearly define its boundaries and demonstrate its benefits Interestingly the greatest acceptance of One Health is seen in the developing world where it is having significant impacts on control of infectious diseases *Swine Influenza* Juergen Richt, Richard J. Webby, 2013-04-23 From the first detailed clinical description of the disease in the Midwestern United States in 1918 to the isolation of the causative agent the first of any influenza virus in 1930 to its role in the genesis of the 2009 human pandemic swine have played a central role in the ecology of influenza Although not considered the major natural reservoir for influenza

A viruses swine are host to a limited but dynamic assortment of viruses A number of subtypes of influenza A viruses of human and avian origin including H1 H2 H3 H4 H5 H7 and H9 have been isolated from global swine populations Most of these isolations have however been limited in number and it is only H1 and H3 influenza viruses that are known to have formed stable lineages in swine In this respect swine influenza viruses SIV are similar to their counterparts in humans where H1 and H3 viruses have also been maintained The nature of these H1 and H3 viruses differ between the two host populations however and as discussed throughout this book are even different in swine populations in different geographic regions of the world due to multiple introductions of avian and human influenza viruses

Zoonoses: Infections Affecting Humans and Animals Andreas Sing, 2023-10-09 This second fully revised and extended edition of *Zoonoses Infections Affecting Humans and Animals* covers the most important pathogens impacting both human and animal public health and debates current developments in this interdisciplinary field from a One Health perspective Following a setting approach the individual chapters each review zoonoses occurring in a specific group of animals such as production animals pets or wildlife or in a defined ecosystem A focus is put on zoonoses emerging along the food chain and on antibiotic resistance as an increasing challenge in infectious disease management Special interest chapters debate non resolved and currently hotly debated zoonoses foremost COVID 19 influenza Crohn paratuberculosis and chronic botulism also taking into account the economic and ecological aspects of zoonotic disease outbreaks This second edition includes brand new chapters on emerging pathogens such as SARS CoV 2 chlamydia and helminths it reviews historic zoonoses provides additional insights into pathogens of reptiles and highlights significant neglected tropical diseases This reference work is a must read for researchers health professionals and students in Microbiology and Veterinary Medicine The book s ambition to spread knowledge on zoonoses and on strategies on how to tackle them complies with the United Nations Sustainable Goals in particular Goal 3 Good Health and Well Being

The One Health Model as Applied to Zoonotic Diseases Oreta M. Samples, George W. McCommon, Thomas H. Terrill, Lori Stose, 2025-03-03 Comprehensive easy to understand and clinically relevant guide to zoonotic healthcare concerns in North America The One Health Model as Applied to Zoonotic Diseases is an easy to understand yet comprehensive explanation of zoonotic healthcare concerns with coverage of diseases and medical conditions seen in North America With a format that is consistent throughout each chapter this book provides clinically relevant information on individual diseases causative agents symptomatology diagnostics and treatment and preventative strategies This book also offers an overview of the history of One Health and perspective on the future of One Health in North America The One Health Model as Applied to Zoonotic Diseases covers sample topics including Arthropod Borne Diseases tapeworms rabbit fever rickettsia spp leishmaniasis chiggers red bird mite and mange Equine encephalitis St Louis encephalitis West Nile Virus Zika American spotted fever babesia bourbon virus Colorado tick fever and heartland virus Lyme disease Powassan encephalitis Q Fever Rocky Mountain spotted fever swimmer s itch and bacterial zoonotic disease

Anthrax cat scratch fever campylobacteriosis leptospirosis psittacosis salmonella staphylococcus tuberculosis rat bite fever hookworms and intestinal flukes Newcastle disease avian and swine influenza foot and mouth disease and creeping eruption The One Health Model as Applied to Zoonotic Diseases is an essential textbook for veterinary technology and animal science students seeking to work as paramedical professionals in the fields of agriculture and veterinary medicine It also serves as an ideal reference guidebook for both human and veterinary practitioners Swine Influenza Jürgen A. Richt, Richard J.

Webby, 2014-07-08 From the first detailed clinical description of the disease in the Midwestern United States in 1918 to the isolation of the causative agent the first of any influenza virus in 1930 to its role in the genesis of the 2009 human pandemic swine have played a central role in the ecology of influenza Although not considered the major natural reservoir for influenza A viruses swine are host to a limited but dynamic assortment of viruses A number of subtypes of influenza A viruses of human and avian origin including H1 H2 H3 H4 H5 H7 and H9 have been isolated from global swine populations Most of these isolations have however been limited in number and it is only H1 and H3 influenza viruses that are known to have formed stable lineages in swine In this respect swine influenza viruses SIV are similar to their counterparts in humans where H1 and H3 viruses have also been maintained The nature of these H1 and H3 viruses differ between the two host populations however and as discussed throughout this book are even different in swine populations in different geographic regions of the world due to multiple introductions of avian and human influenza viruses Pathobiology of Human Disease, 2014-08-01

Pathobiology of Human Disease bridges traditional morphologic and clinical pathology molecular pathology and the underlying basic science fields of cell biology genetics and molecular biology which have opened up a new era of research in pathology and underlie the molecular basis of human disease The work spans more than 48 different biological and medical fields in five basic sections Human Organ Systems Molecular Pathology Basic Mechanisms of Diseases Animal Models Other Model Systems Experimental Pathology Clinical Pathology Each article provides a comprehensive overview of the selected topic to inform a broad spectrum of readers from research professionals to advanced undergraduate students Reviews quantitative advances in the imaging and molecular analysis of human tissue new microarray technologies for analysis of genetic and chromosomal alterations in normal and diseased cells and tissues and new transgenic models of human disease using conditional tissue specific gene targeting Articles link through to relevant virtual microscopy slides illustrating side by side presentation of Normal and Disease anatomy and histology images Fully annotated with many supplementary full color images graphs tables and video files linked to data sets and to live references enabling researchers to delve deeper and visualize solutions **Feigin and Cherry's Textbook of Pediatric Infectious Diseases E-Book** James Cherry, Gail J.

Demmler-Harrison, Sheldon L. Kaplan, William J. Steinbach, Peter J Hotez, 2013-10-05 Feigin and Cherry's Textbook of Pediatric Infectious Diseases helps you put the very latest knowledge to work for your young patients with unparalleled coverage of everything from epidemiology public health and preventive medicine through clinical manifestations diagnosis

treatment and much more Ideal for all physicians whether in an office or hospital setting Feigin and Cherry s equips you with trusted answers to your most challenging clinical infectious disease questions Meet your most difficult clinical challenges in pediatric infectious disease including today s more aggressive infectious and resistant strains as well as emerging and re emerging diseases with unmatched comprehensive coverage of immunology epidemiology public health preventive medicine clinical manifestations diagnosis treatment and much more Find the answers you need quickly thanks to an organization both by organ system and by etiologic microorganism allowing you to easily approach any topic from either direction *Keeping Livestock Healthy* United States. Department of Agriculture,1942 This yearbook deals with the important aspects of modern agriculture is intended to serve as a manual or reference book of animal health There are some diseases and parasites mostly of minor importance that it omits but it is reasonably complete It covers all classes of livestock houses and mules dairy and beef cattle swine sheep and goats poultry and even dogs and cats which are so useful on many farms Morbidity and Mortality Weekly Report ,2011 Zoonoses and Communicable Diseases Common to Man and Animals Pedro N. Acha,Boris Szyfres,2001 In recent years zoonoses and communicable diseases common to man and animals have gained increasing attention worldwide Human diseases that have their origins in infected animals such as AIDS or Creutzfeldt Jakob have highlighted the need for a better understanding of animal diseases in terms of their epidemiology mechanism of transmission to man diagnosis prevention and control Encroachment into formerly little known ecological areas has increased exposure to such diseases Also the speed of modern travel facilitates the spread of the diseases once confined to specific geographic areas Animal migration and trade pose a similar threat This new edition provides a detailed overview of the most important zoonotic diseases including its first appearance most important outbreaks latest scientific knowledge and causative agents It includes etiology geographic distribution symptoms and occurrence in man and animals source of infection mode of transmission role of animals in the epidemiology of the disease diagnostic techniques and prevention and control measures name and number according to the International Statistical Classification of Diseases and Related Health Problems ICD 10 It also includes an index covering synonyms and etiologic agents names *Human-Animal Medicine - E-Book* Peter M. Rabinowitz,Lisa A. Conti,2010-01-04 Human Animal Medicine is an innovative reference exploring the unprecedented convergence of human animal and environmental health triggering global pandemics and requiring new clinical paradigms The One Health approach calls for greater communication and cooperation between human health care providers public health professionals and veterinarians to better address vital issues of emerging diseases and environmental change This incredibly timely book provides for the first time practical guidelines for One Health collaborations in a wide range of clinical human animal health issues including the H1N1 virus zoonotic diseases the human animal bond animal allergy bites and stings and animals as sentinels for toxic environmental health hazards UNIQUE For each condition specific steps human health care providers veterinarians and public health professionals must take to prevent and manage disease UNIQUE

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Green Guide Families Catherine Zandonella, 2010 Offers information on how to make environmentally sound decisions about food health clothing toys and activities with information on topics ranging from lead painted toys to the potential side effects of plastic bottles The Routledge Companion to Gender and Animals Chloë Taylor, 2024-05-31 The Routledge Companion to Gender and Animals is a diverse and intersectional collection which examines human and more than human animal relations as well as the interconnectedness of human and animal oppressions through various lenses Comprising fifty chapters the book explores a range of debates and scholarship within important contemporary topics such as companion animals hunting agriculture and animal activist strategies It also offers timely analyses of zoonotic disease pandemics mass extinction and the climate catastrophe using perspectives including feminist critical race anti colonial critical disability and masculinities studies The Routledge Companion to Gender and Animals is an essential reference for students in gender studies sexuality studies human animal studies cultural studies sociology and environmental studies **Emerging Infectious Diseases** , 2017 **Animal Influenza** David E. Swayne, 2016-12-19 Animal Influenza Second Edition is a comprehensive text on animal influenza Organized by species coverage includes avian swine equine and mammals with each section including data on influenza viruses the infection and disease they cause and strategies used in control Covers the full range of topics within avian swine equine and mammalian influenzas in one comprehensive and authoritative text Provides a summarization of peer reviewed and empirical data on influenza viruses the infection and diseases they cause Discusses strategies used in control of the disease Leading experts are drawn together to provide an international and multi disciplinary perspective Fuses latest developments in basic scientific research with practical guidance on management of the disease Human Respiratory Viral Infections Sunit K. Singh, 2014-06-23 Using a multidisciplinary approach Human Respiratory Viral Infections is set at the level between the definitive reference work and an essential clinical manual Exploring recent advances in human respiratory viral research the text builds on the basic sciences of epidemiology virology molecular biology and immunology to cover clinical diagnosis mechanism of pathogenesis manifestations of disease impact treatment and management strategies Provides a comprehensive review of all the major human respiratory viral infections Supplies a detailed description of the anatomy of the respiratory system Discusses the salient features of specific viruses Examines the latest diagnostic tools Covers risk factors associated with incidence of respiratory viral infections in children

and adults in different occupational and environmental settings Presenting the latest knowledge in human respiratory viral infections this text will be immensely valuable for pulmonologists biomedical scientists research scholars virologists vaccinologists immunologists clinicians pharmacologists and public health specialists

Diseases of Swine Jeffrey J. Zimmerman, Locke A. Karriker, Alejandro Ramirez, Kent J. Schwartz, Gregory W. Stevenson, Jianqiang Zhang, 2019-04-01 Doody's Core Title Essential Provides a fully revised Eleventh Edition of the definitive reference to swine health and disease Diseases of Swine has been the definitive reference on swine health and disease for over 60 years This new edition has been completely revised to include the latest information developments and research in the field Now with full color images throughout this comprehensive and authoritative resource has been redesigned for improved consistency and readability with a reorganized format for more intuitive access to information Diseases of Swine covers a wide range of essential topics on swine production health and management with contributions from more than 100 of the foremost international experts in the field This revised edition makes the information easy to find and includes expanded information on welfare and behavior A key reference for anyone involved in the swine industry Diseases of Swine Eleventh Edition Presents a thorough revision to the gold standard reference on pig health and disease Features full color images throughout the book Includes information on the most current advances in the field Provides comprehensive information on swine welfare and behavior Offers a reorganized format to make the information more accessible Written for veterinarians academicians students and individuals and agencies responsible for swine health and public health Diseases of Swine Eleventh Edition is an essential guide to swine health The 11th edition of Diseases of Swine continues to serve as the gold standard resource for anything and everything related to swine herd health this edition does an outstanding job of keeping up with the advanced diagnostic technologies and the latest research on new or emerging diseases and syndromes there is no other informational resource that comes close to providing the depth or quality of information on the topic of swine diseases as does this book

Handbook of Zoonoses, Section B George W. Beran, 2017-12-06 This multivolume handbook presents the most authoritative and comprehensive reference work on major zoonoses of the world The Handbook of Zoonoses covers most diseases communicable to humans as well as those diseases common to both animals and humans It identifies animal diseases that are host specific and reviews the effects of various human diseases on animals Discussions address diseases that remain important public and animal health problems and the techniques that can control and prevent them The chapters are written by internationally recognized scientists in their respective areas of disease who work or have worked extensively in the most affected areas of the world The emphasis for each zoonosis is on the epidemiology of the disease the clinical syndromes and carrier states in infected animals and humans and the most current methods for diagnosis and approaches to control For infectious agents or biologic toxins which may be transmitted by foods of animal origin a strong focus is placed on food safety measures The etiologic and therapeutic aspects of each disease important to epidemiology and control are identified

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