

Bulletin de veille risques biologiques

N°126 – Janvier-mars 2024

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 éléments issus de cette veille sont fournis sans garantie d'exhaustivité.

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 individuelle : fièvre hémorragique, Ebola**

Sulmonte CJ, Jr., Flinn JB, Yusuf H, Martin E, Luciano NJ, Kim H, et al.

Preparing the Frontlines: Delivering Special Pathogen Training to Maryland Hospital Staff.

Health security. 2024;22(1):65-73.

<https://doi.org/10.1089/hs.2023.0035>

Healthcare workers (HCWs) at community hospitals, also known as frontline hospitals (FLHs), may encounter patients with possible infectious diseases, including those caused by high-consequence pathogens such as Zaire ebolavirus. We created and piloted a 1-day, in-person, didactic and skills training program to determine the feasibility and acceptability of implementing an educational program to enhance the knowledge and skills needed to respond when a patient with a potential HCP presents to an FLH. The Maryland Department of Health queried all 104 state FLHs to identify their interest in participating in the pilot training program. HCWs from 12 (75%) of the 16 interested FLHs participated in the program before it was interrupted by the COVID-19 pandemic. In addition to pathogen-specific training based on the Identify, Isolate, and Inform framework, we provided skills training in the proper use of personal protective equipment, spill cleanup, and removal of an incapacitated HCW from an isolation area. We conducted a paired pretraining and posttraining knowledge assessment and measured a significant learning gain among 135 participants (2-tailed t test, $P < .05$). Over 95% of the participants reported that the training was relevant to their daily work and the clinical simulations and reference material were useful and appropriate for their learning level. Findings from this pilot program demonstrated the feasibility and acceptability of a 1-day combined didactic and skills training program focused on high-consequence pathogens. We plan to reengage the original FLHs and add regional FLHs in an updated training effort based on our findings.

- **Protection respiratoire : ajustement**

Bryant RA, Smith JM, Tervola NK, Smith C, Hoyt C, Dawud B, et al.

Use of Elastomeric Half-Mask Respirator in the Clinical Care Environment.

J Nurs Care Qual. 2024;39(1):37-43.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10655906/pdf/jncqu-39-37.pdf>

Background: Elastomeric half-mask respirators (EHMR) reduce health care workers' exposure to airborne hazards including bioaerosols but have primarily been used in the industrial setting. Purpose: To assess health care workers' perceptions, attitudes, and experiences wearing EHMRs in a clinical environment. Methods: Employees within a single health care system who wore the EHMR continuously during their shift completed an investigator developed survey. Descriptive statistics and thematic analysis were used. Results: Of the 8273 EHMR "fit-tested" eligible employees, 1478 met inclusion criteria and participated. Respondents reported that they felt well protected with the EHMR and confident in their care and maintenance of the EHMR. Although skin changes developed, they were primarily managed by adjusting the straps. Clarity of communication was a concern across all respondents and disciplines. Conclusions: The EHMR was preferred over reusing the N95 although clarity in communication was challenging.

Chu CK, Wu HC, Kuo MC, Chan SY.

Study on the fit of nonwoven face masks on different face shapes.

J Text Inst. 2024;13.

<https://doi.org/10.1080/00405000.2024.2324506>

In the midst of the global COVID-19 pandemic, airborne infectious diseases, including contagious tuberculosis and illnesses transmitted through airborne droplets, such as influenza, SARS, and avian influenza, have emerged as some of the most severe pandemics in human history. Face masks have become an essential everyday item, despite their previous use primarily for the sick. Current mask designs come in various sizes; however, they may not be suitable for all face shapes, particularly for individuals with smaller or frequently moving facial features. Therefore, there is a need for research, especially focusing on women and individuals with smaller faces, to enhance the effectiveness of face masks in providing adequate protection. Accordingly, this study examined the current typical mask design 'normal mask' and four proposed mask designs for five face shapes (round, diamond, oval, square, or oblong) by using a quantitative fit test, as suggested in ISO 16975-3 and OSHA 29 CFR1910.134, to determine the masks' fit factor (FF). The FF of the normal mask was 80% on round faces, 66% on diamond faces, but only 41% on square and oblong faces. The FaceMe artificial intelligence program was used to modify the face mask design in accordance with each face shape, and the level of air leakage was evaluated. The results showed that modifying the mask edges could reduce air leakage, especially during movements. For square faces, the leakage level was reduced from 63% (normal mask) to 38% (line mask). For oblong faces, the normal mask had a leakage level of 63%, whereas wave masks reduced leaking to 34%, resulting in a reduction of almost 30%. Mask fit could also be improved by adjusting earloop tightness.

Collis B, Tacey M, McGrath C, Madigan V, Kainer M, Tramontana A, Aboltins C.

P2/N95 fit testing and the risk of COVID-19 in Healthcare Workers.

Infect Dis Health. 2024;29(1):8-14.

<https://doi.org/10.1016/j.idh.2023.07.005>

Background: Guidelines recommend healthcare workers (HCWs) undertake fit testing of P2/N95 respirators to mitigate the risk of infectious aerosols, however few studies have assessed whether fit testing reduces COVID-19 infection. Methods: A retrospective cohort study was conducted amongst HCWs across two tertiary health services in Melbourne, Australia during a period of low community transmission. Institution-wide quantitative fit testing and detailed questionnaires assessing COVID-19 acquisition risk factors were undertaken from September 2020. HCWs diagnosed with COVID-19 in the period prior to the fit testing program (February 1st - August 31st 2020) were matched on a 1:3 ratio to HCWs who had not been diagnosed with COVID-19. Risk factors for COVID19 acquisition, including fit testing outcome, were compared between groups. Results: A total of 1571 HCWs took part in fit testing programs. Seventy-two (4.6%) were diagnosed with COVID-19 within the study period. Younger age, nursing staff, close contact with a COVID-19 case, and working longer periods in wards with COVID-19 patients, were associated with COVID-19 infection. After matching for intensity of occupational exposure to infectious aerosols, close contact was the only independent variable associated with COVID-19 infection (OR 3.50, 95% CI:1.65-7.44, $p = 0.001$). Adequate fit test for the respirator predominately worn before the fit testing period was not associated with COVID-19 (OR 1.08, 95% CI:0.59 -1.98, $p = 0.815$). Conclusion: After controlling for intensity of occupational exposure to infectious aerosols, P2/ N95 respirator fit testing was not associated with reduced risk of COVID-19 infection. The utility of widespread fit testing to reduce HCW COVID-19 infections should be

reconsidered. (c) 2023 Australasian College for Infection Prevention and Control. Published by Elsevier B.V. All rights reserved.

Onishi K, Nojima M.

Comparison of the inward leakage rate between N95 filtering facepiece respirators and modified surgical masks during the COVID-19 pandemic.

Environmental health and preventive medicine. 2024;29:11.

https://www.jstage.jst.go.jp/article/ehpm/29/0/29_23-00303/_pdf

Background: Owing to shortage of surgical and N95 filtering facepiece respirators (FFRs) during the COVID-2019 pandemic, various masks were developed to prevent infection. This study aimed to examine the inward leakage rate (ILR) of sealed face masks and modified surgical masks using a quantitative fit test and compared it with the ILR of unmodified N95 FFRs. *Methods:* We conducted paired comparisons of ILRs of bent nose-fit wire masks, double masks, and N95 FFRs from October to December 2021. To measure the protective effectiveness of masks, participants wore masks, and the number of particles outside and inside the mask were measured. The ILR was based on the percentage of particles entering the mask using a fit tester. *Results:* We enrolled 54 participants (20 men and 34 women) in this study. The median ILR for surgical masks without and with a W-shaped bend in the nose-fit wire were 96.44% and 50.82%, respectively. The nose-fit wire adjustment reduced the ILR of surgical masks by a mean of 28.57%, which was significantly lower than the ILR without adjustment ($P < 0.001$). For double masks, with surgical or polyurethane masks on top of the W-shaped mask, the ILR did not differ significantly from that of N95. Although the filtration performance of double surgical masks matched that of N95 masks, their ILR was notably higher, indicating that double masks do not provide equivalent protection. *Conclusions:* Wearing N95 masks alone is effective in many cases. However, surgical mask modifications do not guarantee consistent effectiveness. Properly selected, sealed masks with a good fit overcome leakage, emphasizing their crucial role. Without evidence, mask-wearing may lead to unexpected infections. Education based on quantitative data is crucial for preventing adverse outcomes.

- **Zoonoses : pathologies émergentes**

Aguilar XF, Mavrot F, Surujballi O, Leclerc LM, Tomaselli M, Kutz S.

Brucellosis emergence in the Canadian Arctic.

One Health. 2024;18:100712.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11000101/pdf/main.pdf>

Brucellosis is an important zoonotic disease affecting animals and subsistence harvesters in the circumarctic. We investigated recent trends (2015-2022) of brucellosis seropositivity in caribou (Rangifer tarandus) and muskoxen (Ovibos moschatus) in the Central Canadian Arctic by using data from community-based wildlife health surveillance programs. The overall sample prevalence of Brucella antibodies was 10.0% (n = 271) in muskoxen and 15.5% (n = 277) in caribou. Sample seroprevalence in muskoxen varied geographically with an increasing trend of exposure on NW Victoria Island (from 0% to 36.8% between 2016 and 2022; Kendall tau = 0.283, p = 0.001). The presence of Brucella suis biovar 4 was confirmed by culture from clinical cases in this area. Our results indicate that Brucella suis biovar 4 continues to circulate in the Central Canadian Arctic in caribou and muskoxen and may be now

circulating in muskoxen independently from caribou. These findings highlight the need to better understand the ecology and drivers of brucellosis emergence in Arctic multi-host systems.

Brizuela J, Roodsant T, Hasnoe Q, van der Putten BCL, Kozakova J, Slotved H-C, et al.

Molecular Epidemiology of Underreported Emerging Zoonotic Pathogen *Streptococcus suis* in Europe.

Emerging Infectious Disease journal. 2024;30(3):413.

https://wwwnc.cdc.gov/eid/article/30/3/23-0348_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10902550/pdf/23-0348.pdf>

Streptococcus suis, a zoonotic bacterial pathogen circulated through swine, can cause severe infections in humans. Because human S. suis infections are not notifiable in most countries, incidence is underestimated. We aimed to increase insight into the molecular epidemiology of human S. suis infections in Europe. To procure data, we surveyed 7 reference laboratories and performed a systematic review of the scientific literature. We identified 236 cases of human S. suis infection from those sources and an additional 87 by scanning gray literature. We performed whole-genome sequencing to type 46 zoonotic S. suis isolates and combined them with 28 publicly available genomes in a core-genome phylogeny. Clonal complex (CC) 1 isolates accounted for 87% of typed human infections; CC20, CC25, CC87, and CC94 also caused infections. Emergence of diverse zoonotic clades and notable severity of illness in humans support classifying S. suis infection as a notifiable condition.

Chaves TdSS, Perosa A, Barbosa G, Ferreira D, Bellei N.

Betacoronavirus Infection Outbreak, São Paulo, Brazil, Fall 2023.

Emerging Infectious Disease journal. 2024;30(3):622.

https://wwwnc.cdc.gov/eid/article/30/3/23-0990_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10902528/pdf/23-0990.pdf>

We report a human coronavirus OC43 infection outbreak in hospitalized patients and healthcare workers in São Paulo, Brazil, occurring after SARS-CoV-2 cases disappeared. Infection was associated with healthcare workers in 5 (29.4%) patients. Routine surveillance including a respiratory virus panel can improve coronavirus detection in both healthcare professionals and patients.

Cuadrado-Matías R, Moraga-Fernández A, Peralbo-Moreno A, Negredo AI, Sánchez-Seco MP, Ruiz-Fons F.

Crimean-Congo haemorrhagic fever virus in questing non-Hyalomma spp. ticks in Northwest Spain, 2021.

Zoonoses and public health. 2024.

<https://doi.org/10.1111/zph.13130>

Crimean-Congo haemorrhagic fever (CCHF) unexpectedly emerged in humans in Northwest Spain in 2021, and two additional cases were reported in the region in 2022. The 2021 case was associated with a tick bite on the outskirts of the city where the patient lived. PCR analysis of 95 questing ticks collected in the outskirts of that city in 2021, none of the genus Hyalomma, revealed a prevalence of confirmed CCHF virus (CCHFV) infection of 10.5%. Our results in this emerging scenario suggest the need to

consider that CCHFV may be effectively spreading to Northwest Spain and to urgently understand any possible role of non-Hyalomma spp. ticks in the eco-epidemiological dynamics of CCHFV.

Dieng I, Diarra M, Sadio BD, Sow B, Gaye A, Diallo A, et al.

Reemergence of Sylvatic Dengue Virus Serotype 2 in Kedougou, Senegal, 2020.

Emerging Infectious Disease journal. 2024;30(4):770.

https://wwwnc.cdc.gov/eid/article/30/4/23-1301_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10977847/pdf/23-1301.pdf>

In 2020, a sylvatic dengue virus serotype 2 infection outbreak resulted in 59 confirmed dengue cases in Kedougou, Senegal, suggesting those strains might not require adaptation to reemerge into urban transmission cycles. Large-scale genomic surveillance and updated molecular diagnostic tools are needed to effectively prevent dengue virus infections in Senegal.

Estrada Alvarez J, Acuña MH, García Arias H, Alvarado FEP, Ospina Ramírez J.

Estimation of Incubation Period of Mpox during 2022 Outbreak in Pereira, Colombia.

Emerging Infectious Disease journal. 2024;30(1):180.

https://wwwnc.cdc.gov/eid/article/30/1/22-1663_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10756364/pdf/22-1663.pdf>

We estimated the incubation period for mpox during an outbreak in Pereira, Colombia, using data from 11 confirmed cases. Mean incubation period was 7.1 (95% CI 4.9–9.9) days, consistent with previous outbreaks. Accurately estimating the incubation period provides insights into transmission dynamics, informing public health interventions and surveillance strategies.

Field E, McCarty E, Saady D, Darby B.

Monitoring and Characteristics of Mpox Contacts, Virginia, USA, May–November 2022.

Emerging Infectious Disease journal. 2024;30(3):453.

https://wwwnc.cdc.gov/eid/article/30/3/23-0609_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10902522/pdf/23-0609.pdf>

During 2022, a global outbreak of mpox resulted primarily from human-to-human contact. The Virginia Department of Health (Richmond, VA, USA) implemented a contact tracing and symptom monitoring system for residents exposed to monkeypox virus, assessed their risk for infection, and offered interventions as needed. Among 991 contacts identified during May 1–November 1, 2022, import records were complete for 943 (95.2%), but 99 (10.0%) were not available for follow-up during symptom monitoring. Mpox developed in 28 (2.8%) persons; none were healthcare workers exposed at work (n = 275). Exposure risk category and likelihood of developing mpox were strongly associated. A total of 333 persons received ≥1 dose of JYENNOS (Bavarian Nordic, <https://www.bavarian-nordic.com>) vaccine, most (n = 295) administered after virus exposure. Median time from exposure to vaccination was 8 days. Those data tools provided crucial real-time information for public health responses and can be used as a framework for other emerging diseases.

Garcia-Bustos V, Acosta-Hernández B, Cabañero-Navalón MD, Ruiz-Gaitán AC, Pemán J, Rosario Medina I.

Potential Fungal Zoonotic Pathogens in Cetaceans: An Emerging Concern.

Microorganisms. 2024;12(3).

https://mdpi-res.com/d_attachment/microorganisms/microorganisms-12-00554/article_deploy/microorganisms-12-00554.pdf?version=1710139392

Over 60% of emerging infectious diseases in humans are zoonotic, often originating from wild animals. This long-standing ecological phenomenon has accelerated due to human-induced environmental changes. Recent data show a significant increase in fungal infections, with 6.5 million cases annually leading to 3.7 million deaths, indicating their growing impact on global health. Despite the vast diversity of fungal species, only a few are known to infect humans and marine mammals. Fungal zoonoses, especially those involving marine mammals like cetaceans, are of global public health concern. Increased human-cetacean interactions, in both professional and recreational settings, pose risks for zoonotic disease transmission. This review focuses on the epidemiology, clinical manifestations, and zoonotic potential of major fungal pathogens shared in humans and cetaceans, highlighting their interspecies transmission capability and the challenges posed by antifungal resistance and environmental changes. It underscores the need for enhanced awareness and preventative measures in high-risk settings to protect public health and marine ecosystems.

García-San-Miguel L, Giménez-Durán J, Saravia-Campelli G, Calvo-Reyes MC, Fernández-Martínez B, Frank C, et al.

Detection of dengue in German tourists returning from Ibiza, Spain, related to an autochthonous outbreak, August to October 2022.

Euro surveillance : bulletin Européen sur les maladies transmissibles = European communicable disease bulletin. 2024;29(14).

<https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2024.29.14.2300296>

In February 2023, German public health authorities reported two dengue cases (one confirmed, one probable) and four possible cases who travelled to Ibiza, Spain, in late summer/autumn 2022; the infection was probably acquired through mosquito bites. Case 1 visited Ibiza over 1 week in late August with two familial companions; all three developed symptoms the day after returning home. Only Case 1 was tested; dengue virus (DENV) infection was confirmed by presence of NS1 antigen and IgM antibodies. Case 2 travelled to Ibiza with two familial companions for 1 week in early October, and stayed in the same town as Case 1. Case 2 showed symptoms on the day of return, and the familial companions 1 day before and 3 days after return; Case 2 tested positive for DENV IgM. The most probable source case had symptom onset in mid-August, and travelled to a dengue-endemic country prior to a stay in the same municipality of Ibiza for 20 days, until the end of August. Dengue diagnosis was probable based on positive DENV IgM. Aedes albopictus, a competent vector for dengue, has been present in Ibiza since 2014. This is the first report of a local dengue transmission event on Ibiza.

Ibrahim DD, Enem SI, Egbu G, Dantong D, Jolayemi KO, Gaddafi MS.

An emerging zoonosis: molecular detection of multidrug-methicillin resistant *Staphylococcus aureus* from butchers' knives, livestock products and contact surfaces.

Vet Res Commun. 2024.

<https://link.springer.com/article/10.1007/s11259-024-10346-8>

*Methicillin-resistant Staphylococcus aureus (MRSA) transmission in livestock, community, and healthcare settings poses a significant public health concern both locally and globally. This study aimed to investigate the occurrence, molecular detection, and antibiogram of the MRSA strain in fresh beef, contact surfaces, and butchers' knives from the four major abattoirs (Karu, Gwagwalada, Deidei, and Kubwa) located in the Federal Capital Territory, Nigeria. A multi-stage sampling technique was used to collect 400 swab samples from butchers' knives (132), fresh beef (136), and contact surfaces (132). Presumptive colonies on mannitol salt agar were subjected to culture, isolation, and biotyping. The antibiogram was carried out via a Kirby-Bauer disk containing eight antibiotics. MRSA was phenotypically confirmed by oxacillin-resistant screening agar base (ORSAB) and genotypically by PCR to detect the presence of the *mecA* gene. Out of the 400 samples, 47.24% of fresh beef, 37% of contact surfaces, and 64.33% of butchers' knife swabs were *Staphylococcus aureus* positive. Thirty-two *Staphylococcus aureus*-positive isolates were confirmed to be MRSA, 50% fresh beef, 28.12% contact surfaces, and 21.87% butcher's knife swabs. MRSA isolates displayed multidrug-resistant traits, with a high resistance of 90.62% against cloxacillin, and a highest susceptibility of 100% to co-trimazole. The antibiogram showed MRSA strains to be multidrug resistant. Molecular characterisation of the MRSA detected the presence of the *mecA* gene at a band size of 163 bp in all isolates. Strict hygiene of butchers, and working equipment in meat processing and marketing should be of top priority.*

Kalonji T, Malembi E, Matela JP, Likafi T, Kinganda-Lusamaki E, Vakaniaki EH, et al.

Co-Circulating Monkeypox and Swinepox Viruses, Democratic Republic of the Congo, 2022.

Emerging Infectious Disease journal. 2024;30(4):761.

https://wwwnc.cdc.gov/eid/article/30/4/23-1413_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10977837/pdf/23-1413.pdf>

In September 2022, deaths of pigs manifesting pox-like lesions caused by swinepox virus were reported in Tshuapa Province, Democratic Republic of the Congo. Two human mpox cases were found concurrently in the surrounding community. Specific diagnostics and robust sequencing are needed to characterize multiple poxviruses and prevent potential poxvirus transmission.

Kolo FB, Adesiyun AA, Fasina FO, Harris BN, Rossouw J, Byaruhanga C, et al.

Brucellosis Seropositivity Using Three Serological Tests and Associated Risk Factors in Abattoir Workers in Gauteng Province, South Africa.

Pathogens. 2024;13(1):13.

https://mdpi-res.com/d_attachment/pathogens/pathogens-13-00064/article_deploy/pathogens-13-00064.pdf?version=1704802657

Abattoir workers are liable to zoonotic infections from animals and animal products, primarily to diseases with asymptomatic and chronic clinical manifestations in animals, such as brucellosis. No published reports exist on the seroprevalence of brucellosis in abattoir workers in South Africa.

Therefore, this cross-sectional study was conducted to estimate the occurrence and risk factors for *Brucella* exposure in abattoir workers in Gauteng Province. A total of 103 abattoir workers and managers from 6 abattoirs, where brucellosis-positive slaughtered cattle and sheep were previously detected, were interviewed and tested with serological assays using the Rose Bengal test (RBT), *Brucella*Capt, and IgG-ELISA. A pre-tested questionnaire was administered to consenting respondents to obtain information on risk factors for brucellosis. Of the 103 respondents tested, the distribution of female and male workers was 16 (15.5%) and 87 (84.5%), respectively. The seroprevalence for exposure to brucellosis was 21/103 (20.4%, 95%CI: 13.1-29.5) using a combination of RBT, *Brucella*Capt, or IgG-ELISA. For test-specific results, seroprevalences by RBT, *Brucella*Capt, and IgG-ELISA were 13/103 (12.6%, 95%CI: 6.9-20.6), 9/103 (8.74%, 95%CI: 4.1-15.9), and 18/103 (17.5%, 95%CI: 10.7-26.2), respectively. Low-throughput abattoirs were identified as associated risks, as 29.3% of workers were seropositive compared with 12.7% of workers in high-throughput abattoirs, which highlights that direct contact at abattoirs poses higher risk to workers than indirect and direct contact outside abattoirs. This study confirms the occurrence of *Brucella* spp. antibodies among abattoir workers in South Africa, possibly due to occupational exposure to *Brucella* spp., and highlights the occupational hazard to workers. Furthermore, findings underscore that abattoir facilities can serve as points for active and passive surveillance for indicators of diseases of public health importance. We recommend periodic implementation of brucellosis testing of abattoir workers country-wide to establish baseline data for informing appropriate preventive practices and reducing the potential burden of infection rates among these high-risk workers.

Lelli D, Moreno A, Canziani S, Soliani L, Carrera M, Castelli A, et al.

Isolation of Batborne Neglected Zoonotic Agent Issyk-Kul Virus, Italy.

Emerging Infectious Disease journal. 2024;30(4):786.

https://wwwnc.cdc.gov/eid/article/30/4/23-1186_article

<https://wwwnc.cdc.gov/eid/article/30/4/pdfs/23-1186.pdf>

*We isolated Issyk-Kul virus (ISKV) from a bat sampled from Italy in 2021 and conducted ISKV-specific surveillance in bats collected in Italy during 2017–2023. ISKV circulation among synanthropic and sedentary species of bat, such as Savi's pipistrelle bat (*Hypsugo savii*) in northern Italy, may have public health implications in this region.*

Lendino A, Castellanos AA, Pigott DM, Han BA.

A review of emerging health threats from zoonotic New World mammarenaviruses.

BMC Microbiol. 2024;24(1):115.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10993514/pdf/12866_2024_Article_3257.pdf

Despite repeated spillover transmission and their potential to cause significant morbidity and mortality in human hosts, the New World mammarenaviruses remain largely understudied. These viruses are endemic to South America, with animal reservoir hosts covering large geographic areas and whose transmission ecology and spillover potential are driven in part by land use change and agriculture that put humans in regular contact with zoonotic hosts. We compiled published studies about Guanarito virus, Junin virus, Machupo virus, Chapare virus, Sabia virus, and Lymphocytic Choriomeningitis virus to review the state of knowledge about the viral hemorrhagic fevers caused by New World mammarenaviruses. We summarize what is known about rodent reservoirs, the conditions of spillover

transmission for each of these pathogens, and the characteristics of human populations at greatest risk for hemorrhagic fever diseases. We also review the implications of repeated outbreaks and biosecurity concerns where these diseases are endemic, and steps that countries can take to strengthen surveillance and increase capacity of local healthcare systems. While there are unique risks posed by each of these six viruses, their ecological and epidemiological similarities suggest common steps to mitigate spillover transmission and better contain future outbreaks.

Martínez D, Gómez M, Hernández C, Muñoz M, Campo-Palacio S, González-Robayo M, et al.

Emergence of Dengue Virus Serotype 2 Cosmopolitan Genotype, Colombia.

Emerging Infectious Disease journal. 2024;30(1):189.

https://wwwnc.cdc.gov/eid/article/30/1/23-0972_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10756373/pdf/23-0972.pdf>

Using Oxford Nanopore technologies and phylogenetic analyses, we sequenced and identified the cosmopolitan genotype of dengue virus serotype 2 isolated from 2 patients in the city of Villavicencio, Meta department, Colombia. This identification suggests the emergence of this genotype in the country, which warrants further surveillance to identify its epidemic potential.

Marx GE, Curren E, Olesen M, Cronquist L, Schlosser L, Nichols M, et al.

Tularemia From Veterinary Occupational Exposure.

Clinical Infectious Diseases. 2024;78:S71-S5.

<https://doi.org/10.1093/cid/ciad687>

Tularemia is a disease caused by Francisella tularensis, a highly infectious bacteria that can be transmitted to humans by direct contact with infected animals. Because of the potential for zoonotic transmission of F. tularensis, veterinary occupational risk is a concern. Here, we report on a human case of tularemia in a veterinarian after an accidental needlestick injury during abscess drainage in a sick dog. The veterinarian developed ulceroglandular tularemia requiring hospitalization but fully recovered after abscess drainage and a course of effective antibiotics. To systematically assess veterinary occupational transmission risk of F. tularensis, we conducted a survey of veterinary clinical staff after occupational exposure to animals with confirmed tularemia. We defined a high-risk exposure as direct contact to the infected animal's body fluids or potential aerosol inhalation without use of standard personal protective equipment (PPE). Survey data included information on 20 veterinary occupational exposures to animals with F. tularensis in 4 states. Veterinarians were the clinical staff most often exposed (40%), followed by veterinarian technicians and assistants (30% and 20%, respectively). Exposures to infected cats were most common (80%). Standard PPE was not used during 80% of exposures; a total of 7 exposures were categorized as high risk. Transmission of F. tularensis in the veterinary clinical setting is possible but overall risk is likely low. Veterinary clinical staff should use standard PPE and employ environmental precautions when handling sick animals to minimize risk of tularemia and other zoonotic infections; postexposure prophylaxis should be considered after high-risk exposures to animals with suspected or confirmed F. tularensis infection to prevent tularemia. Ulceroglandular tularemia in a veterinarian occurred after an accidental needlestick injury. A survey describing 20 veterinary occupational exposures to animals with confirmed tularemia identified no additional cases despite infrequent personal protective equipment usage and inadequate post-exposure prophylaxis after high-risk exposures.

Mattock J, Chattaway MA, Hartman H, Dallman T, Smith A, Keddy K, et al.

A One Health Perspective on *Salmonella enterica* Serovar Infantis, an Emerging Human Multidrug-Resistant Pathogen.

Emerging Infectious Disease journal. 2024;30(4):701.

https://wwwnc.cdc.gov/eid/article/30/4/23-1031_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10977846/pdf/23-1031.pdf>

Salmonella enterica serovar Infantis presents an ever-increasing threat to public health because of its spread throughout many countries and association with high levels of antimicrobial resistance (AMR). We analyzed whole-genome sequences of 5,284 *Salmonella* Infantis strains from 74 countries, isolated during 1989–2020 from a wide variety of human, animal, and food sources, to compare genetic phylogeny, AMR determinants, and plasmid presence. The global *Salmonella* Infantis population structure diverged into 3 clusters: a North American cluster, a European cluster, and a global cluster. The levels of AMR varied by *Salmonella* Infantis cluster and by isolation source; 73% of poultry isolates were multidrug resistant, compared with 35% of human isolates. This finding correlated with the presence of the pESI megaplasmid; 71% of poultry isolates contained pESI, compared with 32% of human isolates. This study provides key information for public health teams engaged in reducing the spread of this pathogen.

Nguyen TT, Mai TN, Dang-Xuan S, Nguyen-Viet H, Unger F, Lee HS.

Emerging zoonotic diseases in Southeast Asia in the period 2011-2022: a systematic literature review.

Vet Q. 2024;44(1):1-15.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10795789/pdf/TVEQ_44_2300965.pdf

As COVID-19 has shown, pandemics and outbreaks of emerging infections such as Zika, Nipah, monkeypox and antimicrobial-resistant pathogens, especially emerging zoonotic diseases, continue to occur and may even be increasing in Southeast Asia. In addition, these infections often result from environmental changes and human behaviour. Overall, public health surveillance to identify gaps in the literature and early warning signs are essential in this region. A systematic review investigated the prevalence of emerging zoonotic diseases over 11 years from 2011 to 2022 in Southeast Asia to understand the status of emerging zoonotic diseases, as well as to provide necessary actions for disease control and prevention in the region. During the 2011-2022 period, studies on pigs, poultry, ruminants, companion animals and wildlife in Southeast Asia were reviewed thoroughly to assess the quality of reporting items for inclusion in the systematic review. The review was performed on 26 studies of pigs, 6 studies of poultry, 21 studies of ruminants, 28 studies of companion animals and 25 studies of wildlife in Southeast Asia, which provide a snapshot of the prevalence of the emerging zoonotic disease across the country. The findings from the review showed that emerging zoonotic diseases were prevalent across the region and identified a few zoonotic diseases associated with poultry, mainly stemming from Cambodia and Vietnam, as high priority in Southeast Asia. Clinical relevance: Appropriate prevention and control measures should be taken to mitigate the emerging zoonotic diseases in Southeast Asia.

Odigie AE, Stufano A, Schino V, Zarea AAK, Ndiana LA, Mrenoshki D, et al.

West Nile Virus Infection in Occupational Settings-A Systematic Review.

Pathogens. 2024;13(2):16.

https://mdpi-res.com/d_attachment/pathogens/pathogens-13-00157/article_deploy/pathogens-13-00157-v2.pdf?version=1708242373

Background: West Nile virus (WNV) is an emerging mosquito-borne neurotropic virus, belonging to the Flaviviridae family and the Orthoflavivirus genus. The effective control of WNV requires a targeted preventive strategy that also needs the identification of the higher-risk populations. Hence, this study focused on a systematic literature review of WNV-acquired infection in work-related settings and the assessment of the exposure risks among different occupational categories. Methods: A comprehensive search was conducted to identify studies until September 2023 in multiple databases such as PubMed/MEDLINE, SCOPUS and Web of Science, according to the PRISMA 2020 statement. Risk of bias of collected papers was assessed by the ROB tool of the National Toxicology Program's Office of Health Assessment and Translation handbook. Results: A total of 21 studies were included in the systematic review, out of which seventeen were observational studies and four were case reports. Workers identified as at higher risk for WNV infection were military workers, veterinarians, agricultural workers, farmers, and laboratory workers with contact with infected fluids or aerosols. Conclusions: The identification of higher-risk workers could facilitate active surveillance by occupational physicians, which could improve our understanding of the epidemiology of WNV and, in addition, could help tailor appropriate preventive recommendations, reducing the overall burden of disease in high-risk areas.

Ogoti BM, Riitho V, Wildemann J, Mutono N, Tesch J, Rodon J, et al.

Biphasic MERS-CoV Incidence in Nomadic Dromedaries with Putative Transmission to Humans, Kenya, 2022–2023.

Emerging Infectious Disease journal. 2024;30(3):581.

https://wwwnc.cdc.gov/eid/article/30/3/23-1488_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10902546/pdf/23-1488.pdf>

Middle East respiratory syndrome coronavirus (MERS-CoV) is endemic in dromedaries in Africa, but camel-to-human transmission is limited. Sustained 12-month sampling of dromedaries in a Kenya abattoir hub showed biphasic MERS-CoV incidence; peak detections occurred in October 2022 and February 2023. Dromedary-exposed abattoir workers (7/48) had serologic signs of previous MERS-CoV exposure.

Philippon A.

Actualités sur la leptospirose* Some news about leptospirosis.

Bull Acad Natl Med. 2024;208(3):338-44.

<https://doi.org/10.1016/j.banm.2024.01.008>

Due to its high prevalence of France, human leptospirosis, an occupational disease, becomes a notifiable disease. This global and underestimated zoonosis must take into account the importance of the animal reservoir, more than 150 species including rodents, cattle, horses, pigs, but also dogs and cats and the increased role of the environment with water and soil. This detailed epidemiological knowledge is made possible thanks to the progress of the culture of these spiral bacteria and especially to the progress of molecular biology with PCR and sequencing including genomic sequencing with the individualization of 65 species of pathogenic and saprophytes leptospires. The strict application of health and environmental measures has replaced the concept of leisure disease instead of occupational

disease. The possibility of modifying certain genes by mutagenesis (transposon) and gene transfer (transformation, transduction) makes it possible to progress in its pathogenesis by individualizing several virulence factors such as *Loa22*, *OmpL1*, *LipL32*, *LipL41*, *LigB* opening new vaccine perspectives. (c) 2024 Published by Elsevier Masson SAS on behalf of l'Académie nationale de médecine.

Payne M, Williamson S, Wang Q, Zhang X, Sintchenko V, Pavic A, Lan R.

Emergence of Poultry-Associated Human *Salmonella enterica* Serovar Abortusovis Infections, New South Wales, Australia.

Emerging Infectious Disease journal. 2024;30(4):691.

https://wwwnc.cdc.gov/eid/article/30/4/23-0958_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10977856/pdf/23-0958.pdf>

Salmonella enterica serovar *Abortusovis* is a ovine-adapted pathogen that causes spontaneous abortion. *Salmonella Abortusovis* was reported in poultry in 2009 and has since been reported in human infections in New South Wales, Australia. Phylogenomic analysis revealed a clade of 51 closely related isolates from Australia originating in 2004. That clade was genetically distinct from ovine-associated isolates. The clade was widespread in New South Wales poultry production facilities but was only responsible for sporadic human infections. Some known virulence factors associated with human infections were only found in the poultry-associated clade, some of which were acquired through prophages and plasmids. Furthermore, the ovine-associated clade showed signs of genome decay, but the poultry-associated clade did not. Those genomic changes most likely led to differences in host range and disease type. Surveillance using the newly identified genetic markers will be vital for tracking *Salmonella Abortusovis* transmission in animals and to humans and preventing future outbreaks.

Ramos GSS, Rego R, Oliveira MFF, Rocha VFD, Oliveira EP, Reis JN.

***Streptococcus suis* meningitis: An emerging zoonotic disease in Brazil.**

Rev Soc Bras Med Trop. 2024;57:e00805.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11000506/pdf/1678-9849-rsbmt-57-e00805-2024.pdf>

Streptococcus suis has been widely reported as a pathogen in animals, especially pigs. In terms of human health implications, it has been characterized as a zoonosis associated with the consumption of pork products and occupational exposure, particularly in Southeast Asian countries. Here, we present a rare case of human *S. suis* infection in Brazil, diagnosed in an older adult swine farmer, a small rural producer residing in the semi-arid region of Bahia, Brazil.

Umair M, Rehman Z, Whitmer S, Mobley M, Fahim A, Ikram A, et al.

Crimean-Congo Hemorrhagic Fever Virus Diversity and Reassortment, Pakistan, 2017–2020.

Emerging Infectious Disease journal. 2024;30(4):654.

https://wwwnc.cdc.gov/eid/article/30/4/23-1155_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10977834/pdf/23-1155.pdf>

Sporadic cases and outbreaks of Crimean-Congo hemorrhagic fever (CCHF) have been documented across Pakistan since 1976; however, data regarding the diversity of CCHF virus (CCHFV) in Pakistan is

sparse. We whole-genome sequenced 36 CCHFV samples collected from persons infected in Pakistan during 2017–2020. Most CCHF cases were from Rawalpindi (n = 10), followed by Peshawar (n = 7) and Islamabad (n = 4). Phylogenetic analysis revealed the Asia-1 genotype was dominant, but 4 reassorted strains were identified. Strains with reassorted medium gene segments clustered with Asia-2 (n = 2) and Africa-2 (n = 1) genotypes; small segment reassortments clustered with the Asia-2 genotype (n = 2). Reassorted viruses showed close identity with isolates from India, Iran, and Tajikistan, suggesting potential crossborder movement of CCHFV. Improved and continuous human, tick, and animal surveillance is needed to define the diversity of circulating CCHFV strains in Pakistan and prevent transmission.

Yamada S, Katano H, Sato Y, Suzuki T, Uda A, Ishijima K, et al.

Macacine alphaherpesvirus 1 (B Virus) Infection in Humans, Japan, 2019.

Emerging Infectious Disease journal. 2024;30(1):177.

https://wwwnc.cdc.gov/eid/article/30/1/23-0435_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10756385/pdf/23-0435.pdf>

Two human patients with Macacine alphaherpesvirus 1 infection were identified in Japan in 2019. Both patients had worked at the same company, which had a macaque facility. The rhesus-genotype B virus genome was detected in cerebrospinal fluid samples from both patients.

Plaza P, Gamarra-Toledo V, Eugu   JR, Lambertucci S.

Recent Changes in Patterns of Mammal Infection with Highly Pathogenic Avian Influenza A(H5N1) Virus Worldwide.

Emerging Infectious Disease journal. 2024;30(3):444.

https://wwwnc.cdc.gov/eid/article/30/3/23-1098_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10902543/pdf/23-1098.pdf>

We reviewed information about mammals naturally infected by highly pathogenic avian influenza A virus subtype H5N1 during 2 periods: the current panzootic (2020–2023) and previous waves of infection (2003–2019). In the current panzootic, 26 countries have reported >48 mammal species infected by H5N1 virus; in some cases, the virus has affected thousands of individual animals. The geographic area and the number of species affected by the current event are considerably larger than in previous waves of infection. The most plausible source of mammal infection in both periods appears to be close contact with infected birds, including their ingestion. Some studies, especially in the current panzootic, suggest that mammal-to-mammal transmission might be responsible for some infections; some mutations found could help this avian pathogen replicate in mammals. H5N1 virus may be changing and adapting to infect mammals. Continuous surveillance is essential to mitigate the risk for a global pandemic.

- **L  gionellose**

Buchholz U, Brodhun B, Lehfeld A-S.

Incidence of Legionnaires' Disease among Travelers Visiting Hotels in Germany, 2015–2019.

Emerging Infectious Disease journal. 2024;30(1):13.

Rapport de veille Risques biologiques n  126 – 01-03/2024

https://wwwnc.cdc.gov/eid/article/30/1/23-1064_article

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10756367/pdf/23-1064.pdf>

We determined whether the incidence rates of travel-associated Legionnaires' disease (TALD) in hotels in Germany increased after a previous occurrence and whether control measures required by the European Legionnaires' Disease Surveillance Network after a cluster (>2 cases within 2 years) restored the rate to baseline. We analyzed TALD surveillance data from Germany during 2015–2019; a total of 307 TALD cases (163 domestic, 144 nondomestic) in hotels were reported. The incidence rate ratio was 5.5 (95% CI 3.6–7.9) for a second case and 25 (95% CI 11–50) for a third case after a cluster had occurred, suggesting that control measures initiated after the occurrence of TALD clusters might be inadequate to restore the incidence rate to baseline. Our findings indicate that substantial LD preventive measures should be explored by hotels or other accommodations after the first TALD case occurs to reduce the risk for future infections.

- **Endotoxines**

Baldrich-Acosta J, De Vizcaya-Ruiz A, Barbier OC, Aztatzi-Aguilar OG.

Health impacts of endotoxin-particulate matter inhalation, effects beyond cardiopulmonary toxicity.

Toxin Rev. 2024;13.

<https://doi.org/10.1080/15569543.2024.2317291>

Exposure to high levels of particulate matter <2.5 μm (PM_{2.5}) causes cardiorespiratory diseases due to oxidative stress and inflammation. The toxicity of PM_{2.5} depends on particle size and composition. PM_{2.5} can reach organs far from the lungs, such as the brain, heart, kidneys, and adipose tissue, affecting their function. Moreover, endotoxin, an important component of PM_{2.5}, has recently been suggested as a risk factor for the development of metabolic, autoimmune, neurodegenerative, and renal diseases. Most published studies focus only on cardiorespiratory symptoms, airway inflammation, and impaired lung function. An amplified inflammation of the airways can transcend to other organs and cause genetic, biochemical, tissue, and physiological alterations. This review focuses on the role of endotoxin as an air pollutant, its adverse health effects, and the discussion on whether it should be considered as an air quality parameter.

Marchand G, Wingert L, Viegas C, Caetano L, Viegas S, Twaruzek M, et al.

Assessment of waste workers occupational risk to microbial agents and cytotoxic effects of mixed contaminants present in the air of waste truck cabin and ventilation filters.

Journal of the Air & Waste Management Association. 2024;74(3):145-62.

<https://doi.org/10.1080/10962247.2023.2299424>

Workers in the waste-processing industry are potentially exposed to high concentrations of biological contaminants, leading to respiratory and digestive problems and skin irritations. However, few data on the exposure of waste collection truck (WCT) drivers are available. The goal was to document the microbial risk of the waste collection truck (WCT) workers while in the vehicle cab. Long-period

sampling using the truck air filters (CAF) and short time ambient air sampling in the cab were used. The potential release of microbial particles from CAFs was also investigated since it could contribute to the microbial load of the cabin air. A combination of analytical methods also helped assess the complex mixture of the biological agents. *Aspergillus* sections *Fumigati* and *Flavi*, *E. coli*, *Enterobacter* spp. and *Legionella* spp. were detected in the CAF of trucks collecting three types of waste. The highest levels of bacteria and fungi were found in the CAF from organic WCT. The highest endotoxin concentrations in CAF were 300 EU/cm². Most of the CAF showed cytotoxic effects on both lung cells and hepatocytes. Only one mycotoxin was detected in a CAF. The maximal concentrations in the ambient WCT air varied according to the type of waste collected. The highest proportion (84%) of the air samples without cytotoxic effects on the lungs cells was for the recyclable material WCTs. The results revealed the potential microbial risk to workers from a complex mixture of bio-contaminants in the cabs of vehicles collecting all types of waste. The sustained cytotoxic effect indicates the potential adverse health-related impact of mixed contaminants (biological and non-biological) for the workers. Overall, this study highlights the benefits of using complementary sampling strategy and combined analytical methods for a the assessment of the microbial risk in work environments and the need to implement protective measures for the workers. Implications: Exposure to microbial agents is a well-known occupational hazard in the waste management sector. No previous study had evaluated the cytotoxicity of ambient air and ventilation filters to document worker exposure to a combination of contaminants during waste collection. This research confirms the usefulness of ventilation filters for long-term characterization of exposure to infectious agents, azole-resistant fungi, coliform bacteria and mycotoxin. Overall, this study highlights the importance of using several sampling and analysis methods for a comprehensive assessment of microbial risk in work environments, as well as the need to implement appropriate protective measures for collection workers. Complementary sampling strategy and combined analytical methods are helpful in risk assessment. Air filter analysis (long-term sampling) assesses the presence of airborne biological contaminants over a long period. The type of waste collected influences the microbiological hazard of the workers. Waste collection workers are potentially exposed to infectious and mycotoxin-producing fungi. Cytotoxic assays revealed that waste collection workers are potentially.

Mourino N, Varela-Lema L, Ruano-Ravina A, Peiteado C, Candal-Pedreira C, Rey-Brandariz J, et al.

Occupational exposure to endotoxins and small cell lung cancer: a systematic review with meta-analysis.

Journal of toxicology and environmental health Part B, Critical reviews. 2024;27(3):91-105.

<https://doi.org/10.1080/10937404.2024.2316151>

The relationship of occupational exposure to endotoxins with different histologic subtypes of lung cancer has not been established. Our objective was to conduct a systematic review with meta-analysis to assess the effect of exposure to endotoxins on the development of small cell lung cancer (SCLC). A bibliographic search was conducted using MEDLINE, Embase, CENTRAL, and Web of Science databases until December 2022, including all cohort and/or case-control studies that examined occupational exposure to endotoxins and SCLC. Risk of bias was assessed using the U.S. Office of Health Assessment and Translation tool. A random effects model was applied, publication bias were assessed, and a sensitivity analysis was conducted. Four papers were selected for meta-analysis purposes. A total of 144 incident cases of SCLC and 897 population or hospital controls were included. Occupational exposure to endotoxins was considered for textile/leather industry and agricultural sector workers exposed to endotoxins originating from wool, cotton, or leather dust. Except for one study, all investigations were classified as having a low probability of risk of biases. The results of the meta-analysis were not statistically significant (pooled OR: 0.86; 95% CI:0.69-1.08). In addition, neither between-study heterogeneity ($I^2=0\%$; $p=0.92$) nor publication bias was observed ($p=0.49$). The results

of the sensitivity analysis, after including five studies that assessed the risk of SCLC among textile industry and crop/livestock farm workers (not specifically exposed to endotoxins), showed a negative statistically non-significant association and low between-study heterogeneity (pooled OR: 0.90; 95% CI:0.79-1.02; $I^2=22\%$; $p=0.23$). Subjects exposed to occupational exposure to endotoxins seem to exhibit a negative association with the development of SCLC, although the results are not conclusive.

Biotechnologies

- Nouveaux procédés

Akhila DS, Ashwath P, Manjunatha KG, Akshay SD, Surasani VKR, Sofi FR, et al.

Seafood processing waste as a source of functional components: Extraction and applications for various food and non-food systems.

Trends in Food Science & Technology. 2024;145:18.

<https://doi.org/10.1016/j.tifs.2024.104348>

Background: Seafood processing significantly influences economic ventures worldwide and is an essential part of the food chain system. On the other hand, the fish processing units discard the processed by-products such as heads, viscera, bones and shells, even though they are nutritionally rich. Despite being rich in nutrients, processing, management and disposal of seafood waste is a serious concern. This will cause severe environmental pollution, which can be addressed by the recovery and utilization of these nutrients for human healthcare. Scope and approach: The effluents let out by the fishery sector contain organic matter, high amounts of phosphorus, nitrogen, and antibiotics. Lipids with high amounts of polyunsaturated fatty acids (PUFA), proteins, minerals, carotenoids, and amino acids are in abundant quantities in the discard effluents. As a consequence, there is an enormous loss of nutrients and major environmental risks. To solve this problem, it is crucial that the waste generated is subjected to several appropriate secondary processing and valorization for the regeneration of value-added products. The marine-acquired biomolecules are found to be applicable in the agricultural, biotechnological sectors and food industries. Enzymatic, chemical, and microbial processing of fish processing waste permits the fabrication of various beneficial bioactive compounds. Key findings and conclusions: Method of processing employed could affect the quantitative and qualitative characteristic properties of the biomolecules extracted or recovered from these processing wastes. The present review article sheds light on the recent and available techniques employed in the conversion of seafood processing waste towards valuable commodities that could find various applications in a broad spectrum.

Baranwal A, Polash SA, Aralappanavar VK, Behera BK, Bansal V, Shukla R.

Recent Progress and Prospect of Metal-Organic Framework-Based Nanozymes in Biomedical Application.

Nanomaterials (Basel). 2024;14(3).

https://mdpi-res.com/d_attachment/nanomaterials/nanomaterials-14-00244/article_deploy/nanomaterials-14-00244-v3.pdf?version=1708420160

A nanozyme is a nanoscale material having enzyme-like properties. It exhibits several superior properties, including low preparation cost, robust catalytic activity, and long-term storage at ambient temperatures. Moreover, high stability enables repetitive use in multiple catalytic reactions. Hence, it is considered a potential replacement for natural enzymes. Enormous research interest in nanozymes in the past two decades has made it imperative to look for better enzyme-mimicking materials for biomedical applications. Given this, research on metal-organic frameworks (MOFs) as a potential nanozyme material has gained momentum. MOFs are advanced hybrid materials made of inorganic metal ions and organic ligands. Their distinct composition, adaptable pore size, structural diversity, and

ease in the tunability of physicochemical properties enable MOFs to mimic enzyme-like activities and act as promising nanozyme candidates. This review aims to discuss recent advances in the development of MOF-based nanozymes (MOF-NZs) and highlight their applications in the field of biomedicine. Firstly, different enzyme-mimetic activities exhibited by MOFs are discussed, and insights are given into various strategies to achieve them. Modification and functionalization strategies are deliberated to obtain MOF-NZs with enhanced catalytic activity. Subsequently, applications of MOF-NZs in the biosensing and therapeutics domain are discussed. Finally, the review is concluded by giving insights into the challenges encountered with MOF-NZs and possible directions to overcome them in the future. With this review, we aim to encourage consolidated efforts across enzyme engineering, nanotechnology, materials science, and biomedicine disciplines to inspire exciting innovations in this emerging yet promising field.

da Costa CBP, Silva RCE, Rosa LC, Almeida JR, de Assis JVR, Ribeiro LGD, et al.

Enhanced biotechnological process for antivenom production using Quality by Design methodology.

Toxin Rev. 2024;13.

<https://doi.org/10.1080/15569543.2024.2324853>

Snakebites envenoming are a global public health problem that largely affects economically vulnerable populations. The primary recognized treatment involves hyperimmune serum, consisting of sterile and heterologous immunoglobulin solutions targeting specific antigens. One established production method in Vital Brazil Institute involves antibody digestion by pepsin, fractionation with ammonium sulfate salt, and thermocoagulation, yielding 30-40% and requiring a 5-day duration. This study aims to assess a novel production method centered on recovering the (Fab')(2) fraction using caprylic acid, intending to implement a more efficient technological process. A new methodology was developed, defining digestion conditions (37 degrees C, pH 3.2; 2.5 g L-1 of pepsin over 120 minutes at 150 rpm) and fractionation parameters (37 degrees C, pH 5.8; 2% caprylic acid over 60 minutes at 250 rpm). These conditions were established through the application of Quality by Design, supported by a critical risk analysis. This method reduced the usage of raw materials, process time, and labor cost per hour while maintaining yield with greater purity. These modifications were promising, resulting in higher purity and lower manufacturing costs, thereby expanding the prospect of achieving a more robust production process with a safer, optimized product. This allows meeting production goals and exploring new opportunities in foreign markets.

El-Aidie SAM, Khalifa GSA.

Innovative applications of whey protein for sustainable dairy industry: Environmental and technological perspectives-A comprehensive review.

Comprehensive Reviews in Food Science and Food Safety. 2024;23(2):36.

<https://doi.org/10.1111/1541-4337.13319>

Industrial waste management is critical to maintaining environmental sustainability. The dairy industry (DI), as one of the major consumers of freshwater, generates substantial whey dairy effluent, which is notably rich in organic matter and thus a significant pollutant. The effluent represents environmental risks due to its high biological and chemical oxygen demands. Today, stringent government regulations, environmental laws, and heightened consumer health awareness are compelling industries to responsibly manage and reuse whey waste. Therefore, this study investigates sustainable solutions for efficiently utilizing DI waste. Employing a systematic review approach, the research reveals that innovative technologies enable the creation of renewable, high-quality, value-added food products

from dairy byproducts. These innovations offer promising sustainable waste management strategies for the dairy sector, aligning with economic interests. The main objectives of the study deal with, (a) assessing the environmental impact of dairy sector waste, (b) exploring the multifaceted nutritional and health benefits inherent in cheese whey, and (c) investigating diverse biotechnological approaches to fashion value-added, eco-friendly dairy whey-based products for potential integration into various food products, and thus fostering economic sustainability. Finally, the implications of this work span theoretical considerations, practical applications, and outline future research pathways crucial for advancing the sustainable management of dairy waste.

Gebreslassie YT, Gebremeskel FG.

Green and cost-effective biofabrication of copper oxide nanoparticles: Exploring antimicrobial and anticancer applications.

Biotechnol Rep (Amst). 2024;41:e00828.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10835232/pdf/main.pdf>

Nanotechnology has made remarkable advancements in recent years, revolutionizing various scientific fields, industries, and research institutions through the utilization of metal and metal oxide nanoparticles. Among these nanoparticles, copper oxide nanoparticles (CuO NPs) have garnered significant attention due to their versatile properties and wide-range applications, particularly, as effective antimicrobial and anticancer agents. CuO NPs can be synthesized using different methods, including physical, chemical, and biological approaches. However, conventional chemical and physical approaches are expensive, resource-intensive, and involve the use of hazardous chemicals, which can pose risks to human health and the environment. In contrast, biological synthesis provides a sustainable and cost-effective alternative by eliminating chemical pollutants and allowing for the production of CuO NPs of tailored sizes and shapes. This comprehensive review focused on the green synthesis of CuO NPs using various biological resources, such as plants, microorganisms, and other biological derivatives. Current knowledge and recent trends in green synthesis methods for CuO NPs are discussed, with a specific emphasis on their biomedical applications, particularly in combating cancer and microbial infections. This review highlights the significant potential of CuO NPs in addressing these diseases. By capitalizing on the advantages of biological synthesis, such as environmental safety and the ability to customize nanoparticle characteristics, CuO NPs have emerged as promising therapeutic agents for a wide range of conditions. This review presents compelling findings, demonstrating the remarkable achievements of biologically synthesized CuO NPs as novel therapeutic agents. Their unique properties and mechanisms enable effective combating against cancer cells and various harmful microbial infections. CuO NPs exhibit potent anticancer activity through diverse mechanisms, including induction of apoptosis, inhibition of angiogenesis, and modulation of signaling pathways. Additionally, their antimicrobial activity manifests through various mechanisms, such as disrupting microbial membranes, generating reactive oxygen species, and interfering with microbial enzymes. This review offers valuable insights into the substantial potential of biologically synthesized CuO NPs as an innovative approach for future therapeutic interventions against cancer and microbial infections.

Indumathi SM, Vardhan MKH, Kumar RSR, Rohinth M, Ahmed ZHT, Prakash P, Kumar JA.

Biotechnological interventions for monitoring and mitigating microplastic pollution and development of alternatives to single-use plastics.

Environ Qual Manag. 2024;16.

<https://doi.org/10.1002/tqem.22186>

The dawn of mass plastic production in the early 20th century has accelerated the penetration of microplastics into the environment, making them known to be an insidious threat to diverse ecosystems. The current scenario for microplastics is dire, as they pervade living organisms and disrupt vital functions while also affecting the environment by altering soil quality. They pose an inherent risk to human health, making their elimination a multifaceted challenge. Due to factors such as small size, low biodegradability, and ubiquity, microplastics are particularly challenging to detect, and methods for their elimination from terrestrial and marine environments are an ever-evolving field of research. The detection of such microplastics has necessitated the use of various biotechnological techniques to monitor microplastic pollution. The control of microplastic pollution in natural ecosystems can be met by replacing mass-produced single-use plastics with viable bio-based alternatives. The main objectives of this review are to discuss how microplastic pollution is currently monitored, assessed, and controlled using satellite-generated imagery complemented with a range of biotechnological and bioremedial techniques. This review also traces the development of a range of bio-based plastic alternatives that are observed to potentially replace single-use plastics. Further discussion on the various challenges and prospects for the mitigation of microplastics will also be conducted, stressing the importance of future research.

Seyhan AA.

Trials and Tribulations of MicroRNA Therapeutics.

Int J Mol Sci. 2024;25(3):41.

https://mdpi-res.com/d_attachment/ijms/ijms-25-01469/article_deploy/ijms-25-01469.pdf?version=1706171112

The discovery of the link between microRNAs (miRNAs) and a myriad of human diseases, particularly various cancer types, has generated significant interest in exploring their potential as a novel class of drugs. This has led to substantial investments in interdisciplinary research fields such as biology, chemistry, and medical science for the development of miRNA-based therapies. Furthermore, the recent global success of SARS-CoV-2 mRNA vaccines against the COVID-19 pandemic has further revitalized interest in RNA-based immunotherapies, including miRNA-based approaches to cancer treatment. Consequently, RNA therapeutics have emerged as highly adaptable and modular options for cancer therapy. Moreover, advancements in RNA chemistry and delivery methods have been pivotal in shaping the landscape of RNA-based immunotherapy, including miRNA-based approaches. Consequently, the biotechnology and pharmaceutical industry has witnessed a resurgence of interest in incorporating RNA-based immunotherapies and miRNA therapeutics into their development programs. Despite substantial progress in preclinical research, the field of miRNA-based therapeutics remains in its early stages, with only a few progressing to clinical development, none reaching phase III clinical trials or being approved by the US Food and Drug Administration (FDA), and several facing termination due to toxicity issues. These setbacks highlight existing challenges that must be addressed for the broad clinical application of miRNA-based therapeutics. Key challenges include establishing miRNA sensitivity, specificity, and selectivity towards their intended targets, mitigating immunogenic reactions and off-target effects, developing enhanced methods for targeted delivery, and determining optimal dosing for therapeutic efficacy while minimizing side effects. Additionally, the limited understanding of the precise functions of miRNAs limits their clinical utilization. Moreover, for miRNAs to be viable for cancer treatment, they must be technically and economically feasible for the widespread adoption of RNA therapies. As a result, a thorough risk evaluation of miRNA therapeutics is crucial to minimize off-target effects, prevent overdosing, and address various other issues. Nevertheless, the therapeutic potential of miRNAs for various diseases is evident, and future investigations are essential to determine their applicability in clinical settings.

Singh BN, Tabatabaei M, Pandit A, Elling L, Gupta VK.

Emerging advances in glycoengineering of carbohydrates/glycans and their industrial applications.

Biotechnology advances. 2024;108324.

<https://doi.org/10.1016/j.biotechadv.2024.108324>

Tiwari ON, Bobby MN, Kondi V, Halder G, Kargarzadeh H, Ikbal AMA, et al.

Comprehensive review on recent trends and perspectives of natural exo-polysaccharides: Pioneering nano-biotechnological tools.

Int J Biol Macromol. 2024;265(Pt 2):130747.

Exopolysaccharides (EPSs), originating from various microbes, and mushrooms, excel in their conventional role in bioremediation to showcase diverse applications emphasizing nanobiotechnology including nano-drug carriers, nano-excipients, medication and/or cell encapsulation, gene delivery, tissue engineering, diagnostics, and associated treatments. Acknowledged for contributions to adsorption, nutrition, and biomedicine, EPSs are emerging as appealing alternatives to traditional polymers, for biodegradability and biocompatibility. This article shifts away from the conventional utility to delve deeply into the expansive landscape of EPS applications, particularly highlighting their integration into cutting-edge nanobiotechnological methods. Exploring EPS synthesis, extraction, composition, and properties, the discussion emphasizes their structural diversity with molecular weight and heteropolymer compositions. Their role as raw materials for value-added products takes center stage, with critical insights into recent applications in nanobiotechnology. The multifaceted potential, biological relevance, and commercial applicability of EPSs in contemporary research and industry align with the nanotechnological advancements coupled with biotechnological nano-cleansing agents are highlighted. EPS-based nanostructures for biological applications have a bright future ahead of them. Providing crucial information for present and future practices, this review sheds light on how eco-friendly EPSs derived from microbial biomass of terrestrial and aquatic environments can be used to better understand contemporary nanobiotechnology for the benefit of society.

Wang M, Zhang LF, Hao HJ, Yan MY, Zhu ZY.

Applications of Engineered Skin Tissue for Cosmetic Component and Toxicology Detection.

Cell Transplant. 2024;33:24.

<https://doi.org/10.1177/09636897241235464>

The scale of the cosmetic market is increasing every day. There are many safety risks to cosmetics, but they benefit people at the same time. The skin can become red, swollen, itchy, chronically toxic, and senescent due to the misuse of cosmetics, triggering skin injuries, with contact dermatitis being the most common. Therefore, there is an urgent need for a system that can scientifically and rationally detect the composition and perform a toxicological assessment of cosmetic products. Traditional detection methods rely on instrumentation and method selection, which are less sensitive and more complex to perform. Engineered skin tissue has emerged with the advent of tissue engineering technology as an emerging bioengineering technology. The ideal engineered skin tissue is the basis for building good in vitro structures and physiological functions in this field. This review introduces the existing cosmetic testing and toxicological evaluation methods, the current development status, and the types and characteristics of engineered skin tissue. The application of engineered skin tissue in the

field of cosmetic composition detection and toxicological evaluation, as well as the different types of tissue engineering scaffold materials and three-dimensional (3D) organoid preparation approaches, is highlighted in this review to provide methods and ideas for constructing the next engineered skin tissue for cosmetic raw material component analysis and toxicological evaluation.

Mustafa MI, Alzebair AA, Mohammed A.

Development of Recombinant Antibody by Yeast Surface Display Technology.

Curr Res Pharmacol Drug Discov. 2024;6:100174.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10839864/pdf/main.pdf>

Recombinant antibodies have emerged as powerful tools in various fields, including therapeutics, diagnostics, and research applications. The selection of high-affinity antibodies with desired specificity is a crucial step in the development of recombinant antibody-based products. In recent years, yeast surface display technology has gained significant attention as a robust and versatile platform for antibody selection. This graphical review provides an overview of the yeast surface display technology and its applications in recombinant antibody selection. We discuss the key components involved in the construction of yeast surface display libraries, including the antibody gene libraries, yeast host strains, and display vectors. Furthermore, we highlight the strategies employed for affinity maturation and optimization of recombinant antibodies using yeast surface display. Finally, we discuss the advantages and limitations of this technology compared to other antibody selection methods. Overall, yeast surface display technology offers a powerful and efficient approach for the selection of recombinant antibodies, enabling the rapid generation of high-affinity antibodies for various applications.

Organismes français et internationaux - Actualités

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

- **Bactéries**

OMS, [Analyses en laboratoire pour le diagnostic de la diphtérie dans les contextes de flambée épidémique : orientations provisoires](#), 26/01/2024.

ECDC, [Increase of hypervirulent carbapenem-resistant *Klebsiella pneumoniae* in the EU/EEA](#), 14/02/2024.

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

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- **Coqueluche**

Santé Publique France, [Recrudescence de la coqueluche en Europe, appel à une vigilance renforcée en France](#), 18/04/2024.

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Institut Pasteur, [Le virus Toscana à l'origine d'encéphalites non-expliquées](#), 11/12/2023.

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- **Grippe aviaire (H5N1)**

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- **Infection à CMV**

HSCP, [Dépistage systématique de l'infection à cytomégalo virus pendant la grossesse](#), 08/12/2023, mise en ligne le 04/02/2024.

- **Infections respiratoires aiguës**

Santé Publique France, [Infections respiratoires aiguës \(grippe, bronchiolite, COVID-19\). Bilan de la saison 2023-2024](#), 17/04/2024.

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- **Mycoplasmae pneumoniae**

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- **Peste bubonique**

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- **Rougeole**

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[Recrudescence de la rougeole en France et en Europe, restons mobilisés](#), 05/04/2024.

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