Bulletin de veille risques biologiques N°119 - janvier-avril 2023

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.

Les bulletins de veille sont disponibles sur le portail documentaire de l'INRS. L'abonnement permet de recevoir une alerte mail lors de la publication d'un nouveau bulletin (bouton « M'abonner » disponible après connection à son compte).

Sommaire :

Veille risque biologique

• Protection respiratoire : ajustement

Berger S, Mattern M, Niessner J.

Face mask performance related to potentially infectious aerosol particles, breathing mode and facial leakage.

International journal of hygiene and environmental health. 2023;248:9.

https://www.sciencedirect.com/science/article/pii/S1438463922001869?via%3Dihub

During the COVID 19 pandemic, wearing certified Respiratory Protective Devices (RPDs) provided important means of protection against direct and indirect infections caused by virus-laden aerosols. Assessing the RPD performance associated with infection prevention in standardised certification tests, however, faces drawbacks, such as the representativeness of the test aerosols used, the protection of third parties during exhalation or the effect of facial leaks. To address these drawbacks, we designed a novel test bench to measure RPD performance, namely the number based total efficiency, size-segregated fractional filtration efficiency and net pressure loss, for 11 types of certified surgical masks and Filtering Face Pieces dependent on breathing mode and facial fit. To be representative for the context of potentially infectious particles, we use a test aerosol based on artificial saliva that is in its size distribution similar to exhaled aerosols. In inhalation mode excluding facial leaks, all investigated samples deposit by count more than 85% of artificial saliva particles, which suggests a high efficiency of certified RPD filter media related to these particles. In exhalation mode most RPDs tend to have similar efficiencies but lower pressure losses. This deviation tends to be significant primarily for the RPDs with thin filter layers like surgical masks or Filtering Face Pieces containing nanofibers and may depend on the RPDs shape. Both the filtration efficiency and pressure loss are strongly inter-dependent and significantly lower when RPDs are naturally fitted including facial leaks, leading to a wide efficiency range of approximately 30-85%. The results indicate a much greater influence of the facial fit than the filter material itself. Furthermore, RPDs tend be more effective in self-protection than in third-party protection, which is inversely correlated to pressure loss. Comparing different types of RPDs, the

pressure loss partially differs at similar filtration efficiencies, which points out the influence of the material and the filter area on pressure loss.

Goyal N, Goldrich D, Hazard W, Stewart W, Ulinfun C, Soulier J, et al.

The need for systematic quality controls in implementing N95 reprocessing and sterilization.

Journal of Hospital Infection. 2023;133:38-45.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9744483/pdf/main.pdf

Background: Due to increased requirement for personal protective equipment during the coronavirus disease 2019 pandemic, many medical centres utilized sterilization systems approved under Food and Drug Administration Emergency Use Authorization for single-use N95 mask re-use. However, few studies have examined the real-world clinical challenges and the role of ongoing quality control measures in successful implementation. Aims: To demonstrate successful implementation of quality control measures in mask reprocessing, and the importance of continued quality assurance. Methods: A prospective quality improvement study was conducted at a tertiary care medical centre. In total, 982 3M 1860 masks and Kimberly-Clark Tecnol PFR95 masks worn by healthcare workers underwent sterilization using a vaporized hydrogen peroxide gas plasma-based reprocessing system. Post-processing qualitative fit testing (QFT) was per-formed on 265 masks. Mannequin testing at the National Institute for Occupational Safety and Health (NIOSH) laboratory was used to evaluate the impact of repeated sterilization on mask filtration efficacy and fit. A locally designed platform evaluated the filtration efficiency of clinically used and reprocessed masks. Findings: In total, 255 N95 masks underwent QFT. Of these, 240 masks underwent post -processing analysis: 205 were 3M 1860 masks and 35 were PFR95 masks. Twenty-five (12.2%) of the 3M masks and 10 (28.5%) of the PFR95 masks failed post-processing QFT. Characteristics of the failed masks included mask deformation (N=3, all 3M masks), soiled masks (N=3), weakened elastic bands (N=5, three PFR95 masks), and concern about mask shrinkage (N=3, two 3M masks). NIOSH testing demonstrated that while filter efficiency remained >98% after two cycles, mask strap elasticity decreased by 5.6% after reprocessing. Conclusions: This study demonstrated successful quality control implementation for N95 mask disinfection, and highlights the importance of real-world clinical testing beyond laboratory conditions. 2022 Published by Elsevier Ltd on behalf of The Healthcare Infection Society.

Hyun C, Jensen MM, Yang K, Weaver JC, Wang XH, Kudo Y, et al.

The Ultra fit community mask-Toward maximal respiratory protection via personalized face fit.

PloS one. 2023;18(3):18.

https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0281050&type=printable

Effective masking policies to prevent the spread of airborne infections depend on public access to masks with high filtration efficacy. However, poor face-fit is almost universally present in pleated multilayer disposable face masks, severely limiting both individual and community respiratory protection. We developed a set of simple mask modifications to mass-manufactured disposable masks, the most common type of mask used by the public, that dramatically improves both their personalized fit and performance in a low-cost and scalable manner. These modifications comprise a user-moldable full mask periphery wire, integrated earloop tension adjusters, and an inner flange to trap respiratory droplets. We demonstrate that these simple design changes improve quantitative fit factor by 320%, triples the level of protection against aerosolized droplets, and approaches the model efficacy of N95 respirators in preventing the community spread of COVID-19, for an estimated additional cost of less than 5 cents per mask with automated production.

Ibebunjo K, Tella S, Kiljunen S, Repo E.

Shape Memory Respirator Mask for Airborne Viruses.

Polymers. 2023;15(8):18.

https://mdpi-res.com/d_attachment/polymers/polymers-15-01859/article_deploy/polymers-15-01859-v2.pdf?version=1681782101

The emergence of COVID-19 has spurred demand for facemasks and prompted many studies aiming to develop masks that provide maximum protection. Filtration capacity and fit define the level of protection a mask can provide, and the fit is in large part determined by face shape and size. Due to differences in face dimensions and shapes, a mask of one size will not be likely to fit all faces. In this work, we examined shape memory polymers (SMPs) for producing facemasks that are able to alter their shape and size to fit every face. Polymer blends with and without additives or compatibilizers were melt-extruded, and their morphology, melting and crystallization behavior, mechanical properties, and shape memory (SM) behavior were characterized. All the blends had phase-separated morphology. The mechanical properties of the SMPs were modified by altering the content of polymers and compatibilizers or additives in the blends. The reversible and fixing phases are determined by the melting transitions. SM behavior is caused by physical interaction at the interface between the two phases in the blend and the crystallization of the reversible phase. The optimal SM blend and printing material for the mask was determined to be a polylactic acid (PLA)/polycaprolactone (PCL) blend with 30% PCL. A 3D-printed respirator mask was manufactured and fitted to several faces after being thermally activated at 65 degrees C. The mask had excellent SM and could be molded and remolded to fit a variety of facial shapes and sizes. The mask also exhibited self-healing and healed from surface scratches.

Knobloch JK, Franke G, Knobloch MJ, Knobling B, Kampf G.

Overview of tight fit and infection prevention benefits of respirators (filtering face pieces).

Journal of Hospital Infection. 2023;134:89-96.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9894678/pdf/main.pdf

Regulations for measures to protect against SARS-CoV-2 transmission vary widely around the world, with very strict regulations in Germany where respirators (filtering face piece FFP2 or comparable) are often mandatory. The efficiency of respirators, however, depends essentially on the tight facial fit avoiding the bypass of contaminated air via gaps between mask and wearer's face. The facial fit can be verified in a fit test. The aim of this review was to describe the quantitative fit test results depending on the respirator designs. A literature search revealed 29 suitable studies. Of all respirators with circumferential head straps, three-panel folded dome-shaped respirators showed the best fit (80.8% of 4625 fit tests passed), followed by rigid-dome-shaped respirators (72.4% of 8234 fit tests passed), duckbill-shaped respirators (31.6% of 2120 fit tests passed), and coffee-filter-shaped res-pirators (30.9% of 3392 fit tests passed). Respirators with ear loops showed very poor tight fit (3.6% of 222 fit tests passed). In four randomized control trials, single-use respirators were not shown to be superior to surgical masks for the prevention of laboratory -confirmed viral respiratory infections, even when adjusted with a fit test. Therefore, we consider the mandatory use of respirators to be disproportionate and not supported by evidence. Further evidence should be generated, in which scenarios respirators might provide an effective benefit as part of occupational health and safety. For situations with confirmed benefits, only high-quality disposable respirators with head straps or respiratory protective equipment of higher protective levels should be used.(c) 2023 The Author(s). Published by Elsevier Ltd

on behalf of The Healthcare Infection Society. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

Lindsley WG, Blachere FM, Derk RC, Boots T, Duling MG, Boutin B, et al.

Constant vs. cyclic flow when testing face masks and respirators as source control devices for simulated respiratory aerosols.

Aerosol Science and Technology. 2023;57(3):215-32.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10194085/pdf/nihms-1867234.pdf

SARS-CoV-2 spreads by infectious aerosols and droplets from the respiratory tract. Masks and respirators can reduce the transmission of infectious respiratory diseases by collecting these aerosols at the source. The ability of source control devices to block aerosols can be tested by expelling an aerosol through a headform using constant airflows, which are simpler, or cyclic airflows, which are more realistic but require more complex methods. Experiments with respirators found that using cyclic vs. constant flows affected the amount of aerosol inhaled, but similar comparisons have not been made for source control devices with exhaled aerosols. We measured the collection efficiencies for exhaled aerosols for two cloth masks, two medical masks with and without an elastic mask brace, a neck gaiter, and an N95 filtering facepiece respirator using 15 L/min and 85 L/min constant and cyclic flows and a headform with pliable skin. The collection efficiencies for the 15 L/min cyclic flow, 15 L/min constant flow, and 85 L/min constant flow were not significantly different in most cases. The apparent collection efficiencies for the 85 L/min cyclic flow were artificially increased by rebreathing and refiltration of the aerosol from the collection chamber. The collection efficiencies correlated well with the fit factors (rho > 0.95) but not the filtration efficiencies (rho < 0.54). Our results suggest that the aerosol collection efficiency measurements of source control devices are comparable when testing the devices using either constant or cyclic airflows and that the potential for aerosol rebreathing must be considered when conducting experiments.

Montero-Calderon C, Tacuri R, Solis H, De-La-Rosa A, Gordillo G, Araujo-Granda P.

Masks thermal degradation as an alternative of waste valorization on the COVID-19 pandemic: A kinetic study.

Heliyon. 2023;9(2):15.

https://www.cell.com/heliyon/pdf/S2405-8440(23)00725-9.pdf

The COVID-19 pandemic generated a new dynamic around waste management. Personal pro-tective equipment such as masks, gloves, and face shields were essential to prevent the spread of the disease. However, despite the increase in waste, no technical alternatives were foreseen for the recovery of these wastes, which are made up of materials that can be valued for energy recovery.It is essential to design processes such as waste to energy to promote the circular economy. Therefore, techniques such as pyrolysis and thermal oxidative decomposition of waste materials need to be studied and scaled up, for which kinetic models and thermodynamic parameters are required to allow the design of this reaction equipment. This work develops kinetic models of the thermal degradation process by pyrolysis as an alternative for energy recovery of used masks generated by the COVID-19 pandemic.The wasted masks were isolated for 72 h for virus inactivation and characterized by FTIR-ATR spectroscopy, elemental analysis, and determinate the higher calorific value (HCV). The composition of the wasted masks included polypropylene, polyethylene terephthalate, nylon, and spandex, with higher calorific values than traditional fuels. For this reason, they are susceptible to value as an energetic material.Thermal degradation was performed by thermogravimetric analysis at different heating rates

in N2 atmosphere. The gases produced were characterized by gas chromatography and mass spectrometry. The kinetic model was based on the mass loss of the masks on the thermal degradation, then calculated activation energies, reaction orders, pre-exponential factors, and thermodynamic parameters. Kinetics models such as Coats and Redfern, Horowitz and Metzger, Kissinger-Akahira-Sunose were studied to find the best-fit models between the experimental and calcu-lated data.The kinetic and thermodynamic parameters of the thermal degradation processes demonstrated the feasibility and high potential of recovery of these residues with conversions higher than 89.26% and obtaining long-chain branched hydrocarbons, cyclic hydrocarbons, and CO2 as products.

Warren G, Wiggins C, Lansing LM.

Development of a qualitative respirator fit testing program for BSN students.

Teach Learn Nurs. 2023;18(1):225-7.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9692204/pdf/main.pdf

The COVID-19 pandemic has impacted the nursing student clinical experience. At the time of this project, hospitals hosting students for clinical experiences had a high population of COVID-19 positive patients. University and hospital policies at the time prohibited students from caring for COVID-19 patients due to the inability to safely ensure that students could access the proper protective equipment (PPE) necessary when caring for patients in airborne precautions. Infection control guidelines for patients in airborne precautions require a N95 respirator to be always worn by healthcare providers. These respirators require yearly fit test following OSHA (Occupational Safety and Health Administration) standards. Hospitals do have the resources to complete N95 fit tests for nursing students. The solution was to provide qualitative N95 mask fit testing, performed by university faculty, staff, and students using OSHA guidelines and standards. Within 3 months, over 50% of the student population had been fit tested, which increased the clinical opportunities for the students. (c) 2022 Organization for Associate Degree Nursing. Published by Elsevier Inc. All rights reserved.

• Zoonoses : pathologies émergentes

About F, Pastre T, Boutrou M, Martinez AY, Melzani A, Peugny S, et al.

Novel Species of Brucella Causing Human Brucellosis, French Guiana.

Emerging infectious diseases. 2023;29(2):333-40.

https://wwwnc.cdc.gov/eid/article/29/2/pdfs/22-0725.pdf

Human brucellosis is a zoonoses caused by bacteria of the genus Brucella. Infection results in subacute or chronic debilitating disease with nonspecific clinical manifestations and is often associated with consum-ing unpasteurized dairy products. We report 2 cases of brucellosis in male patients who were hospitalized in distinct towns of French Guiana, an overseas ter-ritory of France located on the northeastern shore of South America. Both men were citizens of Brazil work-ing as clandestine goldminers in the deep Amazonian rainforest. Characterization of the 2 bacterial isolates revealed that they represent a potential new species of Brucella. Medical practitioners working in contact with wildlife in this region of the world should be aware of the existence of these pathogens and the potential for human infection.

Alarcón J, Kim M, Balanji N, Davis A, Mata F, Karan A, et al.

Occupational Monkeypox Virus Transmission to Healthcare Worker, California, USA, 2022.

Emerging Infectious Disease journal. 2023;29(2):435.

https://wwwnc.cdc.gov/eid/article/29/2/22-1750_article

https://wwwnc.cdc.gov/eid/article/29/2/pdfs/22-1750.pdf

Risk for transmission of monkeypox virus (MPXV) (clade IIb) to healthcare workers (HCWs) is low. Although many cases have been reported among HCW, only a few have been occupationally acquired. We report a case of non–needle stick MPXV transmission to an HCW in the United States.

Castelo-Branco D, Nobre JA, Souza PRH, Diogenes EM, Guedes GMM, Mesquita FP, et al.

Role of Brazilian bats in the epidemiological cycle of potentially zoonotic pathogens.

Microb Pathog. 2023;177:17.

https://doi.org/10.1016/j.micpath.2023.106032

Bats (Chiroptera) are flying mammals of great biodiversity and habits. These characteristics contribute for them being natural reservoirs and part of the epidemiological cycle of several potentially zoonotic pathogens, such as viruses, protozoa, fungi and bacteria. Brazil hosts approximately 15% of the world's bat diversity, with 181 distinct species, 68 genera and 9 families. About 60% of infectious diseases in humans are of zoonotic origin and, in the last decades, the detection of zoonotic pathogens in bats and their environment has been reported, such as Rabies virus (RABV) and Histoplasma capsulatum. Thus, the aim of this work was to review the reports of zoonotic pathogens associated with bats in Brazil in the past ten years. We reviewed the main pathogenic microorganisms described and the species of bats most frequently involved in the epidemiological cycles of these zoonotic agents. The obtained data show an upward trend in the detection of zoonotic pathogens in Brazilian bats, such as RABV, Bartonella sp., Histoplasma capsulatum and Leishmania spp., with emphasis on the bat species Artibeus lituratus, Carollia perspicillata, Desmodus rotundus and Molossus molossus. These findings highlight the importance of monitoring bat-associated microrganisms to early identify pathogens that may threaten bat populations, including potentially zoonotic microrganisms, emphasizing the importance of the One Health approach to pre-vent and mitigate the risks of the emergence of zoonotic diseases.

Chen Q, Yang Q, Chen HF, Yao YK, Shen LS, Zhang RH, et al.

Zoonotic fungus Arthroderma multifidum causing chronic pulmonary infection.

Int J Infect Dis. 2023;130:17-9.

https://doi.org/10.1016/j.ijid.2023.02.010

A rare case of fungus Arthroderma multifidum infection occurred in a 63-year-old man. The patient had some risk factors, including occupational exposure, immunosuppressive state, and structural basis following pulmonary tuberculosis and pneumothorax surgery. The pathogen was repeatedly isolated from bronchoalveolar lavage fluid and identified by gene sequencing. It is the first report of human infection caused by A. multifidum. Whole genome sequencing and analysis of its genomic characterization are com-pleted. The findings provide us with a key clinical insight that the combination of immune suppression and environmental exposure could create an ideal condition for zoonotic fungal infections.

Dumonteil E, Herrera C, Sabino-Santos G.

Monkeypox Virus Evolution before 2022 Outbreak.

Emerging Infectious Disease journal. 2023;29(2):451.

https://wwwnc.cdc.gov/eid/article/29/2/22-0962_article

https://wwwnc.cdc.gov/eid/article/29/2/pdfs/22-0962.pdf

Phylogenetic analysis of monkeypox virus genomes showed statistically significant divergence and nascent subclades during the 2022 mpox outbreak. Frequency of G>A/C>T transitions has increased in recent years, probably resulting from apolipoprotein B mRNA editing enzyme catalytic polypeptide 3G (APOBEC3) deaminase editing. This microevolutionary pattern most likely reflects community spread of the virus and adaptation to humans.

European Food Safety Authority E, Berezowski J, de Balogh K, Dorea FC, Rueegg S, Broglia A, et al.

Prioritisation of zoonotic diseases for coordinated surveillance systems under the One Health approach for cross-border pathogens that threaten the Union.

Efsa J. 2023;21(3):54.

https://doi.org/10.2903/j.efsa.2023.7853

In the context of the initiative 'CP-g-22-04.01 Direct grants to Member States' authorities', EFSA was requested to develop and conduct a prioritisation of zoonotic diseases, in collaboration with Member States, to identify priorities for the establishment of a coordinated surveillance system under the One Health approach. The methodology developed by EFSA's Working Group on One Health surveillance was based on a combination of multi-criteria decision analysis and the Delphi method. It comprised the establishment of a list of zoonotic diseases, definition of pathogen- and surveillance-related criteria, weighing of those criteria, scoring of zoonotic diseases by Member States, calculation of summary scores, and ranking of the list of zoonotic diseases according to those scores. Results were presented at EU and country level. A prioritisation workshop was organised with the One Health subgroup of EFSA's Scientific Network for Risk Assessment in Animal Health and Welfare in November 2022 to discuss and agree on a final list of priorities for which specific surveillance strategies would be developed. Those 10 priorities were Crimean-Congo haemorrhagic fever, echinococcosis (both E. granulosus and E. multilocularis), hepatitis E, influenza (avian), influenza (swine), Lyme borreliosis, Q-fever, Rift Valley fever, tick-borne encephalitis and West Nile fever. 'Disease X' was not assessed in the same way as other zoonotic diseases on the list, but it was added to the final list of priorities due to its relevance and importance in the One Health context.

Gildas Hounmanou YM, Engberg J, Bjerre KD, Holt HM, Olesen B, Voldstedlund M, et al.

Correlation of High Seawater Temperature with Vibrio and Shewanella Infections, Denmark, 2010–2018.

Emerging Infectious Disease journal. 2023;29(3):605.

https://wwwnc.cdc.gov/eid/article/29/3/22-1568_article

https://wwwnc.cdc.gov/eid/article/29/3/pdfs/22-1568.pdf

During 2010–2018 in Denmark, 638 patients had Vibrio infections diagnosed and 521 patients had Shewanella infections diagnosed. Most cases occurred in years with high seawater temperatures. The substantial increase in those infections, with some causing septicemia, calls for clinical awareness and mandatory notification policies.

Ijsseldijk L, Begeman L, Duim B, Gröne A, Kik MJL, Klijnstra M, et al.

Harbor Porpoise Deaths Associated with Erysipelothrix rhusiopathiae, the Netherlands, 2021.

Emerging Infectious Disease journal. 2023;29(4):835.

https://wwwnc.cdc.gov/eid/article/29/4/22-1698_article

https://wwwnc.cdc.gov/eid/article/29/4/pdfs/22-1698.pdf

In August 2021, a large-scale mortality event affected harbor porpoises (Phocoena phocoena) in the Netherlands. Pathology and ancillary testing of 22 animals indicated that the most likely cause of death was Erysipelothrix rhusiopathiae infection. This zoonotic agent poses a health hazard for cetaceans and possibly for persons handling cetacean carcasses.

Islam A, Cannon D, Rahman MZ, Khan SU, Epstein J, Daszak P, et al.

Nipah Virus Exposure in Domestic and Peridomestic Animals Living in Human Outbreak Sites, Bangladesh, 2013–2015.

Emerging Infectious Disease journal. 2023;29(2):393.

https://wwwnc.cdc.gov/eid/article/29/2/22-1379_article

https://wwwnc.cdc.gov/eid/article/29/2/pdfs/22-1379.pdf

Spillovers of Nipah virus (NiV) from Pteropus bats to humans occurs frequently in Bangladesh, but the risk for spillover into other animals is poorly understood. We detected NiV antibodies in cattle, dogs, and cats from 6 sites where spillover human NiV infection cases occurred during 2013–2015.

Javelle E, de Laval F, Durand GA, Dia A, Ficko C, Bousquet A, et al.

Chikungunya Outbreak in Country with Multiple Vectorborne Diseases, Djibouti, 2019–2020.

Emerging Infectious Disease journal. 2023;29(4):826.

https://wwwnc.cdc.gov/eid/article/29/4/22-1850_article

https://wwwnc.cdc.gov/eid/article/29/4/pdfs/22-1850.pdf

During 2019–2020, a chikungunya outbreak occurred in Djibouti City, Djibouti, while dengue virus and malaria parasites were cocirculating. We used blotting paper to detect arbovirus emergence and confirm that it is a robust method for detecting and monitoring arbovirus outbreaks remotely.

Kijewska A, Koroza A, Grudlewska-Buda K, Kijewski T, Wiktorczyk-Kapischke N, Zorena K, et al.

Molluscs-A ticking microbial bomb.

Frontiers in Microbiology. 2023;13:19.

https://doi.org/10.3389%2Ffmicb.2022.1061223

Bivalve shellfish consumption (ark shells, clams, cockles, and oysters) has increased over the last decades. Following this trend, infectious disease outbreaks associated with their consumption have been reported more frequently. Molluscs are a diverse group of organisms found wild and farmed. They are common on our tables, but unfortunately, despite their great taste, they can also pose a threat as a potential vector for numerous species of pathogenic microorganisms. Clams, in particular, might be filled with pathogens because of their filter-feeding diet. This specific way of feeding favors the accumulation of excessive amounts of pathogenic microorganisms like Vibrio spp., including Vibrio cholerae and V. parahaemolyticus, Pseudomonas aeruginosa, Escherichia coli, Arcobacter spp., and fecal coliforms, and intestinal enterococci. The problems of pathogen dissemination and disease outbreaks caused by exogenous bacteria in many geographical regions quickly became an unwanted effect of globalized food supply chains, global climate change, and natural pathogen transmission dynamics. Moreover, some pathogens like Shewanella spp., with high zoonotic potential, are spreading worldwide along with food transport. These bacteria, contained in food, are also responsible for the potential transmission of antibiotic-resistance genes to species belonging to the human microbiota. Finally, they end up in wastewater, thus colonizing new areas, which enables them to introduce new antibiotic-resistance genes (ARG) into the environment and extend the existing spectrum of ARGs already present in local biomes. Foodborne pathogens require modern methods of detection. Similarly, detecting ARGs is necessary to prevent resistance dissemination in new environments, thus preventing future outbreaks, which could threaten associated consumers and workers in the food processing industry.

Krug C, Rigaud E, Siby-Diakite D, Benezet L, Papadopoulos P, de Valk H, et al.

Seroprevalence of Hantavirus in Forestry Workers, Northern France, 2019-2020.

Viruses-Basel. 2023;15(2):12.

https://mdpi-res.com/d_attachment/viruses/viruses-15-00338/article_deploy/viruses-15-00338.pdf?version=1674654524

We aimed to estimate the seroprevalence of Puumala orthohantavirus (PUUV) among forestry workers in northern France, and to explore sociodemographic risk factors. We conducted a random cross-sectional seroprevalence survey among 1777 forestry workers in 2019-2020. The presence of immunoglobulin G against PUUV antigens in serum was assessed using enzyme-linked immunosorbent assay and confirmed using immunofluorescence assay. Poisson regression models were used to explore factors associated with seropositivity. Weighted seroprevalence was 5% (3-6) in northeastern France, 4% (2-6) in north central France, and 1% in two regions located in the center of the country (Auvergne and Limousin). There were no seropositive workers detected in northwestern France. Seropositivity was associated with age, sex, and cumulative seniority in the forestry sector. Seroprevalence was highest in known endemic areas of the northeast and lowest in the northwest. Nevertheless, we found serological evidence of PUUV infection in two regions located in the center of the country, suggesting circulation of the virus in these regions, previously thought to be non-endemic.

Lorenzo Juanes HM, Carbonell C, Sendra BF, López-Bernus A, Bahamonde A, Orfao A, et al.

Crimean-Congo Hemorrhagic Fever, Spain, 2013–2021.

Emerging Infectious Disease journal. 2023;29(2):252.

https://wwwnc.cdc.gov/eid/article/29/2/22-0677_article

https://wwwnc.cdc.gov/eid/article/29/2/pdfs/22-0677.pdf

Crimean-Congo hemorrhagic fever (CCHF) is a viral infectious disease for which distribution of the main vector, Hyalomma spp. ticks, is expanding. We analyzed all 10 cases of CCHF diagnosed in Spain during 2013–2021; case-patient median age was 56.5 years, and 7 were men. We identified CCHF virus genotypes III and V. Six case-patients acquired the infection in urban areas. Sixty percent of patients were infected in summer and 40% in spring. Two patients met criteria for hemophagocytic syndrome. Seven patients survived. The epidemiologic pattern of CCHF in Spain is based on occasional cases with an elevated mortality rate. Genotype III and, to a less extent also genotype V, CCHF circulates in humans in a common geographic area in Spain. Those data suggest that the expansion pathways are complex and may change over time. Physicians should remain alert to the possibility of new CCHF cases.

Lv X, Liu Z, Li L, Xu W, Yuan Y, Liang X, et al.

Yezo Virus Infection in Tick-Bitten Patient and Ticks, Northeastern China.

Emerging Infectious Disease journal. 2023;29(4):797.

https://wwwnc.cdc.gov/eid/article/29/4/22-0885_article

https://wwwnc.cdc.gov/eid/article/29/4/pdfs/22-0885.pdf

We identified Yezo virus infection in a febrile patient who had a tick bite in northeastern China, where 0.5% of Ixodes persulcatus ticks were positive for viral RNA. Clinicians should be aware of this potential health threat and include this emerging virus in the differential diagnosis for tick-bitten patients in this region.

Mehl C, Wylezich C, Geiger C, Schauerte N, Mätz-Rensing K, Nesseler A, et al.

Reemergence of Lymphocytic Choriomeningitis Mammarenavirus, Germany.

Emerging Infectious Disease journal. 2023;29(3):631.

https://wwwnc.cdc.gov/eid/article/29/3/22-1822_article

https://wwwnc.cdc.gov/eid/article/29/3/pdfs/22-1822.pdf

Lymphocytic choriomeningitis mammarenavirus (LCMV) is a globally distributed zoonotic pathogen transmitted by house mice (Mus musculus). We report the reemergence of LCMV (lineages I and II) in wild house mice (Mus musculus domesticus) and LCMV lineage I in a diseased golden lion tamarin (Leontopithecus rosalia) from a zoo in Germany.

Pinn-Woodcock T, Frye E, Guarino C, Franklin-Guild R, Newman AP, Bennett J, et al.

A one-health review on brucellosis in the United States.

JAVMA-J Am Vet Med Assoc. 2023;261(4):451-62.

https://avmajournals.avma.org/downloadpdf/journals/javma/261/4/javma.23.01.0033.pdf

Brucellosis is a highly infectious zoonotic disease of global significance due to its adverse impact on public health, economics, and trade. Despite being one of the most prevalent zoonoses worldwide, attention given to global brucellosis control and prevention has been inadequate. Brucella species of greatest one-health relevance in the US in-clude those infecting dogs (Brucella canis), swine (Brucella suis), and cattle and domestic bison (Brucella abortus). Although not endemic in the US, Brucella melitensis warrants awareness as it poses a risk to international travelers. While brucellosis has been eradicated from domestic livestock in the US, its detection in US companion animals (B canis) and US wildlife reservoirs (B suis and B abortus) and enzootic presence internationally pose a threat to human and animal health, warranting its spotlight on the one-health stage. The challenges of B canis diagnosis in humans and dogs is addressed in more detail in the companion Currents in One Health by Guarino et al, AJVR, April 2023. Human consumption of unpasteurized dairy products and occupational exposure of laboratory diagnosticians, veterinarians, and animal care providers are responsible for human exposures reported to the US CDC. Diagnosis and treatment of brucellosis is challenging due to the limitations of diagnostic assays and the tendency of Brucella spp to produce nonspecific, insidious clinical signs and evade antimicrobial therapy, making prevention essential. This review will focus on zoonotic considerations for Brucella spp found within the US along with their epidemiology, pathophysiology, clinical presentation, treatment, and control strategies.

Prusinski M, O'Connor C, Russell A, Sommer J, White J, Rose L, et al.

Associations of Anaplasma phagocytophilum Bacteria Variants in Ixodes scapularis Ticks and Humans, New York, USA.

Emerging Infectious Disease journal. 2023;29(3):540.

https://wwwnc.cdc.gov/eid/article/29/3/22-0320_article

https://wwwnc.cdc.gov/eid/article/29/3/pdfs/22-0320.pdf

Anaplasmosis, caused by the tickborne bacterium Anaplasma phagocytophilum, is an emerging public health threat in the United States. In the northeastern United States, the blacklegged tick (Ixodes scapularis) transmits the human pathogenic genetic variant of A. phagocytophilum (Ap-ha) and a nonpathogenic variant (Ap-V1). New York has recently experienced a rapid and geographically focused increase in cases of anaplasmosis. We analyzed A. phagocytophilum–infected I. scapularis ticks collected across New York during 2008–2020 to differentiate between variants and calculate an entomological risk index (ERI) for each. Ap-ha ERI varied between regions and increased in all regions during the final years of the study. Space-time scan analyses detected expanding clusters of Ap-ha located within documented anaplasmosis hotspots. Ap-ha ERI was more positively correlated with anaplasmosis incidence than non-genotyped A. phagocytophilum ERI. Our findings help elucidate the relationship between the spatial ecology of A. phagocytophilum variants and anaplasmosis.

Rodon J, Mykytyn A, Te N, Okba NMA, Lamers M, Pailler-García L, et al.

Extended Viral Shedding of MERS-CoV Clade B Virus in Llamas Compared with African Clade C Strain.

Emerging Infectious Disease journal. 2023;29(3):585.

https://wwwnc.cdc.gov/eid/article/29/3/22-0986_article

https://wwwnc.cdc.gov/eid/article/29/3/pdfs/22-0986.pdf

Middle East respiratory syndrome coronavirus (MERS-CoV) clade B viruses are found in camelids and humans in the Middle East, but clade C viruses are not. We provide experimental evidence for extended shedding of MERS-CoV clade B viruses in llamas, which might explain why they outcompete clade C strains in the Arabian Peninsula.

Roychoudhury P, Sereewit J, Xie H, Nunley E, Bakhash S, Lieberman NAP, et al.

Genomic Analysis of Early Monkeypox Virus Outbreak Strains, Washington, USA.

Emerging Infectious Disease journal. 2023;29(3):644.

https://wwwnc.cdc.gov/eid/article/29/3/22-1446_article

https://wwwnc.cdc.gov/eid/article/29/3/pdfs/22-1446.pdf

We conducted a genomic analysis of monkeypox virus sequences collected early in the 2022 outbreak, during July–August , in Washington, USA. Using 109 viral genomes, we found low overall genetic diversity, multiple introductions into the state, ongoing community transmission, and potential for co-infections by multiple strains.

Sano M, Rimbara E, Suzuki M, Matsui H, Hirai M, Aoki S, et al.

Helicobacter ailurogastricus in Patient with Multiple Refractory Gastric Ulcers, Japan.

Emerging Infectious Disease journal. 2023;29(4):833.

https://wwwnc.cdc.gov/eid/article/29/4/22-1807_article

https://wwwnc.cdc.gov/eid/article/29/4/pdfs/22-1807.pdf

We report the isolation of Helicobacter ailurogastricus, a Helicobacter species that infects cats and dogs, from a person with multiple refractory gastric ulcers. In addition to H. suis, which infects pigs, Helicobacter species that infect cats and dogs should be considered as potential gastric pathogens in humans.

Sgroi G, Iatta R, Carelli G, Uva A, Cavalera MA, Laricchiuta P, et al.

Rickettsia conorii Subspecies israelensis in Captive Baboons.

Emerging Infectious Disease journal. 2023;29(4):841.

https://wwwnc.cdc.gov/eid/article/29/4/22-1176_article

https://wwwnc.cdc.gov/eid/article/29/4/pdfs/22-1176.pdf

Hamadryas baboons (Papio hamadryas) may transmit zoonotic vector-borne pathogens to visitors and workers frequenting zoological parks. We molecularly screened 33 baboons for vector-borne pathogens. Three (9.1%) of 33 animals tested positive for Rickettsia conorii subspecies israelensis. Clinicians should be aware of potential health risks from spatial overlapping between baboons and humans.

Soto R, Baldry E, Vahey G, Lehman J, Silver M, Panella A, et al.

Increase in Colorado Tick Fever Virus Disease Cases and Effect of COVID-19 Pandemic on Behaviors and Testing Practices, Montana, 2020.

Emerging Infectious Disease journal. 2023;29(3):561.

https://wwwnc.cdc.gov/eid/article/29/3/22-1240_article

https://wwwnc.cdc.gov/eid/article/29/3/pdfs/22-1240.pdf

In 2020, Montana, USA, reported a large increase in Colorado tick fever (CTF) cases. To investigate potential causes of the increase, we conducted a case–control study of Montana residents who tested positive or negative for CTF during 2020, assessed healthcare providers' CTF awareness and testing practices, and reviewed CTF testing methods. Case-patients reported more time recreating outdoors on weekends, and all reported finding a tick on themselves before illness. No consistent changes were identified in provider practices. Previously, only CTF serologic testing was used in Montana. In 2020, because of SARS-CoV-2 testing needs, the state laboratory sent specimens for CTF testing to the Centers for Disease Control and Prevention, where more sensitive molecular methods are used. This change in testing probably increased the number of CTF cases detected. Molecular testing is optimal for CTF diagnosis during acute illness. Tick bite prevention measures should continue to be advised for persons doing outdoor activities.

Vazquez Guillamet L, Marx G, Benjamin W, Pappas P, Lieberman NAP, Bachiashvili K, et al.

Relapsing Fever Caused by Borrelia lonestari after Tick Bite in Alabama, USA.

Emerging Infectious Disease journal. 2023;29(2):441.

https://wwwnc.cdc.gov/eid/article/29/2/22-1281_article

https://wwwnc.cdc.gov/eid/article/29/2/pdfs/22-1281.pdf

We report an immunocompromised patient in Alabama, USA, 75 years of age, with relapsing fevers and pancytopenia who had spirochetemia after a tick bite. We identified Borrelia lonestari by using PCR, sequencing, and phylogenetic analysis. Increasing clinical availability of molecular diagnostics might identify B. lonestari as an emerging tickborne pathogen.

- ## Endotoxines : effets toxiques, multi-expositions

Chamba PS, Baatjies R, Singh TS, Cumbane AJ, Jeebhay MF.

Exposure Characterization of Wood Dust Particulate, Endotoxins, and (1-3)-beta-d-Glucans, and Their Determinants in Mozambiquan Wood Processing Workers.

Annals of work exposures and health. 2023;67(4):485-95.

https://doi.org/10.1093/annweh/wxac100

Objectives Dust generated from wood processing comprises a heterogeneous mixture of inorganic and organic particles, including wood fragments, microorganisms, endotoxins, (1-3)-beta-d-glucans, and allergens. This study characterized exposure to wood dust and its determinants in the Mozambiquan wood processing industry. Methods A total of 124 personal inhalable samples, collected from a stratified random sample of 30 workers, were analysed for dust particulate, endotoxins, and (1-3)-beta-d-glucans. Mixed-effects models were developed to investigate significant exposure determinants. Results The geometric mean (GM) inhalable dust particulate concentrations were 3.29 mg m(-3), 98 endotoxin units (EU) m(-3), and 123 ng m(-3) for (1-3)-beta-d-glucans. Significant predictors for higher particulate levels included machinery (GMR = 1.93), sawing (GMR = 2.80), carpentry (GMR = 2.77), or painting (GMR = 3.03) tasks. Lebombo-ironwood species was associated with higher dust particulate levels (GMR = 1.97). Determinants of endotoxin concentrations included working with dry wood and damp cleaning methods, which were associated with lower levels. Working in closed buildings (GMR = 3.10) and dry sweeping methods were associated with higher (1-3)-beta-d-glucan concentrations (GMR = 1.99). Conclusions Work tasks in certain exposure groups (machinery, sawing, carpentry, painting), processing certain wood species (Lebombo-ironwood) and working in closed buildings were associated with higher exposures, whilst using dry wood and damp cleaning practices reduced exposure levels.

Madsen AM, Uhrbrand K, Kofoed VC, Fischer TK, Frederiksen MW.

A cohort study of wastewater treatment plant workers: Association between levels of biomarkers of systemic inflammation and exposure to bacteria and fungi, and endotoxin as measured using two methods.

Water research. 2023;231:9.

https://www.sciencedirect.com/science/article/pii/S004313542300060X?via%3Dihub

Work in wastewater treatment plants (WWTPs) can be associated with exposure to airborne microorganisms and endotoxin from the working environment. The aim of this study was to obtain knowledge about whether serum levels of the markers of systemic inflammation, C-reactive protein (CRP) and serum amyloid A (SAA), are associated with personal exposure to endotoxin, measured using the Limulus (endotoxinLimulus) and the rFC (endotoxinrFC) assays, as well as bacteria and fungi in a cohort of WWTP workers. Exposure and blood samples were collected for 11 workers over one year. Exposure to endotoxinLimulus-day and endotoxinrFC-day correlated significantly (r = 0.80, p<0.0001, n = 104), but endotoxinLimulus-day was 4.4 (Geometric mean (GM) value) times higher than endotoxinrFC-day (p<0.0001). The endotoxinLimulus-day, endotoxinrFC-day, bacteria, and fungal exposure as well as serum levels of CRP-day (GM=1.4 mg/l) and SAA-day (GM=12 mg/l) differed between workers. Serum levels of SAAday correlated significantly with CRPday (r = 0.30, p = 0.0068). The serum levels of CRPday were associated significantly with exposure to endotoxinLimulus-day. Exposure, SAA and CRP data were also analyzed as av. of each season, and SAAseason was associated positively and significantly with endotoxinLimulus-season and endotoxinrFC-season and negatively with fungalseason

exposure. In conclusion, CRPday was associated with the endotoxinLimulus-day and SAAseason with endotoxinLimulus-season and endotoxinrFC-season exposure. Thus, we hereby document that WWTP workers are exposed to airborne endotoxin which seems to have a negative impact on their health.

Loison P, Simon X, Duquenne P.

Measuring of Airborne Endotoxins: What Is Known About the Influence of Filter Media?

Water Air and Soil Pollution. 2023;234(3):15.

https://link.springer.com/article/10.1007/s11270-023-06181-3

The measurement of airborne endotoxins is often necessary because of the inhalation of these lipopolysaccharides from most Gram-negative bacteria is known to provoke harmful effects on worker's health including acute respiratory symptoms. Sampling on filters is one of the most widely used methods for measuring endotoxins in the air, and the present article confirms that there is a wide variety of filters used for the measurement. This article provides an expert opinion based on a mini review on the influence of the nature of the filter used on the measurement results. First, the analysis of published studies shows that the measurement of endotoxins, either at the workplace or in laboratory conditions, is carried out with different measurement protocols from one study to another, at least with regard to the filter used. Secondly, this is questioning since the equivalence of protocols in terms of measurement performance has not been fully investigated. In particular, the review of studies that have investigated the effect of the filter on the measurement of airborne endotoxins is quite contradictory, and no recent published study has provided any tangible evidence. This leads to the conclusion that the current recommendations regarding the type of filters to be used for endotoxin measurements are based on insufficient data. Thus, additional experimental studies are required. Thirdly, a detailed and argued survey of the mechanisms involved in the measurement has been carried in order to facilitate the construction of further studies. This allowed identifying the factors, including either physical or chemical properties of the filter, to be taken into account in studies on the effect of the filter on the measurement of endotoxins in the air and specifying the issues that have not yet been investigated. Finally, the results of these studies should allow a more objective orientation towards a given type of filter and could complement the recommendations of the EN14031 standard.

Sanmark E, Kuula J, Laitinen S, Oksanen L, Bamford DH, Atanasova NS.

Safe use of PHI6 IN the experimental studies.

Heliyon. 2023;9(2):10.

https://www.cell.com/heliyon/pdf/S2405-8440(23)00772-7.pdf

Surrogate viruses theoretically provide an opportunity to study the viral spread in an indoor environment, a highly needed understanding during the pandemic, in a safe manner to humans and the environment. However, the safety of surrogate viruses for humans as an aerosol at concentrations has not been established. In this study, Phi6 surrogate was aerosolized at concentration (Particulate matter(2.5): similar to 1018 mu g m(-3)) in the studied indoor space. Participants were closely followed for any symptoms. We measured the bacterial endotoxin concentration the virus solution used for aerosolization as well as the concentration in the room air containing the aerosolized viruses. In addition, we measured how the bacterial endotoxin concentration the sample was affected by different traditional virus purification procedures. Despite the puri-fication, bacterial endotoxin concentration of the Phi6 was high (350 EU/ml in solution used aerosols) with both (two) purification protocols. Bacterial endotoxins were also detected aerosolized form, but below the occupational exposure limit of 90 EU/m(3). Despite these concerns, no symptoms were observed in exposed humans when they were

using personal protective equipment. In the future, purification protocols should be developed to reduce associated terial endotoxin levels in enveloped bacterial virus specimens to ensure even safer research use surrogate viruses.

Biotechnologies

- ## Nouveaux procédés

Ahmad A, Gulraiz Y, Ilyas S, Bashir S.

Polysaccharide based nano materials: Health implications.

Food Hydrocolloids Health. 2022;2:10.

https://www.sciencedirect.com/science/article/pii/S266702592200022X?via%3Dihub

Polysaccharides are present everywhere as important biomolecules having great potential as biomaterial with numerous applications in biotechnology and food industry sectors. These natural substances have characteristics of biodegradability, low immunogenicity, and low toxicity, thus they found their way into food and pharma products. In these industries, application of new technologies has emerged to improve the permeability, bioavailability, and retention time of polysaccharide material with limited interaction with drugs. The use of these polysaccharides as nanoparticles emerged as a result of research interventions to act as effective carriers in the food and pharmaceutical industry. During this decade, polysaccharide based nano polymers was applied to fabricate biomaterial for different biomedical applications such as drug carriers, cell encapsulation, and delivery of therapeutics to tumor tissues. New ideas are generated to use these nanopolymers in food products that can act as a carrier for drugs and nutrients. Some of these polysaccharides materials such as cellulose, chitosan, pectin, beta-glucan, and dextran can be modified into nanomaterials through chemical, mechanical or biochemical treatment to enhance their bioactive properties. These polysaccharide nanofibers, can be incorporated into food products such as muffins, meatballs, ice-cream further improving their nutritional quality while providing health benefits. This review, discusses the development of polysaccharide nanoparticles from various sources and its applications in food and pharma products in relation to health implications.

Ashokkumar V, Flora G, Sevanan M, Sripriya R, Chen WH, Park J-H, et al.

Technological advances in the production of carotenoids and their applications– A critical review.

Bioresource Technology. 2023;367:128215.

https://www.sciencedirect.com/science/article/pii/S0960852422015486

Carotenoids are naturally occurring pigments that are widely distributed in algae, fungi, bacteria, and plants. Carotenoids play a significant role in the food, feed, cosmetic, nutraceutical, and pharmaceutical industries. These pigments are effectively considered as a health-promoting compounds, which are widely used in our daily diet to reduce the risk of chronic diseases such as cardiovascular diseases, cancer, acute lung injury, cataracts, neural disorders, etc. In this context, this review paper demonstrates the synthesis of carotenoids and their potential application in the food and pharmaceutical industries. However, the demand for carotenoid production is increasing overtime, and the extraction and production are expensive and technically challenging. The recent developments in

carotenoid biosynthesis, and key challenges, bottlenecks, and future perspectives were also discussed to enhance the circular bioeconomy.

Basu U, Ahmed SR, Bhat BA, Anwar Z, Ali A, Ijaz A, et al.

A CRISPR way for accelerating cereal crop improvement: Progress and challenges.

Front Genet. 2023;13:24.

https://doi.org/10.3389%2Ffgene.2022.866976

Humans rely heavily on cereal grains as a key source of nutrients, hence regular improvement of cereal crops is essential for ensuring food security. The current food crisis at the global level is due to the rising population and harsh climatic conditions which prompts scientists to develop smart resilient cereal crops to attain food security. Cereal crop improvement in the past generally depended on imprecise methods like random mutagenesis and conventional genetic recombination which results in high off targeting risks. In this context, we have witnessed the application of targeted mutagenesis using versatile CRISPR-Cas systems for cereal crop improvement in sustainable agriculture. Accelerated crop improvement using molecular breeding methods based on CRISPR-Cas genome editing (GE) is an unprecedented tool for plant biotechnology and agriculture. The last decade has shown the fidelity, accuracy, low levels of off-target effects, and the high efficacy of CRISPR technology to induce targeted mutagenesis for the improvement of cereal crops such as wheat, rice, maize, barley, and millets. Since the genomic databases of these cereal crops are available, several modifications using GE technologies have been performed to attain desirable results. This review provides a brief overview of GE technologies and includes an elaborate account of the mechanisms and applications of CRISPR-Cas editing systems to induce targeted mutagenesis in cereal crops for improving the desired traits. Further, we describe recent developments in CRISPR-Cas-based targeted mutagenesis through base editing and prime editing to develop resilient cereal crop plants, possibly providing new dimensions in the field of cereal crop genome editing.

Gomez M, Martinez MM.

Redistribution of surplus bread particles into the food supply chain.

LWT-Food Sci Technol. 2023;173:11.

https://www.sciencedirect.com/science/article/pii/S0023643822012166?via%3Dihub

Baked goods are at the top of the food waste categories that most negatively contribute to the environmental footprint. Fortunately, the distribution scheme of bread favors opportunities for redistribution pathways that are not always viable for mixed waste or microbiologically contaminated fractions. This review approaches the redistribution of surplus bread back into the food supply chain as food ingredient. Firstly, safety risks and existing regulations challenging the use of surplus bread as food ingredient are highlighted. Secondly, this review emphasizes the functionality of surplus bread flour as edible particles and its suitability as substrate for food biotechnological applications. According to previous studies performed on fresh bread, most surplus bread streams generated at production and retail stages should possess a relatively low risk of microbiological and chemical hazards. However, mycotoxin studies on surplus bread streams are needed. During baking, gluten denatures, and starch gelatinizes, resulting in surplus bread flour with cold thickening and water retention ca-pacity, enhanced accessibility for enzymatic amylolysis, but unable to develop a gluten network. Thus, surplus bread particles possess distinct molecular, supramolecular, and microstructural structure that influence their successful incorporation into semisolid foods or their suitability as substrate for food biotechnological applica-tions (e.g., sourdough, alcoholic drinks).

He ZF, Shen JQ, Li QQ, Yang YL, Zhang DY, Pan XL.

Bacterial metal(loid) resistance genes (MRGs) and their variation and application in environment: A review.

Science of the Total Environment. 2023;871:10.

https://doi.org/10.1016/j.scitotenv.2023.162148

Toxic metal(loid)s are widespread and permanent in the biosphere, and bacteria have evolved a wide variety of metal (loid) resistance genes (MRGs) to resist the stress of excess metal(loid)s. Via active efflux, permeability barriers, extracellular/intracellular sequestration, enzymatic detoxification and reduction in metal(loid)s sensitivity of cellular targets, the key components of bacterial cells are protected from toxic metal(loid)s to maintain their normal physiological functions. Exploiting bacterial metal(loid) resistance mechanisms, MRGs have been applied in many environmental fields. Based on the specific binding ability of MRGs-encoded regulators to metal(loid)s, MRGs-dependent biosensors for monitoring environmental metal(loid)s are developed. MRGs-related biotechnologies have been applied to environmental remediation of metal(loid)s by using the metal(loid) tolerance, biotransformation, and biopassivation abilities of MRGs-carrying microorganisms. In this work, we review the historical evolution, resistance mechanisms, environmental variation, and environmental applications of bacterial MRGs. The potential hazards, unresolved problems, and future research directions are also discussed.

Kudlay DA, Doktorova NP.

ESAT-6 AND CFP-10 ANTIGENS AS A BIOTECHNOLOGY MOLECULE SUBSTRATE. APPLICATIONS IN MEDICINE.

Infektsiya Immun. 2022;12(3):439-49.

https://iimmun.ru/iimm/article/download/1763/1509

Recombinant technologies have been long widely used in medicine. This article presents a review on the application of medical technologies based on ESAT-6 and CFP-10 proteins in diagnostics and prevention of tuberculosis. ESAT-6 and CFP-10 are specific proteins whose genes are encoded in the RD-1 zone (region of difference) of M. tuberculosis. M. bovis BCG and in most nontuberculous mycobacteria lack the RD-1 genome fragment. The discovery of ESAT-6 and CFP-10 antigens allowed to make the first and so far, the only breakthrough in improving the diagnostics of latent tuberculosis infection after the first tuberculin skin test (TST) was implemented. The article describes the principle of action and the experience with diagnostic tools based on ESAT-6 and CFP-10 such as in vitro interferon-gamma release assays (IGRA) and in vivo recombinant tuberculosis allergen (RTA, Diaskintest). RTA is inoculated intradermally similar to TST followed by developing delayed-type immune reaction detected in the area closest to M. tuberculosis. Combined use of ESAT-6 and CFP-10 for early detection of tuberculosis infection allowed to ameliorate for many drawbacks related to TST. High sensitivity and specificity was confirmed for ESAT-6- and CFP-10-based tests, so that former BCG vaccination had no more effect on test results and lowered frequency of false positive results due to reaction to non-tuberculous mycobacteria. The results of a large-scale meta-analysis on studies with patients at high risk demonstrated that the risk of developing tuberculosis in subjects with positive vs. negative IGRA was increased by 9.35-fold (95% confidence interval (CI [6.48-13.49]), whereas for TST - by 4.24-fold (95% CI [3.3-5.46]). 95.1%, (95% CI [95.06-95.1]). Analyzing available publications demonstrated sufficient evidence base regarding efficacy of using ESAT-6- CFP-10-based tests in tuberculosis diagnostics. Finally, there are also reviewed the diagnostic tests and vaccines based on using such proteins currently being under development.

Larsen TS, Eugen-Olsen J, Andersen O, Kirk JW.

Challenges facing the clinical adoption of a new prognostic biomarker: a case study.

BioSocieties.23.

https://link.springer.com/content/pdf/10.1057/s41292-022-00296-2.pdf

In this article, we show how a particular biomarker comes into being in an emergency department in a hospital in Copenhagen, Denmark. We explore the contextual becoming of this biomarker, suPAR, through interviews with nurses and physicians and through relational ontology. We find that as a prognostic biomarker suPAR is challenged in it becoming as an object for clinical practice in the emergency department by the power of diagnostic practices and the desire for experience-based scripts that quickly enable the clinician to reach the right diagnosis. Although suPAR is enacted as a promising triage strategy suggesting a low or high risk of disease, the inability to rule out specific diagnoses and producing the notion of secure clinical actions make its non-specificity and prognostic character problematic in clinical practices. Specific diagnostic criteria versus prognostic interpretation and non-specificity risk profiling challenges the way healthcare workers in an emergency department understand the tasks they are set to solve and how to solve them. We discuss how the becoming of suPAR is strengthened through enactments of specificity and engagement in triage strategies and we reflect on it's becoming through new diagnostic practices with the need to accommodate diagnostic ambiguity.

Lauri R, Incocciati E, Pietrangeli B, Tayou LN, Valentino F, Gottardo M, et al.

Hazop Analysis of a Bioprocess for Polyhydroxyalkanoate (PHA) Production from Organic Waste: Part B.

Fermentation. 2023;9(2):21.

https://mdpi-res.com/d_attachment/fermentation/fermentation-09-00154/article_deploy/fermentation-09-00154-v2.pdf?version=1676023288

The production of polyhydroxyalkanoates (PHAs) from industrial waste streams has attracted the attention of researchers and process industries because they could replace traditional plastics. The integrated treatment of civil wastewater along with organic solid wastes in a novel "urban biorefinery" is a very important option to implement a synergic treatment of all relevant bio-waste streams. The development of new biotech processes should consider the occupational health and safety issues from the initial design stages. Among the process hazards analysis techniques, HAZard and OPerability (HAZOP) methodology is widely used for studying both the processes hazards and their operability problems, by exploring the effects of any deviations from design conditions. In the present study, a modified version of HAZOP methodology has been applied to a three-step process developed at pilot scale in the Treviso municipal wastewater treatment plant in order to produce PHA. This paper (part B) shows the results of HAZOP analysis applied to the second process step aimed at culturing the activated sludge under periodic feeding conditions into a sequencing batch reactor (SBR). The analysis applied to the process conditions, corresponding to the maximum PHA content in the biomass, has led to the identification of technical solutions to mitigate the main occupational risks.

Lauri R, Incocciati E, Pietrangeli B, Tayou LN, Valentino F, Gottardo M, et al.

Hazop Analysis of a Bioprocess for Polyhydroxyalkanoate (PHA) Production from Organic Waste: Part A.

Fermentation. 2023;9(2):14.

https://mdpi-res.com/d_attachment/fermentation/fermentation-09-00099/article_deploy/fermentation-09-00099-v2.pdf?version=1675150460

The number of bioprocesses for the circular economy of organic waste has grown in recent years. Implementation of new processes and technologies should consider occupational health and safety issues from the initial design stages. Among the process hazards analysis techniques, HAZard and OPerability (HAZOP) methodology is widely used for studying both the process's hazards and their operability problems, by exploring the effects of any deviations from design conditions. In the present study, a modified version of HAZOP methodology has been applied to a three-steps process developed at pilot scale in the Treviso municipal wastewater treatment plant in order to produce polyhydroxyalkanoate (PHA) as the final high value product. This paper shows the results of HAZOP analysis applied to the first process step (acidogenic fermentation) aimed at volatile fatty acids production. The analysis has been applied to the process conditions corresponding to the maximum PHA content in the biomass. The HAZOP study results showed that this methodology allowed a comprehensive exploration of conventional chemical engineering process hazards and biological hazards. Final piping and instrumentation diagrams (P&IDs) for acidogenic fermentation have been designed, identifying all prevention measures aimed at managing the hazard and operability issues. The P&ID shows the interconnection of equipment and the instrumentation required for controlling the process.

Malik S, Sah R, Muhammad K, Waheed Y.

Tracking HPV Infection, Associated Cancer Development, and Recent Treatment Efforts-A Comprehensive Review.

Vaccines. 2023;11(1):16.

https://mdpi-res.com/d_attachment/vaccines/vaccines-11-00102/article_deploy/vaccines-11-00102.pdf?version=1672562839

Human papillomaviruses (HPVs) are high-risk causative factors for HPV infection. This infection does not come alone; it is often seen with co-infection with other viruses and acts as a causative agent for several malignancies. The major purpose of this comprehensive study was to highlight some recent advances in biotechnology associated with HPV infection, including understanding its host interactions and cancerous progression. A systematic research strategy was used to gather data from recent, and the most advanced published electronic sources. The compiled data explain the recent understanding of biology, host-viral interaction cycles, co-infection with other viral diseases, and cellular transformation toward malignancies associated with HPV. In recent years, some vaccination protocols have been introduced in the form of live attenuated, subunit, and DNA-based vaccines. Moreover, some strategies of nanotechnology are being employed to synthesize drugs and vaccines with a whole new approach of plant-based products. The data are immense for the proposed research question, yet the need is to implement modern follow-up screening and modern therapeutics at the clinical level and to conduct wide-scale public awareness to lessen the HPV-related disease burden.

Mantri VA, Kambey CSB, Cottier-Cook EJ, Usandizaga S, Buschmann AH, Chung IK, et al.

Overview of global Gracilaria production, the role of biosecurity policies and regulations in the sustainable development of this industry.

Rev Aquac.19.

https://doi.org/10.1111/raq.12761

Gracilaria aquaculture is one of the fastest-growing sectors, contributing to 10.5% of the global seaweed feed-stock supply chain in 2019. It predominantly caters to food-grade agar, animal feed and non-food sector applications viz. biotechnology, biomedical and pharmaceuticals. It has witnessed a rapid expansion triggered by increased demand due to commodity trade. Biosecurity-related issues are the key factors constraining its expansion, but are seldom addressed. The global gracilarioids aquaculture is dominated by China and other Asian countries, namely the Republic of Korea, Indonesia, the Philippines and Vietnam. This paper provides an assessment of their national biosecurity capacity, including current risk management strategies, policies and the implementation of existing regulations. It also highlights specific gaps in national policies and regulations, which can be addressed to improve their health management systems. Biosecurity management strategies, such as the provision of clear regulatory guidance, mechanisms for notifying disease and pest outbreaks, movement of live seaweed, risk assessment, stakeholder incentivisation and certification are recommended. Further, insights into the impending biosecurity measures to the emerging countries in this domain namely India and Malaysia are discussed. We suggest, implementing a uniform format of global integrated biosecurity measures across the Gracilaria aquaculture industry, but this requires organisational, operational and procedural changes, coupled with a cross-sectoral application of risk analysis protocols. Despite one of the important seaweed aquaculture taxa, an overview of Gracilaria production, the role of biosecurity policy and regulation in the sustainable development of this industry was still lacking, this is the first global effort in this direction.

Nargotra P, Sharma V, Lee YC, Tsai YH, Liu YC, Shieh CJ, et al.

Microbial Lignocellulolytic Enzymes for the Effective Valorization of Lignocellulosic Biomass: A Review.

Catalysts. 2023;13(1):28.

https://mdpi-res.com/d_attachment/catalysts/catalysts-13-00083/article_deploy/catalysts-13-00083-v2.pdf?version=1673425445

The urgent demand for alternative energy sources has been sparked by the tremendous burden on fossil fuels and the resulting acute energy crisis and climate change issues. Lignocellulosic biomass is a copious renewable and alternative bioresource for the generation of energy fuels and biochemicals in biorefineries. Different pretreatment strategies have been established to overcome biomass recalcitrance and face technological challenges, such as high energy consumption and operational costs and environmental hazards, among many. Biological pretreatment using microbial enzymes is an environmentally benign and low-cost method that holds promising features in the effective pretreatment of lignocellulosic biomass. Due to their versatility and eco-friendliness, cellulases, hemicellulases, and ligninolytic enzymes have been recognized as "green biocatalysts" with a myriad of industrial applications. The current review provides a detailed description of different types of lignocellulolytic enzymes, their mode of action, and their prospective applications in the valorization of lignocellulosic biomass. Solid state fermentation holds great promise in the microbial production of lignocellulolytic enzymes owing to its energy efficient, environment friendly, and higher product yielding features utilizing the lignocellulosic feedstocks. The recent trends in the application of enzyme immobilization strategies for improved enzymatic catalysis have been discussed. The major bottlenecks

in the bioprocessing of lignocellulosic biomass using microbial enzymes and future prospects have also been summarized.

Ribeiro MDL, Correia VM, de Oliveira LLH, Soares PR, Scudeler TL.

Evolving Diagnostic and Management Advances in Coronary Heart Disease.

Life-Basel. 2023;13(4):27.

https://mdpi-res.com/d_attachment/life/life-13-00951/article_deploy/life-13-00951-v2.pdf?version=1680762255

Despite considerable improvement in diagnostic modalities and therapeutic options over the last few decades, the global burden of ischemic heart disease is steadily rising, remaining a major cause of death worldwide. Thus, new strategies are needed to lessen cardiovascular events. Researchers in different areas such as biotechnology and tissue engineering have developed novel therapeutic strategies such as stem cells, nanotechnology, and robotic surgery, among others (3D printing and drugs). In addition, advances in bioengineering have led to the emergence of new diagnostic and prognostic techniques, such as quantitative flow ratio (QFR), and biomarkers for atherosclerosis. In this review, we explore novel diagnostic invasive and noninvasive modalities that allow a more detailed characterization of coronary disease. We delve into new technological revascularization procedures and pharmacological agents that target several residual cardiovascular risks, including inflammatory, thrombotic, and metabolic pathways.

Salem MA, Mansour HEA, Mosalam EM, El-Shiekh RA, Ezzat SM, Zayed A.

Valorization of by-products Derived from Onions and Potato: Extraction Optimization, Metabolic Profile, Outstanding Bioactivities, and Industrial Applications.

Waste and Biomass Valorization.36.

https://link.springer.com/article/10.1007/s12649-022-02027-x

Huge quantities of vegetables and fruits by-products are discarded annually worldwide following the industrial food processing techniques. These biowastes were found to cause further environmental hazards. However, they could represent rich sources of numerous bioactive metabolites and substrates for high valued products. Specifically, onion (Allium cepa L.) and potato (Solanum tuberosum L.) are of economic importance since they are cultivated and found as chief components of most food recipes worldwide. Nevertheless, potato peels and the outer onion scaly leaves are major non-edible by-products. Both biowastes are rich in bioactive phenolic compounds, whereas potato peels are rich in chlorogenic acids and onion solid wastes in flavonoids, particularly flavonols (quercetin derivatives). Also, they are good sources of dietary fibers, fatty acids, starches, sugars and proteins. In addition, they are potential candidates for biofuels production. Hence, with the recent advances of bio-refinery concepts valorization of such treasures is highly recommended. The current review highlighted the major metabolic classes of onion and potato agro-industrial wastes and how we can utilize the available possibilities to maximize the recovery and benefits of metabolites found in these wastes.

Tanvir F, Sadar N, Yaqub A, Ditta SA.

Synthesis of iron oxide nanoparticles, characterization, applications as nanozyme, and future prospects.

Bioinspired Biomim Nanobiomat. 2023;11(4):156-67.

https://www.icevirtuallibrary.com/doi/10.1680/jbibn.21.00068

Iron oxide nanoparticles (NPs) have recently attracted wider attention because of their unique properties, such as superparamagnetism, larger surface area, surface-to-volume ratio, and simple manufacturing process. Several chemical, physical, and biological techniques have been employed to synthesize NPs with admissible surface chemistry. This paper summarises the approaches for producing iron oxide NPs, shape, and size management, and inviting properties in bioengineering, pharmaceutical, and modern applications. Iron oxides have significant potential in biology, climate change, and horticulture, among other fields. Surface coatings with organic or inorganic particles are one of a kind. The surface coatings of the IONPs are critical to their performance because they prevent nanoparticle aggregation, reduce the risk of immunogenicity, and limit nonspecific cellular uptake. Chitosan is a biodegradable polymer that is applied to iron oxide nanoparticles to coat them. Chitosan subordinates like O-HTCC (an ammonium-quaternary CS subsidiary) have a long-lasting positive charge that allows them to work in different pH ranges allowing their interactions with cell layers at physiological pH. By reacting epoxy propyl trimethyl ammonium chloride (ETA) with chitosan (CS), the hydro-solvent N-(2-hydroxyl) propyl-3-trimethyl ammonium chitosan chloride (HTCC) is formed. For hyperthermic treatment of patients, NPs can also be coordinated to an organ, tissue, or tumor via an external attractive field. Given the increasing interest in iron NPs, the purpose of this review is to present data from iron oxide nanoparticles specially chitosan-capped iron NPs for different biomedical fields.

Tyagi U, Anand N.

Prospective of Waste Lignocellulosic Biomass as Precursors for the Production of Biochar: Application, Performance, and Mechanism-A Review.

Bioenergy Research.26.

https://link.springer.com/article/10.1007/s12155-022-10560-9

This article demonstrates the significance and potential of biochar derived from waste materials via thermochemical technique for environmental remediation. Utilization of biochar has made substantial breakthroughs in increasing agricultural productivity, reducing greenhouse gas emissions and global warming, sequester atmospheric carbon into the soil, reducing bioavailability of environmental contaminants, and subsequently becoming a value-added product sustaining bioeconomy. It possesses several unique physicochemical properties (surface area, microporosity, and pH) which provide an avenue to maximize its efficacy to targeted applications and making it highly efficient, cost-effective, and environmentally friendly material for the removal of diverse contaminants. High-temperature pyrolysis produces biochar with high surface area, microporosity, and hydrophobicity which is suitable for the sorption of organic contaminants while low-temperature pyrolysis produces biochar suitable for inorganic/polar organic contaminants. Further, biochar modification significantly alters the surface charges and functionality and ash content and enhances cation exchange capacity. In addition, biochar serves as a promising alternative to the existing conventional wastewater treatment methods and offers the advantage of energy-intensive conditions, incomplete treatment of pollution, risk of secondary pollution of residual chemicals, and high investment requirements. This review discusses the utilization of various waste biomass materials as precursors for the production of biochar under different operating conditions. Production of biochar via pyrolysis was critically examined, especially influencing parameters and pyrolysis mechanism. Recent research on improving biochar adsorption property through physical and chemical modification has been explored. A connection between the structure and the application of biochar is also revealed. To increase the economic benefits of its implementation, future efforts should also be directed towards improving its adsorption capacity.

Yang YY, Wu YZ, Long HX, Ma XL, Shariati K, Webb J, et al.

Global honeybee health decline factors and potential conservation techniques.

Food Secur.21.

https://link.springer.com/article/10.1007/s12571-023-01346-8

Pesticide exposure, heavy metal pollution, and biological stressors drive a worldwide, ongoing, and rapid population decline of the crucial pollinator honeybee. Drastic colony loss of honeybees may well precipitate a food security crisis. Here a systematic review was conducted, examining reports on a global scale to propose a bench line for common pesticides and potentially toxic element (PTE) residue levels in plant rewards and honeybees and to assess the health risk of chemical residues via oral exposure to honeybees. Relevant articles were retrieved from Scopus, PubMed, ISI Web of Science, and Embase. Recent findings on how chemical and biological stressors cripple honeybee health, and conservation techniques were also summarized. We identified a number of chemical residues at lethal or sublethal risk to honeybees based on their average concentrations, as well as primary evidence pertaining to the bio-accumulative propensity of certain substances. Moreover, combinations of pesticide stressors ("pesticide cocktails"), which are frequently encountered in agricultural landscapes, often interact synergistically with honeybee health via detoxification suppression. Finally, we discuss and describe the relevance of novel, biotechnology-based, approaches to counteract agrochemical and PTE poisoning.

Zhu XY, Zhang ZY, Jia B, Yuan YJ.

Current advances of biocontainment strategy in synthetic biology.

Chin J Chem Eng. 2023;56:141-51.

https://doi.org/10.1016/j.cjche.2022.07.019

Synthetic biotechnology has led to the widespread application of genetically modified organisms (GMOs) in biochemistry, bioenergy, and therapy. However, the uncontrolled spread of GMOs may lead to genetic contamination by horizontal gene transfer, resulting in unpredictable biosafety risks. To deal with these challenges, many effective methods have been developed for biocontainment. In this article, we summa-rize and discuss recent advances in biocontainment strategies from three aspects: DNA replication, tran-scriptional regulation, and protein translation. We also briefly introduce the efforts in the biocontainment convention, such as the recent publication of the Tianjin Biosecurity Guidelines for the Code of Conduct for Scientists.(c) 2022 The Chemical Industry and Engineering Society of China, and Chemical Industry Press Co., Ltd.

Zohra T, Khalil AT, Saeed F, Latif B, Salman M, Ikram A, et al.

Green Nano-Biotechnology: A New Sustainable Paradigm to Control Dengue Infection.

Bioinorg Chem Appl. 2022;2022:21.

https://downloads.hindawi.com/journals/bca/2022/3994340.pdf

Dengue is a growing mosquito-borne viral disease prevalent in 128 countries, while 3.9 billion people are at high risk of acquiring the infection. With no specific treatment available, the only way to mitigate the risk of dengue infection is through controlling of vector, i.e., Aedes aegypti. Nanotechnology-based prevention strategies like biopesticides with nanoformulation are now getting popular for preventing

dengue fever. Metal nanoparticles (NPs) synthesized by an eco-friendly process, through extracts of medicinal plants have indicated potential anti-dengue applications. Green synthesis of metal NPs is simple, cost-effective, and devoid of hazardous wastes. The recent progress in the phyto-synthesized multifunctional metal NPs for anti-dengue applications has encouraged us to review the available literature and mechanistic aspects of the dengue control using green-synthesized NPs. Furthermore, the molecular bases of the viral inhibition through NPs and the nontarget impacts or hazards with reference to the environmental integrity are discussed in depth. Till date, major focus has been on green synthesis of silver and gold NPs, which need further extension to other innovative composite nanomaterials. Further detailed mechanistic studies are required to critically evaluate the mechanistic insights during the synthesis of the biogenic NPs. Likewise, detailed analysis of the toxicological aspects of NPs and their long-term impact in the environment should be critically assessed.

Zubarevich A, Osswald A, Amanov L, Rad AA, Schmack B, Ruhparwar A, et al.

Development and evaluation of a novel combined perfusion decellularization heart-lung model for tissue engineering of bioartificial heart-lung scaffolds.

Artif Organs.9.

https://doi.org/10.1111/aor.14419

Background Bioengineered transplantable heart-lung scaffolds could be potentially lifesaving in a large number of congenital and acquired cardiothoracic disorders including terminal heart-lung disease. Methods We decellularized heart-lung organ-blocs from rats (n = 10) by coronary and tracheal perfusion with ionic detergents in a modified Langendorff circuit. Results In the present project, we were able to achieve complete decellularization of the heart-lung organ-bloc. Decellularized heart-lung organ-blocs lacked intracellular components but maintained structure of the cellular walls with collagen and elastic fibers. Conclusions We present a novel model of combined perfusion and decellularization of heart-lung organ-blocs. This model is the first step on the pathway to creating bioengineered transplantable heart-lung scaffolds. We believe that further development of this technology could provide a life-saving conduit, significantly reducing the risks of heart-lung failure surgery and improving postoperative quality of life.

Organismes français et internationaux - Actualités

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

- **Candida auris**

CDC (US), Increasing Threat of Spread of Antimicrobial-resistant Fungus in Healthcare Facilities, 20/03/2023.

- **Changement climatique**

Santé Publique France, La santé comme levier d'action face au changement climatique : actes du colloque, 09/02/2023.

- **Chenilles processionnaires**

ANSES, Les chenilles processionnaires : des chenilles urticantes à ne pas toucher ni approcher, 10/03/2023.

- **COVID-19**

HAS, Symptômes prolongés de la Covid-19 (dit Covid long) : la HAS actualise ses travaux, 21/04/2023.

HCSP, Évolution des mesures d'isolement des personnes infectées par le SARS-CoV-2, 30/01/2023.

Ministère de la Santé et de la Prévention, Lutte contre l'épidémie de Covid-19 : entrée en vigueur de plusieurs évolutions législatives à compter du 31 janvier 2023, 28/01/2023.

Santé Publique France,

Point épidémiologique COVID-19 : modification du jour de publication, 23/02/2023.

Consortium Emergen : évolution de la surveillance génomique des variants du SARS-CoV-2, 17/01/2023.

CDC (US), CDC simplifies COVID-19 vaccine recommendations, allows older adults and immunocompromised adults to get second dose of the updated vaccine, 19/04/2023.

- **Diphtérie**

Santé Publique France, Augmentation des cas de diphtérie à C. diphtheriae en France en 2022. Point au 31 décembre 2022, 10/02/2023.

- **Ebola**

CDC (US), Ebola Outbreak Over in Uganda, 11/01/2023.

- ## Gastro-entérite infectieuse

Santé Publique France, Gastro-entérites aiguës : bilan des saisons hivernales 2020-2021 et 2021-2022, 28/03/2023.

- ## Gestion des déchets

ANSES, Nématodes parasites de végétaux : de nouvelles solutions pour gérer les déchets, 31/03/2023.

- ## Grippe

Santé Publique France, Poids et impact de la grippe saisonnière en France métropolitaine : bilan des épidémies de 2011-2012 à 2021-2022, 10/02/2023.

- ## Hépatite A

Santé Publique France, Hépatite A en France : les chiffres clés 2021, 13/01/2023.

- ## IST

HAS, Notification des IST aux partenaires : des recommandations pour interrompre la chaine de transmission, 09/03/2023.

CDC (US), U.S. STI Epidemic Showed No Signs of Slowing in 2021 – Cases Continued to Escalate, 11/04/2023.

- ## Protection respiratoire

IRSST,

Prévenir l'inconfort associé au port d'un APR de type N95, 15/12/2022.

Mise à jour de l'outil Choisir une protection respiratoire contre les bioaérosols, 11/11/2022.

- ## Tuberculose

Santé Publique France, Tuberculose en France : les chiffres 2021, 02/02/2023.

CDC (US), TB is Still Here – New CDC Data Show U.S. Cases Increased Again in 2022, 23/03/2023.

- ## Vaccination

HAS,

Obligations vaccinales des professionnels : la HAS publie le 1er volet de ses travaux, 30/03/2023.

Recommandations et obligations vaccinales des professionnels : la HAS publie le cadrage de ses travaux, 08/02/2023.

La HAS actualise la doctrine vaccinale de lutte contre les orthopoxvirus, 23/01/2023.

Ministère de la Santé et de la Prévention, Calendrier des vaccinations 2023, 19/04/2023.

Santé Publique France, Semaine européenne de la vaccination 2023 : les outils pour s'informer et tout comprendre sur la vaccination, 20/04/2023.

- **Zoonoses**

ANSES,

Animaux, aliments et eaux : les coronavirus étudiés sous plusieurs angles, 21/04/2023.

Comment le gel hydroalcoolique tue les microbes ? , 07/04/2023.

Influenza aviaire : 3 scénarios de vaccination pour les volailles, 06/04/2023.

Tuberculose bovine : pourquoi certaines souches persistent en France ? , 06/02/2023.

Un chat infecté par le virus de l'influenza aviaire, 24/01/2023.

Mieux connaître le génome de la bactérie responsable de la fièvre Q, 09/01/2023.

Diplomatie.gouv,

Epidémie de fièvre de Lassa au Nigéria, 03/04/2023

Fièvre de Marburg en Guinée équatoriale, 25/03/2023.

Fièvre de Marburg en Tanzanie, 24/03/2023.

HCSP,

Sécurisation des produits issus du corps humain en prévision de cas d'infection à virus West Nile, 28/04/2023.

Sécurisation des produits du corps humain à la suite d'un cas d'infection à virus West Nile survenu en dehors de la période d'alerte saisonnière, 18/01/2023.

Santé Publique France, Grippe aviaire : quelle est la situation en France et dans le Monde ?, 01/03/2023.