

# Rapport de veille n°117

## Risques biologiques Juillet-septembre 2022

**Objectifs** : veilles spécifiques sur la thématique du risque biologique : biotechnologies (nouveaux procédés), équipements de protection individuelle (fièvre hémorragique, Ebola), protection respiratoire (ajustement), zoonoses (pathologies émergentes), légionellose (cas professionnels), endotoxines (effets toxiques/multi-expositions).

+ suivi d'organismes français et internationaux (sélection d'actualités classées par thème).

*La validation des informations fournies (exactitude, fiabilité, pertinence par rapport aux principes de prévention, etc.) est du ressort des auteurs des articles signalés dans la veille. Les informations ne sont pas le reflet de la position de l'INRS.*

*Les liens mentionnés dans le bulletin donnent accès aux documents sous réserve d'un abonnement à la ressource.*

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## Veille risque biologique

- **Protection respiratoire : Ebola, fièvres hémorragiques**

Doshi RH, Hoff NA, Bratcher A, Mukadi P, Gadoth A, Nicholson BP, et al.

### **Risk Factors for Ebola Exposure in Health Care Workers in Boende, Tshuapa Province, Democratic Republic of the Congo.**

Journal of Infectious Diseases. 2022;226(4):608-15.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9441197/pdf/jiaa747.pdf>

*Background* Health care workers (HCW) are more likely to be exposed to Ebola virus (EBOV) during an outbreak compared to people in the general population due to close physical contact with patients and potential exposure to infectious fluids. However, not all will fall ill. Despite evidence of subclinical and paucisymptomatic Ebola virus disease (EVD), prevalence and associated risk factors remain unknown. *Methods* We conducted a serosurvey among HCW in Boende, Tshuapa Province, Democratic Republic of Congo. Human anti-EBOV glycoprotein IgG titers were measured using a commercially available ELISA kit. We assessed associations between anti-EBOV IgG seroreactivity, defined as  $\geq 2.5$  units/mL, and risk factors using univariable and multivariable logistic regression. Sensitivity analyses explored a more conservative cutoff,  $>5$  units/mL. *Results* Overall, 22.5% of HCWs were seroreactive for EBOV. In multivariable analyses, using any form of personal protective equipment when interacting with a confirmed, probable, or suspect EVD case was negatively associated with seroreactivity (adjusted odds ratio, 0.23; 95% confidence interval, .07-.73). *Discussion* Our results suggest high exposure to EBOV among HCWs and provide additional evidence for asymptomatic or minimally symptomatic EVD. Further studies should be conducted to determine the probability of onward transmission and if seroreactivity is associated with immunity.

GowthamNeppala, Subhashree R, Devi NS.

### **ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICE AMONG DENTAL HEALTH CARE PROFESSIONALS IN USING PERSONAL PROTECTION EQUIPMENT DURING HEALTH EMERGENCIES.**

Int J Early Child Spec Educ. 2022;14(02):5372-80.

<https://pesquisa.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/pt/covidwho-1939400>

*Introduction:* PPE helps health care professional from exposure by preventing occupational exposure from various highly contagious viruses like Ebola Virus, SARS (Severe acute Respiratory Syndrome), Novel coronavirus infection (COVID-19) and helps them to treat when working in a Dental operator or quarantine facility. PPE is used by healthcare professionals, supporting staff, laboratory staff, family members of patients, and situations where contact with blood, body fluids, secretions, or excretions is highly contagious and infectious diseases. PPE acts as a physical barrier between Microorganisms and Health care professionals and protects by preventing microorganisms from contamination of hands,

eyes, clothing, hair and shoes. **Materials and Methods:** A questionnaire-based survey consisting of 10 questions with multiple choices is framed using Google forms by (Google LLC). The questionnaire was divided into demographic data, knowledge-based and attitude-based. Participation in the study was voluntary, and identification information was not collected from the study subjects. Informed consent was obtained from the subjects for their willingness to participate in the study. **Results and Discussion:** This survey was done to assess the knowledge, attitude and practice regarding the use of PPE during emergencies. This survey enables the reader to better understand the precise and indispensable usage of PPE during health emergencies. Within the limitations of the study, it shows that knowledge concerning personal protective equipment (PPE) is moderate, compared to attitude and practice among respondents. It is recommended that CDE programmes, Hands-on courses, and webinar programs be conducted for dentists to increase their awareness and gain more knowledge about the usage of personal protective equipment.

Qureshi MO, Chughtai AA, Islam MS, Tuckerman J, Seale H.

### **Examining the discourse regarding the delivery of occupational infection prevention and control training to healthcare workers: a scoping review of pandemic plans of 23 countries.**

Bmj Open. 2022;12(8):14.

<https://bmjopen.bmj.com/content/bmjopen/12/8/e061850.full.pdf>

**Background** Over the years, countries reformed their pandemic plans but still healthcare systems were unprepared to handle the COVID-19 pandemic. Throughout the COVID-19 pandemic, healthcare workers (HCWs) raised issues around shortage of personal protective equipment (PPE), inadequate occupational infection prevention and control (IPC) training, lack of guidance regarding reuse/extended use of PPE and absence of HCWs. **Objective** The objective of this scoping review was to compare national and transnational pandemic plans and COVID-19 guidelines for the inclusion of recommendations regarding pandemic-specific occupational IPC training for HCWs, as well as strategies for managing the surge in PPE needs and staffing. **Inclusion criteria** From each of the six WHO defined world regions, four countries with the highest burden of COVID-19 cases (as of mid-2020) were selected and attempted to locate the relevant pandemic plans and COVID-19 guidelines. **Methods** Searches were undertaken of 1: National Guidelines Clearinghouse, 2: websites of international public healthcare agencies such as WHO, the European Centre for Disease Prevention and Control (ECDC) and, 3: in-country health departments/Ministry of Health/Department of Public Health, between June 2020 and July 2021. The data were summarised under six themes drawn from publicly available pandemic plans and COVID-19 (IPC) guidelines of WHO, ECDC and 23 countries. **Results** The WHO, ECDC and 14 countries reported pandemic-specific IPC training; however, only four discussed training HCWs on correct PPE use; six countries listed strategies to manage the surge in demand of HCWs, while only five discussed managing the shortage of PPE. None of the COVID-19 guidelines recommended training HCWs for correct reuse or extended use of PPE and only one country's guideline outlined mandatory HCWs attendance and delivery of training in a regional language. **Conclusion** Pandemic plans should be revised to include guiding principles regarding the delivery of pandemic specific IPC training. There is also a need to provide guidance on when countries should consider reuse and extended use of PPE. This discourse should also be reflected in disease-specific pandemic guidelines, like COVID-19 (IPC) guidelines. The aim of this review is to assist international health agencies in generating evidence-based guideline updates.

Sato S, Iijima S.

### **Evaluation of a Web-based learning system for skills in removing personal protective equipment for highly infectious diseases-A randomized controlled trial.**

Infection control and hospital epidemiology.6.

<https://www.cambridge.org/core/services/aop-cambridge-core/content/view/05ACF0B38DB981EDE877AEE2F1BC8A2B/S0899823X22002197a.pdf/div-class-title-evaluation-of-a-web-based-learning-system-for-skills-in-removing-personal-protective-equipment-for-highly-infectious-diseases-a-randomized-controlled-trial-div.pdf>

*Objective: Which educational method is best for 3-month retention of proper skills in removing personal protective equipment (PPE) in the setting of highly infectious diseases is unclear. We evaluated the effectiveness of a Web-based learning system after 3 months of use. Setting: One general hospital in Japan. Intervention: We conducted a randomized, nonblinded, parallel-group trial with 35 nurses using the substitution block method. At baseline, both groups received face-to-face training in putting on and removing PPE. The intervention group was given access to the Web-based learning system we developed using Modular Object-Oriented Dynamic Learning Environment (Moodle). After 3 months, we assessed both groups regarding knowledge and skills in removing PPE using a 34-point test, fluorescent markers, and video recordings. Results: Overall, 34 participants completed the trial: 16 in the intervention group and 18 in the control group. Postintervention knowledge test scores (1.3 vs -0.8;  $P = .013$ ; effect size  $r = .42$ ) and deviations from the required procedure (-5.4 vs 1.9;  $P = .001$ ; effect size  $r = .55$ ) were significantly better in the intervention group than in the control group. The number of contaminated sites (-0.5 vs 0.4;  $P = .128$ ; effect size  $r = .26$ ) and contaminated participants (-18.7% vs 11.1% decreased in the intervention group, and increased in the control group, although this was not significant ( $P = .242$ ; effect size  $\phi = .47$ ). Conclusions: This learning system was an effective educational method in maintaining and improving knowledge of proper PPE removal skills. The number of deviations from the required procedure decreased, and this reduction continued after 3 months.*

- **Protection respiratoire : ajustement**

Barakat-Johnson M, Stephenson J, Dempsey K, Innes L, Jain S, Leong T, et al.

**Fit testing and comfort evaluation of prophylactic dressing use for healthcare workers under N95/P2 respirators in one health service district in Australia.**

Journal of Hospital Infection. 2022;123:100-7.

<https://doi.org/10.1016/j.jhin.2022.02.016>

*Background: This study evaluated the use of prophylactic dressings (silicone foam, silicone tape, hydrocolloid) under N95/P2 respirators to determine which dressings fit successfully. Aim: The aim was to develop a health service protocol for one state in Australia. Methods: Data were collected during August and September 2021 as part of the Respiratory Protection Programme on 600 health workers using three types of prophylactic dressings. Five different types of respirators were used. Participant healthcare workers rated comfort on a four-point Likert scale. Results: Successful fit was achieved by 63.6% of the respirator-dressing combinations. The best-performing respirator-dressing combination was the Trident (R) respirator with dressing Mepilex (R) Lite silicone foam (90.2% pass rate). High pass rates were found in the Trident (R) respirator with Mepilex (R) Border Lite with SofSicure silicone tape (79.1%); the 3M (TM) 1860 respirator with Mepilex (R) Border Lite with SofSicure silicone tape (74%); and the BSN orange duckbill respirator with Mepilex (R) Lite silicone foam (69.8%). The poorest-performing combination was the BYD (TM) respirator with Mepilex (R) Border Lite with SofSicure silicone tape (25.9% pass rate). Uncorrected chi-squared tests for association revealed significant associations between dressing type and outcome ( $P=0.004$ ) and respirator type and outcome ( $P<0.001$ ).*

Most respondents (82%) found the dressing combination markedly comfortable. Conclusions: When using prophylactic dressings under N95/P2 respirators, it is necessary to perform a fit test. In this study Trident (R) respirators had the highest probability of successful fit, while BYD (TM) respirators had the lowest. Combining Trident (R) respirators with Mepilex (R) Lite dressing was optimal. Most participants reported greater comfort with the dressings under the respirators. (C) 2022 The Healthcare Infection Society. Published by Elsevier Ltd. All rights reserved.

Derr TH, James MA, Kuny CV, Patel DR, Kandel PP, Field C, et al.

### **Aerosolized Hydrogen Peroxide Decontamination of N95 Respirators, with Fit-Testing and Viral Inactivation, Demonstrates Feasibility for Reuse during the COVID-19 Pandemic.**

mSphere.17.

<https://doi.org/10.1128/msphere.00303-22>

The COVID-19 pandemic led to unprecedented pressure on health care and research facilities to provide personal protective equipment. The respiratory nature of the SARS-CoV2 pathogen makes respirator facepieces a critical protective measure to limit inhalation of this virus. In response to the demand for N95 respirators by health care workers during the COVID-19 pandemic, we evaluated decontamination of N95 respirators using an aerosolized hydrogen peroxide (aHP) system. This system is designed to dispense a consistent atomized spray of aerosolized, 7% hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) solution over a treatment cycle. Multiple N95 respirator models were subjected to 10 or more cycles of respirator decontamination, with a select number periodically assessed for qualitative and quantitative fit testing. In parallel, we assessed the ability of aHP treatment to inactivate multiple viruses absorbed onto respirators, including phi6 bacteriophage, herpes simplex virus 1 (HSV-1), coxsackievirus B3 (CVB3), and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). For pathogens transmitted via respiratory droplets and aerosols, it is critical to address respirator safety for reuse. This study provided experimental validation of an aHP treatment process that decontaminates the respirators while maintaining N95 function. External National Institute for Occupational Safety & Health (NIOSH) certification verified respirator structural integrity and filtration efficiency after 10 rounds of aHP treatment. Virus inactivation by aHP was comparable to the decontamination of commercial spore-based biological indicators. These data demonstrate that the aHP process is effective, with successful fit-testing of respirators after multiple aHP cycles, effective decontamination of multiple virus species, including SARS-CoV-2, successful decontamination of bacterial spores, and filtration efficiency maintained at or greater than 95%. While this study did not include extended or clinical use of N95 respirators between aHP cycles, these data provide proof of concept for aHP decontamination of N95 respirators before reuse in a crisis-capacity scenario. **IMPORTANCE** The COVID-19 pandemic led to unprecedented pressure on health care and research facilities to provide personal protective equipment. The respiratory nature of the SARS-CoV2 pathogen makes respirator facepieces a critical protective measure to limit inhalation of this virus. While respirator facepieces were designed for single use and disposal, the pandemic increased overall demand for N95 respirators, and corresponding manufacturing and supply chain limitations necessitated the safe reuse of respirators when necessary. In this study, we repurposed an aerosolized hydrogen peroxide (aHP) system that is regularly utilized to decontaminate materials in a biosafety level 3 (BSL3) facility, to develop a method for decontamination of N95 respirators. Results from viral inactivation, biological indicators, respirator fit testing, and filtration efficiency testing all indicated that the process was effective at rendering N95 respirators safe for reuse. This proof-of-concept study establishes baseline data for future testing of aHP in crisis-capacity respirator-reuse scenarios.

Hughes AM, Doos D, Ahmed RA, Pham TND, Barach P.



## **How Can Personal Protective Equipment Be Best Used and Reused: A Closer Look at Donning and Doffing Procedures.**

Disaster medicine and public health preparedness.8.

<https://www.cambridge.org/core/services/aop-cambridge-core/content/view/032718F09BC694760BD749BA2E4D26D4/S1935789322002099a.pdf/div-class-title-how-can-personal-protective-equipment-be-best-used-and-reused-a-closer-look-at-donning-and-doffing-procedures-div.pdf>

*Objective: The aim of this study was to examine safety-related contamination threats and risks to health-care workers (HCWs) due to the reuse of personal protective equipment (PPE) among emergency department (ED) personnel. Methods: We used a Participatory Design (PD) approach to conduct task analysis (TA) of PPE use and reuse. TA identified the steps, risks, and protective behaviors involved in PPE reuse. We used the Centers for Disease Control and Prevention (CDC) guidance for PPE donning and doffing specifying the recommended task order. Then, we convened subject matter experts (SMEs) with relevant backgrounds in Patient Safety, Human Factors and Emergency Medicine to iteratively identify and map the tasks, risks, and protective behaviors involved in the PPE use and reuse. Results: Two emerging threats were associated with behaviors in donning, doffing, and re-using PPE: (i) direct exposure to contaminant, and (ii) transmission/spread of contaminant. Protective behaviors included: hand hygiene, not touching the patient-facing surface of PPE, and ensuring a proper fit and closure of all PPE ties and materials. Conclusions: TA was helpful revealed that the procedure for donning and doffing of re-used PPE does not protect ED personnel from contaminant spread and risk of exposure, even with protective behaviors present (e.g., hand hygiene, respirator use, etc.). Future work should make more apparent the underlying risks associated with PPE use and reuse.*

Jain S, Dempsey K, Clezy K, Bradd P.

## **Implementation of a respiratory protection program within healthcare facilities during the COVID-19 pandemic- lessons learned.**

American Journal of Infection Control. 2022;50(9):1067-9.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9173819/pdf/main.pdf>

*The use of fit tested respirators in the workplace is required to protect health workers against airborne pathogens. The COVID-19 pandemic required rapid upscaling of fit testing which was achieved using the framework of a respiratory protection program. Implementing and sustaining such a program in the midst of a pandemic was challenging and required clear direction from a lead agency combined with stakeholder engagement. Crown Copyright (c) 2022 Published by Elsevier Inc. on behalf of Association for Professionals in Infection Control and Epidemiology, Inc. All rights reserved.*

Novak M, Gloor C, Wicki E, Herb D, Schibli A, Richner G.

## **Assessment of a novel, easy-to-implement, aerosolized H2O2 decontamination method for single-use filtering facepiece respirators in case of shortage.**

Journal of occupational and environmental hygiene.13.

<https://www.tandfonline.com/doi/full/10.1080/15459624.2022.2125519>

*The COVID-19 pandemic has affected the world and caused a supply shortage of personal protection equipment, especially filtering facepiece respirators (FFP). This has increased the risk of many*

healthcare workers contracting SARS-CoV-2. Various strategies have been assessed to tackle these supply issues. In critical shortage scenarios, reusing single-use-designed respirators may be required. Thus, an easily applicable and reliable FFP2 (or alike) respirator decontamination method, allowing safe re-use of FFP2 respirators by healthcare personnel, has been developed and is presented in this study. A potent and gentle aerosolized hydrogen peroxide (12% wt) method was applied over 4 hr to decontaminate various brands of FFP2 respirators within a small common room, followed by adequate aeration and storage overnight. The microbial efficacy was tested on unused respirator pieces using spores of *Geobacillus stearothermophilus*. Further, decontamination effectiveness was tested on used respirators after one 12-hr shift by swabbing before and after the decontamination. The effects of up to ten decontamination cycles on the respirators' functionality were evaluated using material properties, the structural integrity of the respirators, and fit tests with subjects. The suggested H<sub>2</sub>O<sub>2</sub> decontamination procedure was proven to be (a) sufficiently potent (no microbial recovery, total inactivation of biological indicators as well as spore inoculum on critical respirator surfaces), (b) gentle as no significant damage to the respirator structural integrity and acceptable fit factors were observed, and (c) safe as no H<sub>2</sub>O<sub>2</sub> residue were detected after the defined aeration and storage. Thus, this easy-to-implement and scalable method could overcome another severe respirator shortage, providing enough flexibility to draft safe, effective, and logistically simple crisis plans. However, as highlighted in this study, due to the wealth of design and material used in different models and brands of respirators, the decontamination process should be validated for each FFP respirator model before its field implementation.

Temmesfeld MJ, Gorzkowska-Sobas AA, Hedlund K, Oyen MO, Kanten L, Grant P, et al.

#### **Surgical helmets can be converted into efficient disinfectable powered air-purifying respirators.**

American Journal of Infection Control. 2022;50(6):624-30.

<https://doi.org/10.1016/j.ajic.2021.12.002>

*Background: Filtering facepiece respirators often fail to provide sufficient protection due to a poor fit. Powered air-purifying respirators (PAPRs) are not designed for healthcare personnel, and are challenging to disinfect. Surgical helmets (SH) are available in many United States hospitals but do not provide respiratory protection. Several modifications to SH have been suggested, but none are sufficiently compliant with safety and efficiency standards. The purpose of this investigation was the development of a filter adaptor, which converts SHs into efficient, safe, and disinfectable PAPRs. Methods: Four critical features were investigated close to regulatory requirements: total inward leakage of particles, CO<sub>2</sub> concentrations, intra-helmet differential pressure, and automated disinfection. Results: The average total inward leakage in the 2 independent tests were 0.005% and 0.01%. CO<sub>2</sub> concentrations were lower than in the original SH. The modification generates a positive differential pressure. The filter's performance was not compromised after 50 cycles in a sterilization machine. Discussion: The modified SH provides several hundred times better protection than FFP-3 masks. Conclusions: Surgical helmets can be modified into safe, efficient, and disinfectable PAPRs, suitable for HCP and the operating room in particular. They can play a role in the preparedness for upcoming events requiring efficient respiratory protection. (C) 2021 The Author(s). Published by Elsevier Inc. on behalf of Association for Professionals in Infection Control and Epidemiology, Inc.*

Weng CH, Kao CL, Chiu PW, Huang SP, Kuo YS, Lin YY, et al.

#### **A full-face mask for protection against respiratory infections.**

Biomed Eng Online. 2022;21(1):16.

<https://biomedical-engineering-online.biomedcentral.com/counter/pdf/10.1186/s12938-022-01027-1.pdf>

*Background* Aerosols and droplets are the transmission routes of many respiratory infectious diseases. The COVID-19 management guidance recommends against the use of nebulized inhalation therapy directly in the emergency room or in an ambulance to prevent possible viral transmission. The three-dimensional printing method was used to develop an aerosol inhalation treatment mask that can potentially prevent aerosol dispersion. We conducted this utility validation study to understand the practicability of this new nebulizer mask system. *Results* The fit test confirmed that the filter can efficiently remove small particles. The different locations of the mask had an excellent fit with a high pressure making a proper face seal usability. The full-face mask appeared to optimize filtration with pressure and is an example of materials that perform well for improvised respiratory protection using this design. The filtering effect test confirmed that the contamination of designated locations could be protected when using the mask with filters. As in the clinical safety test, a total of 18 participants (10 [55.6%] females; aged 33.1 +/- 0.6 years) were included in the final analysis. There were no significant changes in SPO<sub>2</sub>, EtCO<sub>2</sub>, HR, SBP, DBP, and RR at the beginning, 20th, 40th, or 60th minutes of the test (all  $p > .05$ ). The discomfort of wearing a mask increased slightly after time but remained within the tolerable range. The vision clarity score did not significantly change during the test. The mask also passed the breathability test. *Conclusion* The results of our study showed that this mask performed adequately in the fit test, the filtering test, and the clinical safety test. The application of a full-face mask with antiviral properties, together with the newly designed shape of a respirator that respects the natural curves of a human face, will facilitate the production of personal protective equipment with a highly efficient filtration system. *Methods* We conducted three independent tests in this validation study: (1) a fit test to calculate the particle number concentration and its association with potential leakage; (2) a filtering effect test to verify the mask's ability to contain aerosol spread; and (3) a clinical safety test to examine the clinical safety, comfortableness, and visual clarity of the mask.

- **Zoonoses : pathologies émergentes**

Bartlett H, Holmes MA, Petrovan SO, Williams DR, Wood JLN, Balmford A.

**Understanding the relative risks of zoonosis emergence under contrasting approaches to meeting livestock product demand.**

R Soc Open Sci. 2022;9(6):12.

<https://doi.org/10.1098/rsos.211573>

*It has been argued that intensive livestock farming increases the risk of pandemics of zoonotic origin because of long-distance livestock movements, high livestock densities, poor animal health and welfare, low disease resistance and low genetic diversity. However, data on many of these factors are limited, and analyses to date typically ignore how land use affects emerging infectious disease (EID) risks, and how these risks might vary across systems with different yields (production per unit area). Extensive, lower yielding practices typically involve larger livestock populations, poorer biosecurity, more workers and more area under farming, resulting in different, but not necessarily lower, EID risks than higher yielding systems producing the same amount of food. To move this discussion forward, we review the evidence for each of the factors that potentially link livestock production practices to EID risk. We explore how each factor might vary with yield and consider how overall risks might differ across a mix of production systems chosen to reflect in broad terms the current livestock sector at a global level and in hypothetical low- and high-yield systems matched by overall level of production. We*



*identify significant knowledge gaps for all potential risk factors and argue these shortfalls in understanding mean we cannot currently determine whether lower or higher yielding systems would better limit the risk of future pandemics.*

Berhane Y, Joseph T, Lung O, Embury-Hyatt C, Xu W, Cottrell P, et al.

**Isolation and Characterization of Novel Reassortant Influenza A(H10N7) Virus in a Harbor Seal, British Columbia, Canada.**

Emerging Infectious Disease journal. 2022;28(7):1480.

[https://wwwnc.cdc.gov/eid/article/28/7/21-2302\\_article](https://wwwnc.cdc.gov/eid/article/28/7/21-2302_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9239883/pdf/21-2302.pdf>

*We isolated a novel reassortant influenza A(H10N7) virus from a harbor seal in British Columbia, Canada, that died from bronchointerstitial pneumonia. The virus had unique genome constellations involving lineages from North America and Eurasia and polymerase basic 2 segment D701N mutation, associated with adaptation to mammals.*

Christofi E.

**Cystic Echinococcosis: An Impact Assessment of Prevention Programs in Endemic Developing Countries in Africa, Central Asia, and South America.**

J Zool Syst Evol Res. 2022;2022:28.

<https://downloads.hindawi.com/journals/jzs/2022/8412718.pdf>

*Background. Cystic echinococcosis (CE), caused by the tapeworm species, Echinococcus granulosus sensu stricto (G1), is one of many primary neglected zoonoses worldwide. Within endemic developing countries, CE has multiple effects on animal and human health and well-being. To address such effects, veterinary and human medical sector collaboration on prevention program delivery is essential. To begin preliminary evaluations of county specific prevention programs, a critically appraised topic (CAT) was conducted. It sought to answer: What impact do CE prevention programs have on human and animal disease prevalence, in populations living in endemic developing countries within Africa, Central Asia, and South America? Methodology. The aim was to assess the ability of prevention and control program outputs to produce measurable differences in health, social, and economic outcomes (e.g., improved access to medical services, positive behavioral change, or reduced treatment costs, respectively). Included articles were obtained using predefined inclusion/exclusion criteria from the four databases (CAB Abstracts and Global Health; the National Library of Medicine (PubMed); ScienceDirect; and WHO Institutional Repository of Information Sharing (IRIS)). The articles were appraised using three checklists: the Royal College of Veterinary Surgeons (RCVS), the Critical Appraisals Skills Programme (CASP), and the Joanna Briggs Institute checklists. Results. Ten articles were selected. Geographically, 20% of studies were conducted in South America, 30% in Africa, and 50% in Central Asia. For definitive hosts, dogs, CoproELISA antigen testing, before and after Praziquantel (PZQ) de-worming, was a primary focus. For humans, who are intermediate hosts (IH), disease surveillance methods, namely ultrasound (US), were commonly assessed. Whilst for sheep, also acting as IH, disease prevention methods, such as the EG95 livestock vaccine and de-worming farm dogs, were evaluated. Common to all studies were issues of program sustainability, in terms of regular human US screening, dog de-worming, and annual sheep vaccination. This was attributed to transient and remote human or animal populations; limited access to adequate roads or hospitals; few skilled health workers or veterinarians; an over-reliance on communities to administer preventatives; and limited resources.*

*Conclusion. Despite variations in result validity and collection periods, useful comparisons of CE endemic countries produced key research and program recommendations. Future research recommendations included testing the significance of multiple program outcomes in relation to prevalence (e.g., the social outcome: behavioral change), further research on the impact of livestock vaccinations, and the CE transmission role of waterways and sanitation. Program recommendations included calculating and distinguishing between stray versus owned dog populations; formal representation of internal and external stakeholder interests through institutional organization; establishing sustainable guidelines around the frequency of PZQ and vaccination administration; improved veterinary-human medical training and resource sharing; and combined prevention methods and multiple canine disease management.*

Filaire F, Lebre L, Foret-Lucas C, Vergne T, Daniel P, Lelièvre A, et al.

#### **Highly Pathogenic Avian Influenza A(H5N8) Clade 2.3.4.4b Virus in Dust Samples from Poultry Farms, France, 2021.**

Emerging Infectious Disease journal. 2022;28(7):1446.

[https://wwwnc.cdc.gov/eid/article/28/7/21-2247\\_article](https://wwwnc.cdc.gov/eid/article/28/7/21-2247_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9239875/pdf/21-2247.pdf>

*Avian influenza A(H5N8) virus has caused major epizootics in Europe since 2016. We conducted virologic analysis of aerosol and dust collected on poultry farms in France during 2020–2021. Our results suggest dust contributes to viral dispersal, even early in an outbreak, and could be a valuable surveillance tool.*

Giovanetti M, Pereira LA, Santiago G, Fonseca V, Mendoza MPG, de Oliveira C, et al.

#### **Emergence of Dengue Virus Serotype 2 Cosmopolitan Genotype, Brazil.**

Emerging Infectious Disease journal. 2022;28(8):1725.

[https://wwwnc.cdc.gov/eid/article/28/8/22-0550\\_article](https://wwwnc.cdc.gov/eid/article/28/8/22-0550_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9328905/pdf/22-0550.pdf>

*We used nanopore sequencing and phylogenetic analyses to identify a cosmopolitan genotype of dengue virus serotype 2 that was isolated from a 56-year-old male patient from the state of Goiás in Brazil. The emergence of a cosmopolitan genotype in Brazil will require risk assessment and surveillance to reduce epidemic potential.*

Gofton AW, Blasdel KR, Taylor C, Banks PB, Michie M, Roy-Dufresne E, et al.

#### **Metatranscriptomic profiling reveals diverse tick-borne bacteria, protozoans and viruses in ticks and wildlife from Australia.**

Transboundary and emerging diseases. 2022;69(5):E2389-E407.

<https://doi.org/10.1111/tbed.14581>

*Tick-borne zoonoses are emerging globally due to changes in climate and land use. While the zoonotic threats associated with ticks are well studied elsewhere, in Australia, the diversity of potentially zoonotic agents carried by ticks and their significance to human and animal health is not sufficiently understood. To this end, we used untargeted metatranscriptomics to audit the prokaryotic, eukaryotic*

and viral biomes of questing ticks and wildlife blood samples from two urban and rural sites in New South Wales, Australia. *Ixodes holocyclus* and *Haemaphysalis bancrofti* were the main tick species collected, and blood samples from *Rattus rattus*, *Rattus fuscipes*, *Perameles nasuta* and *Trichosurus vulpecula* were also collected and screened for tick-borne microorganisms using metatranscriptomics followed by conventional targeted PCR to identify important microbial taxa to the species level. Our analyses identified 32 unique tick-borne taxa, including 10 novel putative species. Overall, a wide range of tick-borne microorganisms were found in questing ticks including haemoprotozoa such as *Babesia*, *Theileria*, *Hepatozoon* and *Trypanosoma* spp., bacteria such as *Borrelia*, *Rickettsia*, *Ehrlichia*, *Neoehrlichia* and *Anaplasma* spp., and numerous viral taxa including Reoviridae (including two coltivirus) and a novel Flaviviridae-like jingmenvirus. Of note, a novel hard tick-borne relapsing fever *Borrelia* sp. was identified in questing *H. bancrofti* ticks which is closely related to, but distinct from, cervid-associated *Borrelia* spp. found throughout Asia. Notably, all tick-borne microorganisms were phylogenetically unique compared to their relatives found outside Australia, and no foreign tick-borne human pathogens such as *Borrelia burgdorferi* s.l. or *Babesia microti* were found. This work adds to the growing literature demonstrating that Australian ticks harbour a unique and endemic microbial fauna, including potentially zoonotic agents which should be further studied to determine their relative risk to human and animal health.

Gu M, Chen K, Ge Z, Jiao J, Cai T, Liu S, et al.

#### **Zoonotic Threat of G4 Genotype Eurasian Avian-Like Swine Influenza A(H1N1) Viruses, China, 2020.**

Emerging Infectious Disease journal. 2022;28(8):1664.

[https://wwwnc.cdc.gov/eid/article/28/8/21-2530\\_article](https://wwwnc.cdc.gov/eid/article/28/8/21-2530_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9328894/pdf/21-2530.pdf>

*We investigated genetic and biologic characteristics of 2 Eurasian avian-like H1N1 swine influenza viruses from pigs in China that belong to the predominant G4 genotype. One swine isolate exhibited strikingly great homology to contemporaneous human Eurasian avian-like H1N1 isolates, preferential binding to the human-type receptor, and vigorous replication in mice without adaptation.*

Kim Y-C, Jeong B-H.

#### **Creutzfeldt-Jakob Disease Incidence, South Korea, 2001–2019.**

Emerging Infectious Disease journal. 2022;28(9):1863.

[https://wwwnc.cdc.gov/eid/article/28/9/21-2050\\_article](https://wwwnc.cdc.gov/eid/article/28/9/21-2050_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9423913/pdf/21-2050.pdf>

*We found increasing trends of Creutzfeldt-Jakob disease (CJD) cases and annual incidence in South Korea during 2001–2019. We noted relatively low (5.7%) distribution of familial CJD. An unusually high percentage (≈1%) of patients were in the 30–39 age group, which should prompt a preemptive CJD control system.*

Kuroda M, Usui T, Shibata C, Nishigaki H, Yamaguchi T.

#### **Possible bidirectional human-swine and subsequent human-human transmission of influenza virus A(H1N1)/2009 in Japan.**

Zoonoses and public health. 2022;69(6):721-8.

<https://doi.org/10.1111/zph.12960>

*In 2019, sows at a swine farm in Japan showed influenza-like illness (ILI) shortly after contact with an employee that exhibited ILI. Subsequently, a veterinarian became sick shortly after examining the sows and was diagnosed with influenza A virus (IAV) infection. Then, her family also contracted the infection. Subsequently, Pandemic A(H1N1)2009 viruses were isolated from all samples obtained from the sows, veterinarian and her family. Whole-genome analysis of the isolates confirmed that the viruses belonged to the same lineage (6B.1A) and the genome sequences obtained from all of the isolates were almost identical to each other. Furthermore, an epidemiological survey revealed no contact between veterinarians or their families and influenza patients prior to the onset of illness. These results strongly indicated a case of bidirectional infection between humans and sows. At the same time, we found a few unique mutations in the IAV genomes corresponding to the host species. The mutations that occurred in the virus after it was transferred from the farm worker to the sows were not observed in the humans infected from the sows, probably as a result of the mutations reverting to the original nucleotides. These results demonstrate that the bidirectional transmission of IAV is a potential risk for the next pandemic outbreak due to the emergence of new mutant strains.*

Lerch A, Ten Bosch QA, Jackson ML, Bettis AA, Bernuzzi M, Murphy GAV, et al.

### **Projecting vaccine demand and impact for emerging zoonotic pathogens.**

BMC Med. 2022;20(1):18.

<https://bmcmmedicine.biomedcentral.com/counter/pdf/10.1186/s12916-022-02405-1.pdf>

*Background Despite large outbreaks in humans seeming improbable for a number of zoonotic pathogens, several pose a concern due to their epidemiological characteristics and evolutionary potential. To enable effective responses to these pathogens in the event that they undergo future emergence, the Coalition for Epidemic Preparedness Innovations is advancing the development of vaccines for several pathogens prioritized by the World Health Organization. A major challenge in this pursuit is anticipating demand for a vaccine stockpile to support outbreak response. Methods We developed a modeling framework for outbreak response for emerging zoonoses under three reactive vaccination strategies to assess sustainable vaccine manufacturing needs, vaccine stockpile requirements, and the potential impact of the outbreak response. This framework incorporates geographically variable zoonotic spillover rates, human-to-human transmission, and the implementation of reactive vaccination campaigns in response to disease outbreaks. As proof of concept, we applied the framework to four priority pathogens: Lassa virus, Nipah virus, MERS coronavirus, and Rift Valley virus. Results Annual vaccine regimen requirements for a population-wide strategy ranged from > 670,000 (95% prediction interval 0-3,630,000) regimens for Lassa virus to 1,190,000 (95% PrI 0-8,480,000) regimens for Rift Valley fever virus, while the regimens required for ring vaccination or targeting healthcare workers (HCWs) were several orders of magnitude lower (between 1/25 and 1/700) than those required by a population-wide strategy. For each pathogen and vaccination strategy, reactive vaccination typically prevented fewer than 10% of cases, because of their presently low R-0 values. Targeting HCWs had a higher per-regimen impact than population-wide vaccination. Conclusions Our framework provides a flexible methodology for estimating vaccine stockpile needs and the geographic distribution of demand under a range of outbreak response scenarios. Uncertainties in our model estimates highlight several knowledge gaps that need to be addressed to target vulnerable populations more accurately. These include surveillance gaps that mask the true geographic distribution of each pathogen, details of key routes of spillover from animal reservoirs to humans, and the role of human-to-human transmission outside of healthcare settings. In addition, our estimates are based on the current epidemiology of each pathogen, but pathogen evolution could alter vaccine stockpile requirements.*

Lopes P, Gomes J, Cunha MV.

### **Knowledge, attitudes, and practices of municipal veterinary practitioners towards echinococcosis.**

Vet Parasitol Reg, Stud Rep. 2022;34:13.

<https://doi.org/10.1016/j.vprsr.2022.100759>

*Cystic echinococcosis (CE) and alveolar echinococcosis (AE) are among the most relevant zoonoses in Europe. According to the European Food Safety Authority (EFSA), Echinococcus granulosus sensu lato causing CE is the most significant foodborne parasite in South-Western Europe, followed by Echinococcus multilocularis, the etio-logical agent of AE. Among the challenges and opportunities highlighted in the literature to combat these dis-eases are the need to evaluate and increase awareness of stakeholders. In Portugal, Municipal Veterinary Practitioners (MVP) are the animal health authority at the municipality level, playing a crucial role in diagnosis, prevention and control of infectious diseases in animals, helping to mitigate transmission to humans. However, their knowledge, attitudes, and practices (KAP) towards CE, as well as awareness of AE expansion across Europe, remain overlooked. In this work, a cross-sectional study was conducted for the first time in Portugal to bridge knowledge gaps concerning CE and AE, using an online self-administered questionnaire collecting information on the municipal kennel, KAP towards CE, and understanding of AE epidemiology. Eighty-three MVP from mainland and islands completed the questionnaire, with highest representability from the central-northern region. MVP had, on average, a medium to high level of knowledge of CE but acquaintance with AE was insufficient, although echinococcosis was frequently mentioned as target of health education sessions (77.0%). A high rate (60%) of reported entries into municipal kennels of stray dogs originating from countries with AE endemic areas was registered, suggesting that the presence of these potentially AE-infected stray dogs pose public health risks. Most kennels did not perform routine coprological analysis or faecal matter disinfection after dog internal deworming. The lack of proper training and well-conceived written plans of infection control and prevention were evidenced in several kennels. Altogether, our findings highlight the need to update knowledge and practice of MVP under the One Health approach, through reinforced education, training and communication involving all stakeholders.*

Madera S, Kistler A, Ranaivoson HC, Ah Yong V, Andrianiana A, Andry S, et al.

### **Discovery and Genomic Characterization of a Novel Henipavirus, Angavokely Virus, from Fruit Bats in Madagascar.**

Journal of virology. 2022;96(18):13.

<https://doi.org/10.1128/jvi.00921-22>

*Henipaviruses include highly pathogenic emerging zoonotic viruses, derived from bat, rodent, and shrew reservoirs. Bat-borne Hendra (HeV) and Nipah (NiV) are the most well-known henipaviruses, for which no effective antivirals or vaccines for humans have been described. The genus Henipavirus (family Paramyxoviridae) currently comprises seven viruses, four of which have demonstrated prior evidence of zoonotic capacity. These include the biosafety level 4 agents Hendra (HeV) and Nipah (NiV) viruses, which circulate naturally in pteropodid fruit bats. Here, we describe and characterize Angavokely virus (AngV), a divergent henipavirus identified in urine samples from wild, Madagascar fruit bats. We report the nearly complete 16,740-nucleotide genome of AngV, which encodes the six major henipavirus structural proteins (nucleocapsid, phosphoprotein, matrix, fusion, glycoprotein, and L polymerase). Within the phosphoprotein (P) gene, we identify an alternative start codon encoding the AngV C protein and a putative mRNA editing site where the insertion of one or two guanine residues encodes, respectively, additional V and W proteins. In other paramyxovirus systems, C, V, and W are accessory*



proteins involved in antagonism of host immune responses during infection. Phylogenetic analysis suggests that AngV is ancestral to all four previously described bat henipaviruses-HeV, NiV, Cedar virus (CedV), and Ghanaian bat virus (GhV)-but evolved more recently than rodent- and shrew-derived henipaviruses, Mojiang (MojV), Gamak (GAKV), and Daeryong (DARV) viruses. Predictive structure-based alignments suggest that AngV is unlikely to bind ephrin receptors, which mediate cell entry for all other known bat henipaviruses. Identification of the AngV receptor is needed to clarify the virus's potential host range. The presence of V and W proteins in the AngV genome suggest that the virus could be pathogenic following zoonotic spillover. **IMPORTANCE** Henipaviruses include highly pathogenic emerging zoonotic viruses, derived from bat, rodent, and shrew reservoirs. Bat-borne Hendra (HeV) and Nipah (NiV) are the most well-known henipaviruses, for which no effective antivirals or vaccines for humans have been described. Here, we report the discovery and characterization of a novel henipavirus, Angavokely virus (AngV), isolated from wild fruit bats in Madagascar. Genomic characterization of AngV reveals all major features associated with pathogenicity in other henipaviruses, suggesting that AngV could be pathogenic following spillover to human hosts. Our work suggests that AngV is an ancestral bat henipavirus that likely uses viral entry pathways distinct from those previously described for HeV and NiV. In Madagascar, bats are consumed as a source of human food, presenting opportunities for cross-species transmission. Characterization of novel henipaviruses and documentation of their pathogenic and zoonotic potential are essential to predicting and preventing the emergence of future zoonoses that cause pandemics.

Martin G, Erinjery JJ, Ediriweera D, de Silva HJ, Laloo DG, Iwamura T, et al.

**A mechanistic model of snakebite as a zoonosis: Envenoming incidence is driven by snake ecology, socioeconomics and its impacts on snakes.**

PLoS neglected tropical diseases. 2022;16(5):20.

<https://journals.plos.org/plosntds/article/file?id=10.1371/journal.pntd.0009867&type=printable>

Snakebite is the only WHO-listed, not infectious neglected tropical disease (NTD), although its eco-epidemiology is similar to that of zoonotic infections: envenoming occurs after a vertebrate host contacts a human. Accordingly, snakebite risk represents the interaction between snake and human factors, but their quantification has been limited by data availability. Models of infectious disease transmission are instrumental for the mitigation of NTDs and zoonoses. Here, we represented snake-human interactions with disease transmission models to approximate geospatial estimates of snakebite incidence in Sri Lanka, a global hotspot. Snakebites and envenomings are described by the product of snake and human abundance, mirroring directly transmitted zoonoses. We found that human-snake contact rates vary according to land cover (surrogate of occupation and socioeconomic status), the impacts of humans and climate on snake abundance, and by snake species. Our findings show that modelling snakebite as zoonosis provides a mechanistic eco-epidemiological basis to understand snakebites, and the possible implications of global environmental and demographic change for the burden of snakebite. **Author summary** Snakebite envenoming occurs after contact between two vertebrates, which makes it similar to some transmissible diseases. Based on such similarity, we used estimates of snakebite incidence, snake abundance and biology, and surrogates of human occupational risks to derive a mathematical expression that represents snakebite envenoming as human-snake contacts. Our model explained risk variability very well. We found that snake and human abundance explain incidence estimates and that agriculture-linked occupations tend to have more frequent contacts with snakes; and that snake abundance decreases with increasing human population. Because snake abundance estimates and contact rates are based on climate or land cover, we identify a pathway for land use change, global warming and population growth to affect the epidemiology of snakebites.

McKee C, Islam A, Rahman MZ, Khan SU, Rahman M, Satter S, et al.

### **Nipah Virus Detection at Bat Roosts after Spillover Events, Bangladesh, 2012–2019.**

Emerging Infectious Disease journal. 2022;28(7):1384.

[https://wwwnc.cdc.gov/eid/article/28/7/21-2614\\_article](https://wwwnc.cdc.gov/eid/article/28/7/21-2614_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9239894/pdf/21-2614.pdf>

*Knowledge of the dynamics and genetic diversity of Nipah virus circulating in bats and at the human-animal interface is limited by current sampling efforts, which produce few detections of viral RNA. We report a series of investigations at Pteropus medius bat roosts identified near the locations of human Nipah cases in Bangladesh during 2012–2019. Pooled bat urine was collected from 23 roosts; 7 roosts (30%) had >1 sample in which Nipah RNA was detected from the first visit. In subsequent visits to these 7 roosts, RNA was detected in bat urine up to 52 days after the presumed exposure of the human case-patient, although the probability of detection declined rapidly with time. These results suggest that rapidly deployed investigations of Nipah virus shedding from bat roosts near human cases could increase the success of viral sequencing compared with background surveillance and could enhance understanding of Nipah virus ecology and evolution.*

Mia MM, Hasan M, Pory FS.

### **Occupational exposure to livestock and risk of tuberculosis and brucellosis: A systematic review and meta-analysis.**

One Health. 2022;15:15.

<https://doi.org/10.1016/j.onehlt.2022.100432>

*Occupational diseases are caused by zoonotic pathogens, which spread to humans through various types and intensities of human-livestock contact at work. In the present era, human brucellosis and tuberculosis remain the predominant occupational diseases throughout the world. However, the actual percentage of reported cases that are acquired from various livestock-related occupational groups is not well known. Therefore, we carried out a systematic review and meta-analysis of previous scatter studies mentioned the occurrence of human brucellosis and tuberculosis. From 2000 to 2021, a computer search of PubMed, Science Direct, Google Scholar, BioMed and Scopus was conducted and finally we found 71 studies (brucellosis = 54, tuberculosis = 17), which were included in this meta-analysis to calculate the aggregate prevalence using the random effects model. Moreover, I<sup>2</sup> statistic, Cochran's Q statistic heterogeneity and subgroup analysis were also performed. The analysis of the data showed that among the various livestock-related occupational groups, the global pooled prevalence of tuberculosis was 19% (95% CI: 09-30), which was higher than brucellosis 14% (95% CI: 10-18). In addition, North America and Africa were reported as the continents of the maximum prevalence rate of 25% (95% CI: 08-58) and 16% (95% CI: 11-21) for tuberculosis and brucellosis than the other continents. Afterwards, the individual's occupation was broken down into the following four groups: farm worker, livestock owner, livestock connected person and abattoir worker. The significant association was found between slaughterhouse workers and brucellosis prevalence (20%; 95% CI: 13-27) as well as the livestock owners and tuberculosis prevalence (28%; 95% CI: 06-50). Likely, a maximum prevalence of tuberculosis was documented among workers ages 20 to 49 years, and of brucellosis among those between the ages of 20 and 25, which suggests that age also had a role. Therefore, it is concluded that the livestock-related occupational groups were found to be at an increased risk of*

adverse zoonotic disease outcomes. Future studies could be focused on specific occupational group that are in high risk of disease transmission to minimize the effect of these two hazardous pathogens.

Mougin J, Joyce A.

# **Fish disease prevention via microbial dysbiosis-associated biomarkers in aquaculture.**

Rev Aquac.16.

<https://onlinelibrary.wiley.com/doi/full/10.1111/raq.12745>

*Infectious diseases are a major burden in aquaculture, and represent a significant yield-limiting factor in production that is costly to manage as well as a potential vector for zoonoses. Over the past decades, a range of new diseases have emerged, alongside increased levels of antibiotic resistance, thus heightening the need for improved disease management methods supportive of the One Health concept. Simultaneously, recent advances in Next-Generation Sequencing have increasingly elucidated the role of the microbiome in regulating metabolism, immune function and resilience. Such work has included a plethora of studies on the potential for the management of pathogens through manipulation of the microbiome, as well as related studies of the mechanisms behind host resilience. There is now an increasing robust body of evidence recognizing the importance of a holistic framework in disease aetiology between the host, its environment and colonizing microorganisms, with perturbation increasingly associated with specific dysbiotic states and disease outcomes. Elucidating disease aetiology is a preliminary step towards the development of new prevention methods, with the main goal being early identification of dysbiosis-associated biomarkers prior to any physical signs of the disease. While acknowledging the challenges associated with using key microbial taxa as biomarkers, we review recent advances in the characterization of dysbiosis and associated microbiome signatures in the context of disease development, with an emphasis on early biomarkers for aquaculture disease prevention. Several promising strategies are suggested, including the use of functional genes or metabolic pathways that are conserved between microbial taxa as a potential proxy for homeostasis.*

Okuya K, Mine J, Tokorozaki K, Kojima I, Esaki M, Miyazawa K, et al.

# **Genetically Diverse Highly Pathogenic Avian Influenza A(H5N1/H5N8) Viruses among Wild Waterfowl and Domestic Poultry, Japan, 2021.**

Emerging Infectious Disease journal. 2022;28(7):1451.

[https://wwwnc.cdc.gov/eid/article/28/7/21-2586\\_article](https://wwwnc.cdc.gov/eid/article/28/7/21-2586_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9239871/pdf/21-2586.pdf>

*Genetic analyses of highly pathogenic avian influenza H5 subtype viruses isolated from the Izumi Plain, Japan, revealed cocirculation of 2 genetic groups of clade 2.3.4.4b viruses among migratory waterfowl. Our findings demonstrate that both continuous surveillance and timely information sharing of avian influenza viruses are valuable for rapid risk assessment.*

Prejit P, Hitziger M, Asha K.

# **Effectiveness of One Health approach for control of Kyasanur Forest Disease in Wayanad, Kerala, India.**

J Vector Borne Dis. 2022;59(1):70-8.

<https://www.jvbd.org/article.asp?issn=0972-9062;year=2022;volume=59;issue=1;spage=70;epage=78;aulast=Prejit>,

*Background & objectives:* Kyasanur Forest Disease (KFD) is a vector borne haemorrhagic fever that is endemic in the Wayanad region located in Northern part of Kerala, India. The region is managing the outbreak well ever since the major epidemic of 2015. This was because of the successful implementation of One Health (OH) initiative concentrating on multisectoral collaboration between regional institutions involved in public, animal and environmental health domains. The article presents how OH was implemented for the first time in the district in the year 2015 and evaluates the degree OH-ness of the Initiative. *Methods:* The OH approach involved trans-disciplinary stakeholder meetings and reviews, outbreak management and integrated surveillance targeting ticks, monkeys and humans. The degree of OH-ness used for addressing KFD during the year 2015 was evaluated following the protocol developed by the Network for Evaluation of One Health (NEOH). In detail, we (i) described the OH initiative and its system (Aim, stakeholders, action strategy) and (ii) scored different aspects of this initiative (i.e., OH-thinking, -planning, -working, -sharing, -learning, -organization), with values from 0 (=no OH approach) to 1 (=perfect OH approach). *Results:* We obtained a median score for each aspect evaluated. We reached high scores for OH systemic organization (1.0), OH thinking (0.83) and OH working (0.83). Lower scores were attributed to OH planning (0.58), OH sharing (0.50) and OH learning (0.33). The OH index was 0.36 and OH ratio was 0.95, indicating a balance between the OH operations and supporting infrastructures. *Interpretation & conclusion:* With this we could high-light some critical issues related to communication on sharing data as well as learning gaps for consideration to control future outbreaks. The strengths and weaknesses detected may be used to refine the initiative, aiming to provide a basis for the development of shared recommendations in a more OH-oriented perspective. This model of evaluation criteria will serve to create a database of OH success stories in India that will in turn help to institutionalize the approach at ministerial level. Future India is moving towards implementing a One Health, hence, this study data will provide an ideal opportunity for all sectors to control any vector borne diseases.

Pulit-Penaloza J, Belser J, Brock N, Thakur PB, Tumpey T, Maines T.

### **Pathogenesis and Transmissibility of North American Highly Pathogenic Avian Influenza A(H5N1) Virus in Ferrets.**

Emerging Infectious Disease journal. 2022;28(9):1913.

[https://wwwnc.cdc.gov/eid/article/28/9/22-0879\\_article](https://wwwnc.cdc.gov/eid/article/28/9/22-0879_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9423912/pdf/22-0879.pdf>

*Highly pathogenic avian influenza A(H5N1) viruses have spread rapidly throughout North American flyways in recent months, affecting wild birds in over 40 states. We evaluated the pathogenicity and transmissibility of a representative virus using a ferret model and examined replication kinetics of this virus in human respiratory tract cells.*

Queirós J, Barros S, Sánchez-Cano A, Henriques AM, Fagulha T, dos Santos FA, et al.

### **Bagaza Virus in Wild Birds, Portugal, 2021.**

Emerging Infectious Disease journal. 2022;28(7):1504.

[https://wwwnc.cdc.gov/eid/article/28/7/21-2408\\_article](https://wwwnc.cdc.gov/eid/article/28/7/21-2408_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9239872/pdf/21-2408.pdf>

*Bagaza virus emerged in Spain in 2010 and was not reported in other countries in Europe until 2021, when the virus was detected by molecular methods in a corn bunting and several red-legged partridges in Portugal. Sequencing revealed high similarity between the 2021 strains from Portugal and the 2010 strains from Spain.*

Rabalski L, Kosinski M, Mazur-Panasiuk N, Szewczyk B, Bienkowska-Szewczyk K, Kant R, et al.

#### **Zoonotic spill-over of SARS-CoV-2: mink-adapted virus in humans.**

Clin Microbiol Infect. 2022;28(3):4.

<https://doi.org/10.1016/j.cmi.2021.12.001>

*Objectives: This work aimed to analyse possible zoonotic spill-over of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). We report the spill-over of mink-adapted SARS-CoV-2 from farmed mink to humans after adaptation that lasted at least 3 months. Methods: Next-generation sequencing and a bioinformatic approach were applied to analyse the data. Results: In an isolate obtained from an asymptomatic patient testing positive for SARS-CoV-2, we found four distinguishing mutations in the S gene that gave rise to the mink-adapted variant (G75V, M177T, Y453F, and C1247F) and others. Conclusions: Zoonotic spill-over of SARS-CoV-2 can occur from mink to human. (C) 2021 European Society of Clinical Microbiology and Infectious Diseases. Published by Elsevier Ltd. All rights reserved.*

Sears W, Cardenas J, Kubofcik J, Nutman T, Cooper P.

#### **Zoonotic Ancylostoma ceylanicum Hookworm Infections, Ecuador.**

Emerging Infectious Disease journal. 2022;28(9):1867.

[https://wwwnc.cdc.gov/eid/article/28/9/22-0248\\_article](https://wwwnc.cdc.gov/eid/article/28/9/22-0248_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9423896/pdf/22-0248.pdf>

*Ancylostoma ceylanicum hookworms are zoonotic parasites that can infect humans. To detect autochthonous transmission, we analyzed human fecal samples collected in 2000. Multiparallel quantitative PCR detected infection in persons who had never traveled outside Ecuador. These data indicate human transmission of A. ceylanicum in the Americas, although endemicity remains unknown.*

See KC.

#### **Vaccination for Monkeypox Virus Infection in Humans: A Review of Key Considerations.**

Vaccines. 2022;10(8):12.

[https://mdpi-res.com/d\\_attachment/vaccines/vaccines-10-01342/article\\_deploy/vaccines-10-01342.pdf?version=1660814762](https://mdpi-res.com/d_attachment/vaccines/vaccines-10-01342/article_deploy/vaccines-10-01342.pdf?version=1660814762)

*Monkeypox virus infection in humans (MVIH) is currently an evolving public health concern given that >3000 MVIH cases have been reported in >50 countries globally, and the World Health Organization declared monkeypox a global health emergency on 23 July 2022. Adults ( $\geq 16$  years old) usually have mild disease in contemporary studies, with a pooled case fatality rate of 0.03% (1/2941 cases). In comparison, poorer outcomes have been reported in children <16 years old (pooled case fatality rate 19% (4/21 cases)), immunocompromised patients, and pregnant women, with high rates of fetal demise in this group. Monkeypox-specific treatments include oral or intravenous tecovirimat,*



*intravenous or topical cidofovir, oral brincidofovir, and vaccinia immunoglobulin, but the overall risk-benefit balance of monkeypox-specific treatment is unclear. Two effective vaccines exist for the prevention of MVIH: modified vaccinia Ankara and ACAM2000. Most probably, vaccination will be a key strategy for mitigating MVIH given the current rapid global spread of monkeypox, the existence of efficacious vaccines, and the uncertain risk-benefit profile of current antivirals. Priority groups for vaccination should include healthcare workers at high risk for occupational exposure, immunocompromised patients, and children. Vaccination strategies include pre-exposure vaccination, post-exposure prophylaxis, and ring vaccination of close contacts.*

Sgroi G, Iatta R, Lovreglio P, Stufano A, Laidoudi Y, Mendoza-Roldan JA, et al.

#### **Detection of Endosymbiont *Candidatus* Midichloria mitochondrii and Tickborne Pathogens in Humans Exposed to Tick Bites, Italy.**

Emerging Infectious Disease journal. 2022;28(9):1824.

[https://wwwnc.cdc.gov/eid/article/28/9/22-0329\\_article](https://wwwnc.cdc.gov/eid/article/28/9/22-0329_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9423927/pdf/22-0329.pdf>

*During 2021, we collected blood and serum samples from 135 persons exposed to tick bites in southern Italy. We serologically and molecularly screened for zoonotic tickborne pathogens and only molecularly screened for *Candidatus* Midichloria mitochondrii. Overall, 62 (45.9%) persons tested positive for tickborne pathogens. *Coxiella burnetii* was detected most frequently (27.4%), along with *Rickettsia* spp. (21.5%) and *Borrelia* spp. (10.4%). We detected *Candidatus* M. mitochondrii DNA in 46 (34.1%) participants who had statistically significant associations to tickborne pathogens ( $p < 0.0001$ ). Phylogenetic analysis of *Candidatus* M. mitochondrii sequences revealed 5 clades and 8 human sequence types that correlated with vertebrates, Ixodes spp. ticks, and countries in Europe. These data demonstrated a high circulation of tickborne pathogens and *Candidatus* M. mitochondrii DNA in persons participating in outdoor activities in southern Italy. Our study shows how coordinated surveillance among patients, clinicians, and veterinarians could inform a One Health approach for monitoring and controlling the circulation of tickborne pathogens.*

Sila T, Sunghan J, Laochareonsuk W, Surasombatpattana S, Kongkamol C, Ingviya T, et al.

#### **Suspected Cat-to-Human Transmission of SARS-CoV-2, Thailand, July–September 2021.**

Emerging Infectious Disease journal. 2022;28(7):1485.

[https://wwwnc.cdc.gov/eid/article/28/7/21-2605\\_article](https://wwwnc.cdc.gov/eid/article/28/7/21-2605_article)

<https://wwwnc.cdc.gov/eid/article/28/7/pdfs/21-2605.pdf>

*A veterinarian in Thailand was diagnosed with COVID-19 after being sneezed on by an infected cat owned by an infected patient. Genetic study supported the hypothesis of SARS-CoV-2 transmission from the owner to the cat, and then from the cat to the veterinarian.*

Suolaniemi J, Autio T, Heikkinen J, Rasanen K.

#### **Knowledge, Attitudes, and Practices of Finnish Dairy Farmers on Cryptosporidiosis.**

Journal of Agromedicine.12.

<https://www.tandfonline.com/doi/full/10.1080/1059924X.2022.2112417>

*Calf-mediated zoonotic cryptosporidiosis is an emerging occupational health risk among Finnish dairy farmers. We studied farmers' knowledge, attitudes, and practices (KAP) regarding cryptosporidiosis to reveal possible weaknesses, which might increase the risk of zoonotic infection. KAP study was carried out as a cross-sectional questionnaire survey (n = 243). A total of 400 cryptosporidiosis-negative and 138 cryptosporidiosis-positive dairy farms, with more than 50 cows, were invited to participate in the study. The response rate was 45%. Half (49%) of the respondents had adequate knowledge concerning zoonotic cryptosporidiosis. Knowledge score was associated with age ( $p < 0.01$ ), level of education ( $p < 0.01$ ), and cryptosporidiosis status of the farm ( $p < 0.01$ ). Though most respondents had favorable attitudes, one-third (32.5%) had poor zoonotic transmission prevention practices. Use of a personal mobile device was the most common risky practice (90%) performed daily in the cowhouse. Most respondents (93%) reported gaining information about infectious diseases in animals from more than two information sources. Veterinarians were the most mentioned source (n = 228), whereas primary care physicians were among the least common sources (n = 16). Having favorable attitudes towards the prevention of zoonotic cryptosporidiosis was common. However, shortages in knowledge and several risky practices were identified in both cryptosporidiosis positive and negative farms. The role of the occupational health sector should be strengthened in work-related zoonotic disease prevention and may require further education of the personnel. A one-health approach to control zoonotic diseases is recommended.*

Val-Calvo J, Darcy J, Gibbons J, Creighton A, Egan C, Buckley T, et al.

#### **International Spread of Multidrug-Resistant *Rhodococcus equi*.**

Emerging Infectious Disease journal. 2022;28(9):1899.

[https://wwwnc.cdc.gov/eid/article/28/9/22-0222\\_article](https://wwwnc.cdc.gov/eid/article/28/9/22-0222_article)

<https://wwwnc.cdc.gov/eid/article/28/9/pdfs/22-0222.pdf>

*A multidrug-resistant clone of the animal and human pathogen *Rhodococcus equi*, MDR-RE 2287, has been circulating among equine farms in the United States since the 2000s. We report the detection of MDR-RE 2287 outside the United States. Our finding highlights the risk for MDR-RE spreading internationally with horse movements.*

Wang S-Y, Wen F, Yu L-X, Wang J, Wang M-Z, Yan J-C, et al.

#### **Potential Threats to Human Health from Eurasian Avian-Like Swine Influenza A(H1N1) Virus and Its Reassortants.**

Emerging Infectious Disease journal. 2022;28(7):1489.

[https://wwwnc.cdc.gov/eid/article/28/7/21-1822\\_article](https://wwwnc.cdc.gov/eid/article/28/7/21-1822_article)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9239861/pdf/21-1822.pdf>

*During 2018–2020, we isolated 32 Eurasian avian-like swine influenza A(H1N1) viruses and their reassortant viruses from pigs in China. Genomic testing identified a novel reassortant H3N1 virus, which emerged in late 2020. Derived from G4 Eurasian H1N1 and H3N2 swine influenza viruses. This virus poses a risk for zoonotic infection.*

- **Légionellose**

Treglia M, Pallocci M, Tenore GR, Castellani P, Pizzuti F, Bianco G, et al.

**Legionella and Air Transport: A Study of Environmental Contamination.**

International Journal of Environmental Research and Public Health. 2022;19(13):10.

[https://mdpi-res.com/d\\_attachment/ijerph/ijerph-19-08069/article\\_deploy/ijerph-19-08069-v2.pdf?version=1656647494](https://mdpi-res.com/d_attachment/ijerph/ijerph-19-08069/article_deploy/ijerph-19-08069-v2.pdf?version=1656647494)

*Introduction: There is growing interest in the public health and transport sectors in research into exposure to biological hazards, considering not only the risks arising from inter-human contagion, but also those related to exposure to the flight environment itself. The aim of this paper is to report data from an investigation into the water and air-conditioning systems of commercial aircraft for the presence of Legionella contamination, with a total of 645 water samples taken during the period 2007-2021. Methods: The investigation involved 126 aircraft of six different commercial aircraft types: MD80, Airbus A320 F, Embraer 175/190, AIRBUS A330, Boeing 767 and Boeing 777. Water samples were taken from the water systems (toilet taps, galley and boilers). Each sample was preliminarily subjected to an evaluation of the following parameters: temperature, pH and residual chlorine. The ScanVit (R) Legionella kit was used for bacteria detection and enumeration. Results: Samples were considered positive if the number of colony-forming units/liter (CFU/L) was >100. For the entire observation period, 45% of the investigated aircraft tested positive. Regarding the overall number of samples analyzed, 68.4% (441/645) were below 100 CFU/L, and thus within the limits allowed by the Italian Guidelines. Conclusions: Water system contamination with Legionella in the air transport field is a real public health issue that should not be underestimated given the heavy passenger traffic. Infection should be considered an occupational risk to which crew members are exposed.*

- **Endotoxines : effets toxiques, multi-expositions**

Kraemer JG, Hilty M, Oppliger A.

**Occupational Exposure to beta-d-Glucans, Mould Allergens, Endotoxins and Cultivable Fungi in Pig Farms.**

Annals of work exposures and health. 2022;66(8):967-73.

<https://doi.org/10.1093/annweh/wxac055>

*Airborne concentrations of organic dust on animal farms are known to be very high. This dust is partly composed of microorganisms such as bacteria, fungi and their components [endotoxins, (1 -> 3)-beta-d-glucans, mould allergens, mycotoxins], recognised as being responsible for numerous health effects. Several cross-sectional studies have measured levels of airborne bacteria, fungi and endotoxins on pig farms. However, the temporal dynamics of organic dust's components throughout the year have rarely been assessed, and airborne concentrations of (1 -> 3)-beta-d-glucans and mould allergens remain poorly understood in these work environments. This longitudinal, four-season study measured cultivable fungi, endotoxins, (1 -> 3)-beta-d-glucans, Aspergillus versicolor (AveX), Aspergillus fumigatus (Asp f1) and Alternaria sp (Alt a1) allergens on 31 pig farms in Switzerland. Results showed that exposure to AveX occurred in all four seasons. Total mean airborne concentration of endotoxins were between 3 and 4 times higher than the Swiss recommended limit value of 1000 EU m(-3) and mean airborne concentrations of fungi were between 30 and 50 times higher than the Swiss recommended limit value of 1000 cfu m(-3). Finally, accumulations of faecal matter on floors, humidity*

and dusty pathways were associated with increased concentrations of (1 → 3)-beta-d-glucans. In conclusion, pig farmers require better information about biological occupational risks, and measures to improve air quality should be implemented, especially in winter.

Rasuli L, Dehghani MH, Aghaei M, Mahvi AH, Mubarak NM, Karri RR.

### **Occurrence and fate of bacterial endotoxins in the environment (air, water, wastewater) and remediation technologies: An overview.**

Chemosphere. 2022;303:11.

<https://doi.org/10.1016/j.chemosphere.2022.135089>

*Endotoxins as the outer membrane of most Gram-Negative Bacteria (GNB) and typical toxic biochemical produced by microorganisms are identified as one of the emerging pollutants. These microbial by-products are harmful compounds that can be present in various environments including air, water, soil, and other ecosystems which were discussed in detail in this review. Environmental and occupational exposure caused by endotoxin occurs in water and wastewater treatment plants, industrial plants, farming, waste recovery, and composting facilities. Even though the health risk related to endotoxin injection in intravenous and dialysis are well identified, the harmful effects of ingestion, inhalation, and other way of exposure are not well quantified and there is insufficient information on the potential health risks of endotoxins exposure in water environments, and another exposure. Because of limited studies, the outbreaks of diseases related to endotoxins in the various source of exposure not been well documented. Endotoxin removal from different environments are investigated in this review. The results of various studies have shown that conventional treatment methods have been unable to remove endotoxins from water and wastewater, therefore, monitoring the effectiveness of these processes in controlling this contaminant and also using the appropriate removal method is essential. However, management of water and wastewater treatment processes and the use of advanced processes such as Advanced Oxidation Processes (AOPs) can be effective in monitoring and reducing endotoxin levels during water and wastewater treatment. One of the limitations of endotoxin monitoring is the lack of sufficient information to develop monitoring levels. In addition, the lack of guidelines and methods of controlling them at high levels may cause irreparable disaster.*

## **Biotechnologies**

- **Nouveaux procédés**

Bhat SA, Bashir O, Haq SAU, Amin T, Rafiq A, Ali M, et al.

### **Phytoremediation of heavy metals in soil and water: An eco-friendly, sustainable and multidisciplinary approach.**

Chemosphere. 2022;303:10.

<https://doi.org/10.1016/j.chemosphere.2022.134788>

*Rapid industrialization, increased waste production and surge in agricultural activities, mining, contaminated irrigation water and industrial effluents contribute to the contamination of water resources due to heavy metal (HM) accumulation. Humans employ HM-contaminated resources to*

*produce food, which eventually accumulates in the food chain. Decontamination of these valuable resources, as well as avoidance of additional contamination has long been needed to avoid detrimental health impacts. Phytoremediation is a realistic and promising strategy for heavy metal removal from polluted areas, based on the employment of hyper-accumulator plant species that are extremely tolerant to HMs present in the environment/soil. Green plants are used to remove, decompose, or detoxify hazardous metals in this technique. For soil decontamination, five types of phytoremediation methods have been used viz. phytostabilization, phytodegradation, rhizofiltration, phytoextraction and phytovolatilization. Traditional phytoremediation methods, on the other hand, have significant limits in terms of large-scale application, thus biotechnological efforts to modify plants for HM phytoremediation ways are being explored to improve the efficacy of plants as HM decontamination candidates. It is relatively a new technology that is widely regarded as economic, efficient and unique besides being environment friendly. New metal hyperaccumulators with high efficiency are being explored and employed for their use in phytoremediation and phytomining. Therefore, this review comprehensively discusses different strategies and biotechnological approaches for the removal of various HM containments from the environment, with emphasis on the advancements and implications of phytoremediation, along with their applications in cleaning up various toxic pollutants. Moreover, sources, effects of HMs and factors affecting phytoremediation of HMs metals have also been discussed.*

Chauhan S, Dahiya D, Sharma V, Khan N, Chaurasia D, Nadda AK, et al.

**Advances from conventional to real time detection of heavy metal(loid)s for water monitoring: An overview of biosensing applications.**

Chemosphere. 2022;307:16.

<https://www.sciencedirect.com/science/article/pii/S0045653522026170>

*The rapid growth of the industrial sector has expedited the accumulation of heavy metal(loid)s in the environment at hazardous levels. The elements such as arsenic, lead, mercury, cadmium and chromium are lethal in terms of toxicity with severe health impacts. With issues like water scarcity, limitations in wastewater treatment, and costs pertaining to detection in environmental matrices; their rapid and selective detection for reuse of effluents is of the utmost priority. Biosensors are the futuristic tool for the accurate qualitative and quantitative analysis of a specific analyte and integrate biotechnology, microelectronics and nanotechnology to fabricate a miniaturized device without compromising the sensitivity, specificity and accuracy. The characteristic features of supporting matrix largely affect the biosensing ability of the device and incorporation of highly sensitive and durable metal organic frameworks (MOFs) are reported to enhance the efficiency of advanced biosensors. Electrochemical biosensors are among the most widely developed biosensors for the detection of heavy metal (loids), while direct electron transfer approach from the recognition element to the electrode has been found to decrease the chances of interference. This review provides an insight into the recent progress in biosensor technologies for the detection of prevalent heavy metal(loid)s; using advanced support systems such as functional metal-based nanomaterials, carbon nanotubes, quantum dots, screen printed electrodes, glass beads etc. The review also delves critically in comparison of various techno-economic studies and the latest advances in biosensor technology.*

Ferdowsi M, Khabiri B, Buelna G, Jones JP, Heitz M.

**Air biofilters for a mixture of organic gaseous pollutants: an approach for industrial applications.**

Crit Rev Biotechnol.16.

<https://doi.org/10.1080/07388551.2022.2100735>



*Hazardous airborne pollutants are frequently emitted to the atmosphere in the form of a gaseous mixture. Air biofilters as the primary biotechnological choice for waste gas treatment (low inlet concentration and high gas flow rate) should run properly when the feed contains multiple pollutants. Simultaneous removal of pollutants in biofilters has been extensively studied over the last 10 years. In this review, the results and findings of the mentioned studies including different groups of pollutants, such as methane (CH<sub>4</sub>) and volatile organic compounds (VOCs) are discussed. As the number of pollutants in a mixture increases, their elimination might become more complicated due to interactions between the pollutants. Parallel batch studies might be helpful to better understand these interaction effects in the absence of mass transfer limitations. Setting optimum operating conditions for removal of mixtures in biofilters is challenging because of opposing properties of pollutants. In biofilters, concerns, such as inlet gas composition variation and stability while dealing with abrupt inlet load and concentration changes, must be managed especially at industrial scales. Biofilters designed with multi-layer beds, allow tracking the fate of each pollutant as well as analyzing the diversity of microbial culture across the filter bed. Certain strategies are recommended to improve the performance of biofilters treating mixtures. For example, addition of (bio)surfactants as well as a second liquid phase in biotrickling filters might be considered for the elimination of multiple pollutants especially when hydrophobic pollutants are involved.*

Gan JS, Bilal M, Li XB, Shah SZH, Mohamed BA, Hadibarata T, et al.

#### **Peroxidases-based enticing biotechnological platforms for biodegradation and biotransformation of emerging contaminants.**

Chemosphere. 2022;307:16.

<https://doi.org/10.1016/j.chemosphere.2022.136035>

*Rampant industrial boom, urbanization, and exponential population growth resulted in widespread environmental pollution, with water being one of the leading affected resources. All kinds of pollutants, including phenols, industrial dyes, antibiotics, pharmaceutically active residues, and persistent/volatile organic compounds, have a paramount effect, either directly or indirectly, on human health and aquatic entities. Strategies for affordable and efficient decontamination of these emerging pollutants have become the prime focus of academic researchers, industry, and government to constitute a sustainable human society. Classical treatment techniques for environmental contaminants are associated with several limitations, such as inefficiency, complex pretreatments, overall high process cost, high sludge generation, and highly toxic side-products formation. Enzymatic remediation is considered a green and ecologically friendlier method that holds considerable potential to mitigate any kinds of contaminating agents. Exploiting the potential of various peroxidases for pollution abatement is an emerging research area and has considerable advantages, such as efficiency and ease of handling, over other methods. This work is designed to provide recent progress in deploying peroxidases as green and versatile biocatalytic tools for the degradation and transformation of a spectrum of potentially hazardous environmental pollutants to broaden their scope for biotechnological and environmental purposes. More studies are required to explicate the degradation mechanisms, assess the toxicology levels of bio-transformed metabolites, and standardize the treatment strategies for economic viability.*

Goyal S, Singh J.

#### **Bioprocess optimization for glycopeptide biosurfactant production by means of *Lactobacillus delbrueckii*: Design expert laden approach.**

J Food Process Preserv.17.

<https://doi.org/10.1111/jfpp.17195>

*A bacterial strain, Lactobacillus delbrueckii, was isolated and screened for high potential of biosurfactant (BS) production yield. The current research emphasizes the optimization of process parameters through OFAT (one factor at a time) and RSM (response surface methodology) to achieve optimal BS production. Therefore, xylose and peptone were screened as the best carbon and nitrogen sources respectively by means of OFAT, along with temperature (37 degrees C), inoculum size (5%), and fermentation time (39 h). Furthermore, optimization of xylose (1% w/v), peptone (0.5%w/v), and pH (6.5) through Box-Behnken statistical design was validated by ANOVA (analysis of variance) and found significant ( $p < .05$ ) with optimal BS yield (7.31 g/L). The solvent-extracted glycopeptide BS displayed cationic nature, with thermal (0-120 degrees C), pH (2-12), and NaCl (2%-12% w/v) stability. The functional attributes of BS like antiadhesive and antimicrobial activity toward Gram-positive and Gram-negative bacteria and emulsifying potency against various vegetable oils make it worthwhile and applicable. Practical applications The recent applications of BS and hazards of pathogenic biofilm make it challenging to produce enhanced yield of BS. In light of this, present work is focused to optimize yield from Lactobacillus delbrueckii for its applications as antibiofilm and bioemulsifier agent in various industries. Furthermore, the glycoproteinaceous BS from microbe in question is itself unique and novel. Additionally, the statistical design of optimization provides experiment modeling, production rate, and significance of opted design which makes the whole process feasible to explore new possibilities for BS production.*

Lim J, Mohamad Z, editors.

#### **Enzymes immobilized polymeric supports for wastewater treatment application: A short review.**

2nd International Conference on Sustainable Environmental Technology (ISET); 2021 Nov 09-10;  
Electr Network: Elsevier.

<https://doi.org/10.1016/j.matpr.2022.02.526>

*Micro-pollutants, with a growing number of hazardous contaminants being introduced into both human and natural ecosystems, have become a major topic of rising environmental concern and the biological method is an up-and-coming wastewater treatment technique in late decades. This review focuses on enzyme immobilization in biological wastewater treatment, in which enzymes are used to biodegrade and remove various types of pollutants. The synthesis of different kinds of polymer substrates, their bio-compatibility, stability, reusability and application for the immobilization of enzymes, and their bio-chemical as well as biotechnological applications which employment of enzymes immobilization for different wastewater treatment processes are reviewed. Various cases of wastewater biotreatment are described, such as removal of pigments and colour in textile industry wastewater, refractory organics wastewater, as well as nitrogen and phosphorous wastewater treatment. The review concludes with a brief discussion of potential research directions in enzyme immobilization on polymeric supports for wastewater treatment application. Copyright (c) 2022 Elsevier Ltd. All rights reserved. Selection and peer-review under responsibility of the scientific committee of the 2nd International Con-ference on Sustainable Environmental Technology (ISET2021).*

Mussagy CU, Remonatto D, Picheli FP, Paula AV, Herculano RD, Santos-Ebinuma VC, et al.

#### **A look into Phaffia rhodozyma biorefinery: From the recovery and fractionation of carotenoids, lipids and proteins to the sustainable manufacturing of biologically active bioplastics.**

Bioresource Technology. 2022;362:11.

<https://doi.org/10.1016/j.biortech.2022.127785>

*Carotenoids over-producing yeast has become a focus of interest of the biorefineries, in which the integration of the bioproduction with the following downstream processing units for the recovery and purification of carot-enoids and other value-added byproducts is crucial to improve the sustainability and profitability of the overall bioprocess. Aiming the future implementation of Phaffia rhodozyma-based biorefineries, in this work, an inte-grative process for fractionation of intracellular compounds from P. rhodozyma biomass using non-hazardous bio-based solvents was developed. After one-extraction step, the total amount of astaxanthin, beta-carotene, lipids and proteins recovered was 63.11  $\mu\text{g/gDCW}$ , 42.81  $\mu\text{g/gDCW}$ , 53.75  $\text{mg/gDCW}$  and 10.93  $\text{mg/g}$ , respectively. The implementation of sequential back-extraction processes and integration with saponification and precipitation operations allowed the efficient fractionation and recovery (% w/w) of astaxanthin (-72.5 %), beta-carotene-90.17 %), proteins (21.04 %) and lipids (23.72 %). After fractionation, the manufacture of carotenoids-based products was demonstrated, through the mixture of carotenoids-rich extracts with bacterial cellulose to obtain biologically active bioplastics.*

Ochs J, Hanga MP, Shaw G, Duffy N, Kulik M, Tissin N, et al.

### **Needle to needle robot-assisted manufacture of cell therapy products.**

Bioeng Transl Med. 2022;7(3):15.

<https://doi.org/10.1002/btm2.10387>

*Advanced therapeutic medicinal products (ATMPs) have emerged as novel therapies for untreatable diseases, generating the need for large volumes of high-quality, clinically-compliant GMP cells to replace costly, high-risk and limited scale manual expansion processes. We present the design of a fully automated, robot-assisted platform incorporating the use of multiliter stirred tank bioreactors for scalable production of adherent human stem cells. The design addresses a needle-to-needle closed process incorporating automated bone marrow collection, cell isolation, expansion, and collection into cryovials for patient delivery. AUTOSTEM, a modular, adaptable, fully closed system ensures no direct operator interaction with biological material; all commands are performed through a graphic interface. Seeding of source material, process monitoring, feeding, sampling, harvesting and cryopreservation are automated within the closed platform, comprising two clean room levels enabling both open and closed processes. A bioprocess based on human MSCs expanded on microcarriers was used for proof of concept. Utilizing equivalent culture parameters, the AUTOSTEM robot-assisted platform successfully performed cell expansion at the liter scale, generating results comparable to manual production, while maintaining cell quality postprocessing.*

Pardo A, Bakht SM, Gomez-Florit M, Rial R, Monteiro RF, Teixeira SPB, et al.

### **Magnetically-Assisted 3D Bioprinting of Anisotropic Tissue-Mimetic Constructs.**

Adv Funct Mater.18.

<https://doi.org/10.1002/adfm.202208940>

*Recreating the extracellular matrix organization and cellular patterns of anisotropic tissues in bioengineered constructs remains a significant biofabrication challenge. Magnetically-assisted 3D bioprinting strategies can be exploited to fabricate biomimetic scaffolding systems, but they fail to provide control over the distribution of magnetic materials incorporated in the bioinks while preserving the fidelity of the designed composites. To overcome this dichotomy, the concepts of magnetically- and matrix-assisted 3D bioprinting are combined here. By allowing low viscosity bioinks to remain uncrosslinked after printing, this approach enables the arrangement of incorporated magnetically-responsive microfibers without compromising the resolution of printed structures before inducing their*

*solidification. Moreover, the fine design of these magnetic microfillers allows the use of low inorganic contents and weak magnetic field strengths, minimizing the potentially associated risks. This strategy is evaluated for tendon tissue engineering purposes, demonstrating that the synergy between the biochemical and biophysical cues stemming from a tendon-like anisotropic fibrous microstructure, combined with remote magneto-mechanical stimulation during in vitro maturation, is effective on directing the fate of the encapsulated human adipose-derived stem cells toward tenogenic phenotype. In summary, the developed strategy allows the fabrication of anisotropic high-resolution magnetic composites with remote stimulation functionalities, opening new horizons for tissue engineering applications.*

Sawan S, Errachid A, Maalouf R, Jaffrezic-Renault N.

### **Aptamers functionalized metal and metal oxide nanoparticles: Recent advances in heavy metal monitoring.**

Trac-Trends Anal Chem. 2022;157:15.

<https://doi.org/10.1016/j.trac.2022.116748>

*Heavy metal contamination has long been a major hazard to the entire ecological system and human beings. Consequently, sensitive and reliable methods have been developed for the detection of heavy metal ions from different systems. Advancements in biotechnology, and in functional nucleic acids specifically, have offered new methods for heavy metal monitoring based on the specific interactions of aptamers with heavy metal ions. The introduction of nanoparticles to aptamer-based technologies has also presented its advantages of increased immobilization efficiency, sensitivity and selectivity. Thus, this review provides an update on the progress of using nucleobases and aptamers functionalized nano -particles for the monitoring of heavy metal ions. The aptamer-based detection of heavy metal ions using metallic and metallic oxide nanoparticles are emphasized. Even though gold nanoparticles are the most commonly used with aptamers for the detection of heavy metal ions reporting extremely low detection limits, several other nanoparticles have emerged as promising modifications to aptamers in heavy metal monitoring as well. Comparing the different techniques used, electrochemical methods have presented the best performance while offering their advantages over optical and spectrometric techniques. (c) 2022 Elsevier B.V. All rights reserved.*

Singh A, Shourie A, Mazahar S.

### **Integration of Microalgae-Based Wastewater Bioremediation-Biorefinery Process to Promote Circular Bioeconomy and Sustainability: A Review.**

Clean-Soil Air Water.22.

<https://doi.org/10.1002/clen.202100407>

*Bioremediation of wastewater using microalgae is inexpensive, energy efficient, and effective in pollutant reduction as compared to conventional wastewater treatment technologies. Wastewater is a huge resource of minerals, nutrients, bioenergy, and valuable organic compounds and can be used for cultivation of microalgae. The microalgal biomass can be further used as biorefinery feedstock to produce biofuels and commercially important high-value products. The potential of microalgae toward bioremediation and biorefinery applications presents the avenues for integrating the two processes to support circular bioeconomy and sustainability. This review presents a holistic view of integration of bioremediation and biorefinery processes using microalgae for deriving multiple benefits like pollutant removal, resource recovery, biofuel production, and generation of high-value commercial products. The current status of high-throughput microalgal screening technologies is also discussed since the*

*selection of suitable microalgal strains is crucial for the application. The review further summarizes various processes involved in bioremediation and biorefinery systems such as cultivation, bioremediation, harvesting, and downstream processing. Recent trends in microalgal strain improvement for bioremediation and biorefinery applications through genetic engineering, bioinformatics, omics technologies, and genome editing tools are highlighted, while addressing the risks, biosafety issues, and regulatory affairs associated with genetically modified algae.*

Singh RP, Shadan A, Ma Y.

### **Biotechnological Applications of Probiotics: A Multifarious Weapon to Disease and Metabolic Abnormality.**

Probiotics Antimicrob Proteins.27.

<https://link.springer.com/content/pdf/10.1007/s12602-022-09992-8.pdf>

*Consumption of live microorganisms "Probiotics" for health benefits and well-being is increasing worldwide. Their use as a therapeutic approach to confer health benefits has fascinated humans for centuries; however, its conceptuality gradually evolved with methodological advancement, thereby improving our understanding of probiotics-host interaction. However, the emerging concern regarding safety aspects of live microbial is enhancing the interest in non-viable or microbial cell extracts, as they could reduce the risks of microbial translocation and infection. Due to technical limitations in the production and formulation of traditionally used probiotics, the scientific community has been focusing on discovering new microbes to be used as probiotics. In many scientific studies, probiotics have been shown as potential tools to treat metabolic disorders such as obesity, type-2 diabetes, non-alcoholic fatty liver disease, digestive disorders (e.g., acute and antibiotic-associated diarrhea), and allergic disorders (e.g., eczema) in infants. However, the mechanistic insight of strain-specific probiotic action is still unknown. In the present review, we analyzed the scientific state-of-the-art regarding the mechanisms of probiotic action, its physiological and immuno-modulation on the host, and new direction regarding the development of next-generation probiotics. We discuss the use of recently discovered genetic tools and their applications for engineering the probiotic bacteria for various applications including food, biomedical applications, and other health benefits. Finally, the review addresses the future development of biological techniques in combination with clinical and preclinical studies to explain the molecular mechanism of action, and discover an ideal multifunctional probiotic bacterium.*

Srimongkol P, Sangtanoo P, Songserm P, Watsuntorn W, Karnchanatat A.

### **Microalgae-based wastewater treatment for developing economic and environmental sustainability: Current status and future prospects.**

Frontiers in bioengineering and biotechnology. 2022;10:18.

[https://www.scienceopen.com/document\\_file/14e4f33b-c3ff-40ed-8305-91033fca1808/PubMedCentral/14e4f33b-c3ff-40ed-8305-91033fca1808.pdf](https://www.scienceopen.com/document_file/14e4f33b-c3ff-40ed-8305-91033fca1808/PubMedCentral/14e4f33b-c3ff-40ed-8305-91033fca1808.pdf)

*Over the last several decades, concerns about climate change and pollution due to human activity has gained widespread attention. Microalgae have been proposed as a suitable biological platform to reduce carbon dioxide, a major greenhouse gas, while also creating commercial sources of high-value compounds such as medicines, cosmetics, food, feed, and biofuel. Industrialization of microalgae culture and valorization is still limited by significant challenges in scaling up the production processes*



*due to economic constraints and productivity capacities. Therefore, a boost in resource usage efficiency is required. This enhancement not only lowers manufacturing costs but also enhancing the long-term viability of microalgae-based products. Using wastewater as a nutrient source is a great way to reduce manufacturing costs. Furthermore, water scarcity is one of the most important global challenges. In recent decades, industrialization, globalization, and population growth have all impacted freshwater resources. Moreover, high amounts of organic and inorganic toxins in the water due to the disposal of waste into rivers can have severe impacts on human and animal health. Microalgae cultures are a sustainable solution to tertiary and quaternary treatments since they have the ability to digest complex contaminants. This review presents biorefineries based on microalgae from all angles, including the potential for environmental pollution remediation as well as applications for bioenergy and value-added biomolecule production. An overview of current information about microalgae-based technology and a discussion of the associated hazards and opportunities for the bioeconomy are highlighted.*

Tokgozoglu L, Libby P.

### **The dawn of a new era of targeted lipid-lowering therapies.**

Eur Heart J. 2022;43(34):3198-+.

<https://doi.org/10.1093/eurheartj/ehab841>

*Lipid risk factors for cardiovascular disease depend in part on lifestyle, but optimum control of lipids often demands additional measures. Low-density lipoprotein (LDL) doubtless contributes causally to atherosclerosis. Recent human genetic findings have substantiated a number of novel targets for lipid-lowering therapy including apolipoprotein C-III, angiopoietin-like protein 3 and 4, apolipoprotein V, and ATP citrate lyase. These discoveries coupled with advances in biotechnology development afford new avenues for management of LDL and other aspects of lipid risk. Beyond LDL, new treatments targeting triglyceride-rich lipoproteins and lipoprotein(a) have become available and have entered clinical development. Biological and RNA-directed agents have joined traditional small-molecule approaches, which themselves have undergone considerable refinement. Innovative targeting strategies have increased efficacy of some of these novel interventions and markedly improved their tolerability. Gene-editing approaches have appeared on the horizon of lipid management. This article reviews this progress offering insight into novel biological and therapeutic discoveries, and places them into a practical patient care perspective.*

Ungureanu N, Vladut V, Biris SS.

### **Sustainable Valorization of Waste and By-Products from Sugarcane Processing.**

Sustainability. 2022;14(17):27.

[https://mdpi-res.com/d\\_attachment/sustainability/sustainability-14-11089/article\\_deploy/sustainability-14-11089-v2.pdf?version=1662453271](https://mdpi-res.com/d_attachment/sustainability/sustainability-14-11089/article_deploy/sustainability-14-11089-v2.pdf?version=1662453271)

*Sugarcane is a lignocellulosic crop and the juice extracted from its stalks provides the raw material for 86% of sugar production. Globally, sugarcane processing to obtain sugar and/or ethanol generates more than 279 million tons of solid and liquid waste annually, as well as by-products; namely, straws, bagasse, press mud, wastewater, ash from bagasse incineration, vinasse from ethanol distillation, and molasses. If not properly managed, this waste will pose risks to both environmental factors and human health. Lately, valorization of waste has gained momentum, having an important contribution to the fulfillment of policies and objectives related to sustainable development and circular bioeconomy. Various technologies are well-established and implemented for the valorization of waste and by-products from sugarcane processing, while other innovative technologies are still in the research and*

development stage, with encouraging prospects. We propose a sustainable sugarcane processing flow and present an analysis of the physico-chemical characteristics of generated wastes and by-products. We emphasize the available possibilities of valorizing each waste and by-product, considering that they are important biomass resources for obtaining biofuels and a wide range of other products with added value, which will contribute to the sustainability of the environment, agriculture, and human health worldwide.

Usmani Z, Sharma M, Gaffey J, Sharma M, Dewhurst RJ, Moreau B, et al.

#### **Valorization of dairy waste and by-products through microbial bioprocesses.**

Bioresource Technology. 2022;346:10.

<https://doi.org/10.1016/j.biortech.2021.126444>

*Waste is an inherent and unavoidable part of any process which can be attributed to various factors such as process inefficiencies, usability of resources and discarding of not so useful parts of the feedstock. Dairy is a burgeoning industry following the global population growth, resulting in generation of waste such as wastewater (from cleaning, processing, and maintenance), whey and sludge. These components are rich in nutrients, organic and inorganic materials. Additionally, the presence of alkaline and acidic detergents along with sterilizing agents in dairy waste makes it an environmental hazard. Thus, sustainable valorization of dairy waste requires utilization of biological methods such as microbial treatment. This review brings forward the current developments in utilization and valorization of dairy waste through microbes. Aerobic and anaerobic treatment of dairy waste using microbes can be a sustainable and green method to generate biofertilizers, biofuels, power, and other biobased products.*

Wang RH, Liu QW, Gao A, Tang N, Zhang Q, Zhang AM, et al.

#### **Recent developments of sonodynamic therapy in antibacterial application.**

Nanoscale. 2022;14(36):12999-3017.

<https://pubs.rsc.org/en/content/articlelanding/2022/NR/D2NR01847K>

*The rapid emergence of pathogenic bacteria poses a serious threat to global health. Notably, traditional antibiotic therapies suffer from the risk of strengthening bacterial drug resistance. Sonodynamic therapy (SDT) combining sonosensitizers and low-intensity ultrasound (US) has broadened the way towards treating drug-resistant bacteria. The allure of this therapy emerges from the capacity to focus the US energy on bacterial infection sites buried deep in tissues, locally activating the sonosensitizers to produce cytotoxic reactive oxygen species (ROS) with the ability to induce bacterial death. The past decade has witnessed the rapid development of antibacterial SDT owing to their excellent penetration, favorable biocompatibility and specific targeting ability. This review summarizes available sonosensitizers for antibacterial SDT, and digs into innovative biotechnologies to improve SDT efficiency, such as enhancing the targeting ability of sonosensitizers, image-guided assisted SDT, improvement of hypoxia and combination of SDT with other therapies. Finally, we conclude with the present challenges and provide insights into the future research of antibacterial SDT.*

Xie DM.

#### **Continuous biomanufacturing with microbes - upstream progresses and challenges.**

Current opinion in biotechnology. 2022;78:11.

<https://doi.org/10.1016/j.copbio.2022.102793>

*Current biomanufacturing facilities are mainly built for batch or fed-batch operations, which are subject to low productivities and do not achieve the great bioconversion potential of the rewired cells generated via modern biotechnology. Continuous biomanufacturing should be the future directions for high-yield and low-cost manufacturing of various fermentation products. This review discusses the major challenges and the strategies for continuous biomanufacturing with microbes, which include minimizing contamination risk, enhancing genetic stability over a long-term continuous operation, achieving high product titer, rate, and yield simultaneously by decoupling cell growth from product formation, and using modeling approach to accelerate research and development of continuous biomanufacturing. New strain designs and process engineering strategies, including integration with artificial intelligence, are also discussed for intelligent and the next generation of continuous biomanufacturing.*

# Organismes français et internationaux - Actualités

Suivi d'organismes français et internationaux. Sélection d'actualités classées par thème.

- **Agents pathogènes fongiques**

OMS, [L'OMS publie la toute première liste d'agents pathogènes fongiques](#), 25/10/2022.

- **Biosurveillance**

ANSES, [Santé : la biosurveillance des principaux produits chimiques se met en place en Europe](#), 13/09/2022.

- **Biotechnologies**

ANSES, [Lancement du comité de dialogue de l'Anses « Biotechnologies, environnement et santé »](#), 10/10/2022.

- **Choléra**

OMS, [La pénurie de vaccins contre le choléra entraîne la suspension temporaire de la stratégie à deux doses, alors que le nombre de cas augmente dans le monde](#), 19/10/2022.

- **Coronavirus (dont Covid-19)**

ANSES, [La vaccination modifie l'évolution d'un coronavirus chez les poules](#), 27/10/2022.

HAS, [Covid-19 : la HAS intègre les vaccins bivalents dans la stratégie de vaccination pour l'automne](#), 20/09/2022.

HAS, [Covid-19 : la HAS préconise le maintien de l'obligation vaccinale des personnels exerçant dans les établissements de santé et médico-sociaux](#), 22/07/2022.

HCSP, [Dépistage olfactif canin dans la stratégie de dépistage de l'infection à SARS-CoV-2](#), 16/09/2022.

Santé Publique France, [Point épidémiologique COVID-19 du 27 octobre 2022 : ralentissement de la circulation du SARS-CoV-2, le nombre de décès toujours en hausse](#), 28/10/2022.

- **Dengue**

HCSP, [Sécurisation des produits du corps humain dans le cadre de la survenue de cas autochtones de dengue dans les Alpes-Maritimes en août-septembre 2022](#), 02/10/2022.

HCSP, [Sécurisation des produits du corps humain dans le cadre de la survenue de cas autochtones de dengue dans le département du Var en juillet-août 2022](#), 12/09/2022.

- **Monkeypox**

ANSES, [Variole du singe : quel risque de diffusion aux animaux de compagnie ?](#), 03/10/2022.

HAS, [Monkeypox : la HAS complète ses recommandations sur la vaccination](#), 11/10/2022.

HAS, [Monkeypox : une vaccination préventive proposée aux personnes les plus à risque d'exposition](#), 08/07/2022.

HCSP, [Mesures de prévention vis-à-vis de l'infection à Monkeypox virus](#), 09/07/2022.

Santé Publique France, [Cas de variole du singe : point de situation au 1er novembre 2022](#), 03/11/2022.

OMS, [L'OMS publie une taxonomie de santé publique pour l'écoute sociale des conversations sur la variole du singe](#), 26/09/2022.

- **Paludisme**

HCSP, [Actualisation de la liste d'exclusion des pays à risque de transmission du paludisme pour les dons de produits du corps humain](#), 12/09/2022.

- **Poliovirus**

CDC (US), [United States confirmed as country with circulating vaccine-derived poliovirus](#), 13/09/2022.