



Centro de Documentación / Documentation Center

Objetivos/ Objectives

Identificar y atender las necesidades de información, adquisición, organización, almacenamiento, generación, uso y difusión de la información en salud pública veterinaria y proveer recursos bibliográficos técnicos-científicos al equipo de profesionales de la unidad y a los usuarios externos.

Identify and take care of the needs of information, acquisition, organization, storage, generation, use and diffusion of the information in veterinary public health and provide technical scientific bibliographical resources to the professional staff of the unit and to the users external.

Temas de interés general / Subjects of general interest



**REVISTA
PANAMERICANA
DE SALUD PÚBLICA**

**PAN AMERICAN
JOURNAL OF
PUBLIC HEALTH**

Importance of Animal/Human Health Interface in Potential Public Health Emergencies of International Concern in the Americas

Schneider MC, Aguilera XP, Smith RM, Moynihan MJ, Barbosa da Silva Junior J, Aldighieri S, Almiron M

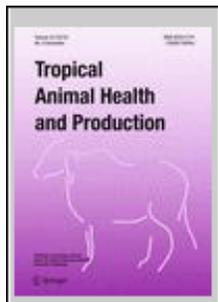
Rev Panam Salud Publica. May 2011; 29 (5): 371–9

This study analyzed the importance of zoonoses and communicable diseases common to man and animals as potential Public Health Emergencies of International Concern to build an evidence base for future efforts to reduce risk of infection at the animal/human health interface. The events recorded in the World Health Organization (WHO) Event Management System (EMS) database for the Americas during the 18 months since the implementation of the 2005 revised version of WHO's International Health Regulations (15 June 2007–31 December 2008) were the main source for this analysis. Of the 110 events recorded by the EMS for the Americas during the study period, 86 were classified as communicable diseases—77 (70.0%) "within the animal/human health interface," 9 (8.2%) "not common to man and animals," 16 (14.5%) "syndromes with unknown etiologies," and 8 (7.3%) "product- related/ other." Of the 77 events within the animal/human health interface, 48 were "substantiated" (the presence of hazard was confirmed and/or human cases occurred clearly in excess of normal expectancy). These results confirm previous research and underscore the importance of the animal/human health interface as well as inter-sectoral collaboration.

http://new.paho.org/journal/index.php?option=com_docman&task=doc_download&gid=250&Itemid=

<http://bit.ly/mMjSpX>

Brucelosis / Brucellosis

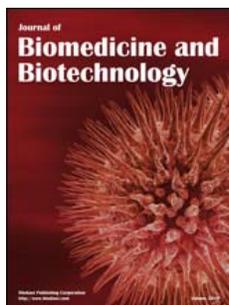


Molecular typing of Brucella species isolates from livestock and human

Nagalingam M, Shome R, Balamurugan V, Shome BR, Narayanarao K, Vivekananda, Isloor S, Prabhudas K
Trop Anim Health Prod. 2011 Jun

Although host specificity has been observed in different species of Brucella, crossing the animal host boundary is likely to occur at any time. In this study, Bruce ladder PCR and abortus-melitensis-ovis-suis (AMOS) PCR assays were used to characterize 47 Brucella isolates from Indian origin in order to know exact species for understanding epidemiology of brucellosis. Out of them, 28, 14, and 5 isolates were found to be Brucella abortus, Brucella melitensis, and Brucella suis, respectively. Further analysis by AMOS PCR has identified that all the B. abortus isolates belong to any one of the biovar 1, 2, or 4; of the five B. suis isolates, three belong to biovar 1 and two belong to any one of the biovar 2, 3, 4, or 5. Although this multiplex Bruce ladder PCR is useful in differentiating all Brucella species, elaborate study is required to further characterize the isolates at exact biovar level.

Text in English



Laboratory animal models for brucellosis research

Silva TM, Costa EA, Paixão TA, Tsohis RM, Santos RL
J Biomed Biotechnol. 2011; 2011: 518323

Brucellosis is a chronic infectious disease caused by Brucella spp., a gram-negative facultative intracellular pathogen that affects humans and animals, leading to significant impact on public health and animal industry. Human brucellosis is considered the most prevalent bacterial zoonosis in the world and is characterized by fever, weight loss, depression, hepato/splenomegaly, osteoarticular, and genital infections. Relevant aspects of Brucella pathogenesis have been intensively investigated in culture cells and animal models. The mouse is the animal model more commonly used to study chronic infection caused by Brucella. This model is most frequently used to investigate specific pathogenic factors of Brucella spp., to characterize the host immune response, and to evaluate therapeutics and vaccines. Other animal species have been used as models for brucellosis including rats, guinea pigs, and monkeys. This paper discusses the murine and other laboratory animal models for human and animal brucellosis.

Text in English

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3043301/pdf/JBB2011-518323.pdf>

Enfermedades Desatendidas / Neglected Diseases

Parasites & Vectors

Zoonoses and marginalised infectious diseases of poverty: where do we stand?

Molyneux DM, Hallaj Z, Keusch GT, McManus DP, Ngowi H, Cleaveland S, Ramos-Jimenez P, Gotuzzo E, Kar K, Sanchez A, Garba A, Carabin H, Bassili A, Chaignat CL, Meslin FX, Abushama HM, Willingham AL, Kioy D
Parasit Vectors. 2011 Jun; 4 (1): 106

Despite growing awareness of the importance of controlling neglected tropical diseases as a contribution to poverty alleviation and achieving the Millennium Development Goals, there is a need to up-scale programmes to achieve wider public health benefits. This implementation deficit is attributable to several factors but one often overlooked is the specific difficulty in tackling diseases that involve both people and animals - the zoonoses. A Disease Reference Group on Zoonoses and Marginalised Infectious Diseases (DRG6) was convened by the Special Programme for Research and Training in Tropical Diseases (TDR), a programme executed by the World Health Organization and co-sponsored by UNICEF, UNDP, the World Bank and WHO. The key considerations included: (a) the general lack of reliable quantitative data on their public health burden; (b) the need to evaluate livestock production losses and their additional impacts on health and poverty; (c) the relevance of cross-sectoral issues essential to designing and implementing public health interventions for zoonotic diseases; and (d) identifying priority areas for research and interventions to harness resources most effectively. Beyond disease specific research issues, a set of common macro-priorities and interventions, were identified which, if implemented through a more integrated approach by countries, would have a significant impact on human health of the most marginalised populations characteristically dependent on livestock.

Text in English

<http://www.parasitesandvectors.com/content/pdf/1756-3305-4-106.pdf>

Enfermedades Vesiculares / Vesicular Diseases



Multiplex RT-PCR detection and microarray typing of vesicular disease viruses

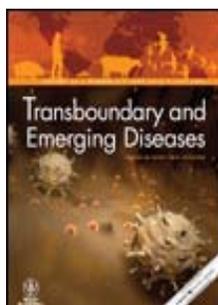
Lung O, Fisher M, Beeston A, Hughes KB, Clavijo A, Goolia M, Pasick J, Mauro W, Deregt D
J Virol Methods. 2011 May

A vesicular disease multiplex reverse transcription (RT)-PCR with an accompanying microarray assay was developed for simultaneous detection and typing of foot-and-mouth disease virus (FMDV) and vesicular stomatitis virus (VSV), and for the detection of swine vesicular disease virus (SVDV) and vesicular exanthema of swine virus (VESV). The multiplex RT-PCR successfully detected viral RNA from a collection of 49 strains of vesicular viruses, including multiple strains from all seven serotypes of FMDV and both serotypes of VSV. The multiplex RT-PCR was also able to produce amplified products from the RNA genome of all four viruses simultaneously in mixed samples. An indirect (post-PCR labelling) amplicon labelling method and a direct (concurrent labelling with PCR) amplicon labelling method were compared for the purpose of microarray detection and typing. Accurate detection and typing was achieved with all strains tested in the microarray assay which utilized 163 virus- and serotype-specific probes. It was observed that microarray increased detection for some samples compared to using multiplex RT-PCR alone. This was most likely due to signal amplification resulting from fluorescent labelling. The limit of detection of the microarray assay was as low as 4.6TCID₅₀/mL for FMDV. No amplification products or microarray reactivity was observed with non-target livestock pathogens tested or with samples collected from healthy cattle, sheep and pigs. All FMDV and VSV serotypes were detected as early as 2 days post-inoculation from

oral swabs obtained from cattle infected experimentally.

Text in English (article in press)

Fiebre Aftosa / Foot and Mouth Disease



The pathogenesis of foot-and-mouth disease II: viral pathways in swine, small ruminants, and wildlife; myotropism, chronic syndromes, and molecular virus-host interactions

Arzt J, Baxt B, Grubman MJ, Jackson T, Juleff N, Rhyan J, Rieder E, Waters R, Rodriguez LL

Transbound Emerg Dis. 2011 Jun

Investigation into the pathogenesis of foot-and-mouth disease (FMD) has focused on the study of the disease in cattle with less emphasis on pigs, small ruminants and wildlife. 'Atypical' FMD-associated syndromes such as myocarditis, reproductive losses and chronic heat intolerance have also received little attention. Yet, all of these manifestations of FMD are reflections of distinct pathogenesis events. For example, naturally occurring porciphilic strains and unique virus-host combinations that result in high-mortality outbreaks surely have their basis in molecular-, cellular- and tissue-level interactions between host and virus (i.e. pathogenesis). The goal of this review is to emphasize how the less commonly studied FMD syndromes and host species contribute to the overall understanding of pathogenesis and how extensive in vitro studies have contributed to our understanding of disease processes in live animals.

Text in English (article in press)



Validation of a recombinant integrin $\alpha\nu\beta 6$ /monoclonal antibody based antigen ELISA for the diagnosis of foot-and-mouth disease

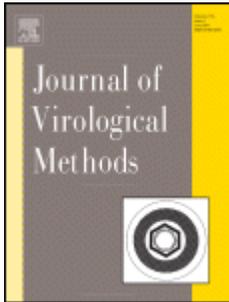
Ferris NP, Grazioli S, Hutchings GH, Brocchi E

J Virol Methods. 2011 May

A sandwich ELISA using recombinant integrin $\alpha\nu\beta 6$ as a capture ligand and serotype-specific monoclonal antibodies (Mabs) as detecting reagents has been compared with a polyclonal antibody based ELISA (using type-specific rabbit antibodies as capture and guinea pig antibodies as detectors), which is employed routinely at the FAO World Reference Laboratory for Foot-and-Mouth Disease (FMD), for the identification and serotyping of FMD virus (FMDV). The study used cell culture grown antigens (1351 FMDV positive) derived from suspected cases of vesicular disease collected from 86 countries between 1924 and 2011, those positive for the other vesicular diseases of swine vesicular disease (n=25) and vesicular stomatitis (n=45) and negative samples collected from uninfected cell cultures (n=36). The diagnostic sensitivity of the assays was similar at 98.1% (polyclonal ELISA) compared to 97.9% (integrin/Mab ELISA) but the serotypic-specificity of the latter was vastly superior (96%) to that of the former (61.5%). Reactions with the viruses of swine vesicular disease and vesicular stomatitis, which produce clinically indistinguishable syndromes in pigs and cattle, did not occur. The integrin/Mab ELISA recognized FMDV strains of wide antigenic and molecular diversity of all seven serotypes and although some FMDV isolates were not detected, the greater specificity of the assay, while retaining test sensitivity comparable to the conventional assay, warrants its consideration for adoption for routine diagnostic use.

Text in English (article in press)

Influenza Aviar / Avian Influenza



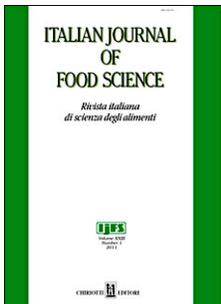
The use of FTA® filter papers for diagnosis of avian influenza virus

Abdelwhab EM, Lüscho D, Harder TC, Hafez HM
J Virol Methods. 2011 Jun; 174 (1-2): 120-2

Avian influenza viruses (AIVs) infect a wide range of host species including domestic poultry and wild birds; also, AIVs may infect humans in whom some highly pathogenic viruses (HPAIV) may cause acute fatal disease. Accurate laboratory diagnosis of AIV infections requires time-consuming and logistically complex precautionary measures for shipment of specimens or viruses to avoid biohazard exposure. The feasibility was investigated of the Flinders Technology Associates filter paper (FTA(®) card) for infectivity of AIVs and to preserve viral RNA for detection by RT-qPCR, sequencing and by DNA microarray assay. The infectivity of AIV subtype H6N2 and HPAIV subtype H5N1 was inactivated completely within one hour after adsorption to the FTA card at room temperature. FTA-adsorbed viral RNA remained stable for five months. Swab samples obtained from chickens infected experimentally with H5N1 virus and spotted directly onto the FTA (®) cards allowed a sensitive and straightforward diagnosis by RT-qPCR. FTA(®) cards were also suitable for examination of field samples, although AIV RNA was detected with reduced sensitivity in comparison to direct examination of swab fluids. The use of FTA(®) cards will facilitate safe transport of samples for molecular diagnosis of AIV avoiding the need for an uninterrupted cold storage.

Text in English (article in press)

Inocuidad de los Alimentos / Food Safety



The application of HACCP system in meat products for catering industry a practical guide for pork loin chop

Gramza-Michalowska A, Nowak B, Korczak J
Ital J Food Sci. 2011; 23 (1): 45-54

The HACCP system is based on an assumption that the virtual hazard and irregularities in food processing may be detected before or during technological processes, so that their risk is minimalised. Preventing health hazards is a major objective of the HACCP system, which is currently considered as one of the most efficient tools available in this respect.

The aim of the present study is to elaborate selected sections of the HACCP system for meat products, to adapt and verify it in the production chain. The study involved a description of selected representative meat product – Pork Loin Chops, the production design, designation of critical control points (CCP) in the process, the hazard and the development of a hazard identification analysis sheet. A monitoring system, prevention and correction measures were also planned. The HACCP system was practically verified by testing its introduction and implementation during the production process.

Text in English

Leishmaniasis



Caracterização Imunofenotípica em linfócitos do sangue periférico de pacientes portadores de leishmaniose tegumentar americana

Castro MCABC

Dissertação (Mestrado em Saúde Pública)

Centro de Pesquisa Aggeu Magalhães, Fundação Oswaldo Cruz, Recife, 2011

The American cutaneous leishmaniasis (ACL) is a disease observed in all states of Brazil. In Pernambuco, there is an incidence in all regions, with *L. (V.) braziliensis* being the prevalent etiologic agent. ACL can cause from skin localized lesions to mucocutaneous ones, resulting from the host-parasite-vector interactions. The susceptibility or resistance to the disease is dependent on T cell responses, characterized by an increased in the CD4+ T cells, showing a Th1 or Th2 profile. CD8+ T cells meanwhile are related to immunoprotective mechanisms in ACL. The objectives of this study were to characterize immunophenotypically T lymphocytes from peripheral blood from 17 patients before treatment, 11 after treatment and 5 spontaneously cured. Furthermore, to characterize the cytokine production of IL-10, IL-4, TNF- α and IFN- γ by PBMC cultures after stimulation with soluble and insoluble antigenic fractions of *L. (V.) braziliensis*. The results showed that both fractions were able to induce a specific immune response. There were no significant changes in the phenotypic profile of CD3+, CD4+ and CD8+ T cells *ex vivo*, however CD25+ T cells were significantly increased. We observed a transitory immunosuppression in the early phase of leishmaniasis, with significant presence of IL-10 and IL-4 and CD4+ T cells, suggesting their connection with disease progression. After treatment or spontaneous healing, the immune pattern observed indicates the presence of memory T cells with a type 1 response, with the production of TNF- α , IFN- γ and the significant presence of CD4+ and CD8+ T cells. Furthermore, immunoregulatory mechanisms were suggested by the existence of CD25+ T cells *ex vivo* and by the significant production of IL-10 in cultures. Therefore, this T cell response after treatment or spontaneous healing seems to be associated with cure and / or protection in the ACL.

Text in Portuguese

<http://www.cpqam.fiocruz.br/bibpdf/2011castro-mcab.pdf>



Comparison of the sensitivity of imprint and scraping techniques in the diagnosis of American tegumentary leishmaniasis in a referral centre in Rio de Janeiro, Brazil

Mello CX, Schubach A O, Oliveira RV, Silva FC, Pimentel MI, Lyra MR, E Vasconcellos EC, Madeira MF

Parasitol Res. 2011 May

American tegumentary leishmaniasis (ATL) is an infectious disease that presents a wide spectrum of clinical manifestations making parasitological tests important for its diagnosis. Direct examination, although considered of low sensitivity is still employed mainly in areas with poor laboratory infrastructure. The aim of this study was to standardize the method of collecting and reading the scraping procedure and to then compare sensitivity of this procedure on two sites of the lesion (outer edge-OE and inner edge-IE) and of the imprint against the reference method (isolation in culture) in a group of 110 patients treated at a Referral Center in Rio de Janeiro, Brazil. ATL diagnosis was confirmed in 40 patients (36.4%), 39 cases were caused by *L. braziliensis* and 1 by *L. amazonensis*. Imprint was positive in 28 patients and scraping in OE in 17 and in IE in 25 patients, resulting in sensitivity of 70%, 42.5%, and 62.5% respectively. When the

three direct examinations were combined, sensitivity value attained 77.5%. Aspects related to ease and quality of the collected material, pain intensity and frequency of bleeding in the scraping procedure were also broached and discussed in this study. The parameters of accuracy presented indicate that the direct methods can be safely used in ATL diagnosis, principally in IE scraping, as it is easy to produce and the examination is not costly, which allows the procedure to be repeated at different moments which, in turn, increases the possibility of finding the parasite. Despite that the direct methods are technically widespread, they are not standardized and the parameters of accuracy are unknown. If we consider the high incidence of leishmaniasis in low-income areas, the implantation of standardized and selective methods would provide advances in the diagnosis of leishmaniasis.

Text in English (article in press)

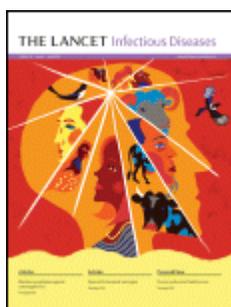


Endemic tegumentary leishmaniasis in Brazil: correlation between level of endemicity and number of cases of mucosal disease

Bedoya-Pacheco SJ, Araujo-Melo MH, Valete-Rosalino CM, Pimentel MI, Silva FC, Schubach AO, Marzochi MC
Am J Trop Med Hyg. 2011 Jun; 84 (6): 901-5

The purpose of this study was to establish a correlation between the endemic level of tegumentary leishmaniasis in different regions of Brazil during 2002-2009 and the number of cases of mucosal or mucocutaneous leishmaniasis. The proportion of mucosal leishmaniasis was inversely correlated with prevalence of infection. In areas with a lower infection prevalence, the proportion of mucosal leishmaniasis increased ($P < 0.05$). The hypothesis of an Amazonian origin and dissemination through human migration is considered. Our results show that in regions with lower prevalence and endemically younger, the proportion of cases that evolve to the mucosal form is higher than in regions with higher prevalence and endemically older.

Text in English



Visceral leishmaniasis: elimination with existing interventions

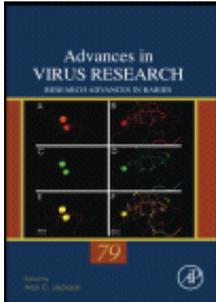
Matlashewski G, Arana B, Kroeger A, Battacharya S, Sundar S, Das P, Sinha PK, Rijal S, Mondal D, Zilberstein D, Alvar J
Lancet Infect Dis. 2011 Apr; 11 (4): 322-5

The world's burden of infectious diseases can be substantially reduced by more-effective use of existing interventions. Advances in case detection, diagnosis, and treatment strategies have made it possible to consider the elimination of visceral leishmaniasis in the Indian subcontinent. The priority must now be to effectively implement existing interventions at the community level by actively finding cases in endemic villages and treating them with single-dose liposomal amphotericin B at primary-health-care centres. Once the elimination target of one case per 10,000 population has been reached, combination therapies involving miltefosine and paromomycin can be introduced to ensure long-term availability of several drugs for visceral leishmaniasis and to protect against resistance.

Text in English

[http://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(10\)70320-0/fulltext#aff1](http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(10)70320-0/fulltext#aff1)

Rabia / Rabies



Evasive strategies in rabies virus infection

Lafon M

Adv Virus Res. 2011; 79: 33-53

Rabies virus (RABV) is a strictly neurotropic virus that slowly propagates in the nervous system (NS) of the infected host from the site of entry (usually due to a bite) up to the site of exit (salivary glands). Successful achievement of the virus cycle relies on the preservation of the neuronal network. Once RABV has entered the NS, its progression is not interrupted either by destruction of the infected neurons or by the immune response, which are major host mechanisms for combating viral infection. RABV has developed two main mechanisms to escape the host defenses: (1) its ability to kill protective migrating T cells and (2) its ability to sneak into the NS without triggering apoptosis of the infected neurons and preserving the integrity of neurites.

Text in English



Host and viral ecology determine bat rabies seasonality and maintenance

George DB, Webb CT, Farnsworth ML, O'Shea TJ, Bowen RA, Smith DL, Stanley TR, Ellison LE, Rupprecht CE

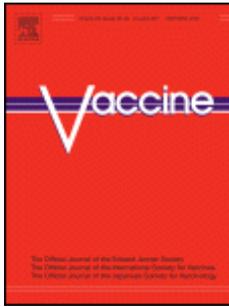
Proc Natl Acad Sci U S A. 2011 Jun

Rabies is an acute viral infection that is typically fatal. Most rabies modeling has focused on disease dynamics and control within terrestrial mammals (e.g., raccoons and foxes). As such, rabies in bats has been largely neglected until recently. Because bats have been implicated as natural reservoirs for several emerging zoonotic viruses, including SARS-like corona viruses, henipaviruses, and lyssaviruses, understanding how pathogens are maintained within a population becomes vital. Unfortunately, little is known about maintenance mechanisms for any pathogen in bat populations. We present a mathematical model parameterized with unique data from an extensive study of rabies in a Colorado population of big brown bats (*Eptesicus fuscus*) to elucidate general maintenance mechanisms. We propose that life history patterns of many species of temperate-zone bats, coupled with sufficiently long incubation periods, allows for rabies virus maintenance. Seasonal variability in bat mortality rates, specifically low mortality during hibernation, allows long-term bat population viability. Within viable bat populations, sufficiently long incubation periods allow enough infected individuals to enter hibernation and survive until the following year, and hence avoid an epizootic fadeout of rabies virus. We hypothesize that the slowing effects of hibernation on metabolic and viral activity maintains infected individuals and their pathogens until susceptibles from the annual birth pulse become infected and continue the cycle. This research provides a context to explore similar host ecology and viral dynamics that may explain seasonal patterns and maintenance of other bat-borne diseases.

Text in English

<http://anpron.eu/wp-content/uploads/2011/06/Host-and-viral-ecology-determine-bat-rabies-seasonality-and-maintenance.pdf>

Zoonosis / Zoonoses



Enhancing the role of veterinary vaccines reducing zoonotic diseases of humans: Linking systems biology with vaccine development

Adams LG, Khare S, Lawhon SD, Rossetti CA, Lewin HA, Lipton MS, Turse JE, Wylie DC, Bai Y, Drake KL
Vaccine. 2011 Jun

The aim of research on infectious diseases is their prevention, and brucellosis and salmonellosis as such are classic examples of worldwide zoonoses for application of a systems biology approach for enhanced rational vaccine development. When used optimally, vaccines prevent disease manifestations, reduce transmission of disease, decrease the need for pharmaceutical intervention, and improve the health and welfare of animals, as well as indirectly protecting against zoonotic diseases of people. Advances in the last decade or so using comprehensive systems biology approaches linking genomics, proteomics, bioinformatics, and biotechnology with immunology, pathogenesis and vaccine formulation and delivery are expected to enable enhanced approaches to vaccine development. The goal of this paper is to evaluate the role of computational systems biology analysis of host: pathogen interactions (the interactome) as a tool for enhanced rational design of vaccines. Systems biology is bringing a new, more robust approach to veterinary vaccine design based upon a deeper understanding of the host-pathogen interactions and its impact on the host's molecular network of the immune system. A computational systems biology method was utilized to create interactome models of the host responses to *Brucella melitensis* (BMEL), *Mycobacterium avium paratuberculosis* (MAP), *Salmonella enterica* Typhimurium (STM), and a *Salmonella* mutant (isogenic $\Delta sipA$, $sopABDE2$) and linked to the basis for rational development of vaccines for brucellosis and salmonellosis as reviewed by Adams et al. and Ficht et al. [1,2]. A bovine ligated ileal loop biological model was established to capture the host gene expression response at multiple time points post infection. New methods based on Dynamic Bayesian Network (DBN) machine learning were employed to conduct a comparative pathogenicity analysis of 219 signaling and metabolic pathways and 1620 gene ontology (GO) categories that defined the host's biosignatures to each infectious condition. Through this DBN computational approach, the method identified significantly perturbed pathways and GO category groups of genes that define the pathogenicity signatures of the infectious agent. Our preliminary results provide deeper understanding of the overall complexity of host innate immune response as well as the identification of host gene perturbations that defines a unique host temporal biosignature response to each pathogen. The application of advanced computational methods for developing interactome models based on DBNs has proven to be instrumental in elucidating novel host responses and improved functional biological insight into the host defensive mechanisms. Evaluating the unique differences in pathway and GO perturbations across pathogen conditions allowed the identification of plausible host-pathogen interaction mechanisms. Accordingly, a systems biology approach to study molecular pathway gene expression profiles of host cellular responses to microbial pathogens holds great promise as a methodology to identify, model and predict the overall dynamics of the host-pathogen interactome. Thus, we propose that such an approach has immediate application to the rational design of brucellosis and salmonellosis vaccines.

Text in English



Zoonoses num mundo globalizado: riscos & mitos

Martins P
Aveworld 2008; 35: 46-57

As doenças infecciosas de origem animal são conhecidas tecnicamente como zoonoses. Zoonoses emergentes são aquelas que aparecem pela primeira vez ou que, já tendo sido descritas anteriormente, apresentam novos padrões de incidência ou alcance geográfico. Um grande número de fatores antropogênicos – sociais, culturais, econômicos e ambientais – exercem um papel fundamental na criação de condições favoráveis para o surgimento destas enfermidades.

A fase de pré-pandemia de qualquer enfermidade zoonótica emergente ou re-emergente ainda é um momento ideal a ser utilizado para se organizar os sistemas de vigilância sanitária – humana e animal.

Text in Portuguese

http://www.aveworld.com.br/img/File/sanidade_ave35.pdf



Salud Pública Veterinaria

[Centro Panamericano de Fiebre Aftosa](#)



Veterinary Public Health

[Pan American Foot and Mouth Disease Center](#)

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<http://new.paho.org/panaftosa>

<http://bvs.panaftosa.org.br>

<http://bvs.panalimentos.org>

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