

Bulletin de veille risques biologiques

N°130 – Janvier 2025

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 connexion à son compte).

Sommaire :

Veille risque biologique.....	3
• Protection individuelle : fièvre hémorragique, Ebola	3
• Protection respiratoire : ajustement.....	4
• Zoonoses : pathologies émergentes.....	7
• Légionellose	16
• Endotoxines	18
Biotechnologies	20
• Nouveaux procédés.....	20
Organismes français et internationaux - Actualités.....	29
• Biotechnologies	29
• Coronavirus	29
• Ebola	29
• Infections respiratoires aiguës	29
• Maladies bactériennes	29

- Maladie non identifiée – Congo 30
- Maladies vectorielles et zoonoses..... 30
- Mayotte – surveillance sanitaire suite cyclone Chido..... 31
- Poliovirus..... 31
- Rougeole..... 31
- VIH 31

Veille risque biologique

- **Protection individuelle : fièvre hémorragique, Ebola**

Graham A, Ettles S, McGrath M, Ogunremi T, Selkirk J, Bruce N.

Is there sufficient evidence to inform personal protective equipment choices for healthcare workers caring for patients with viral hemorrhagic fevers?

Canada communicable disease report = Relevé des maladies transmissibles au Canada. 2025;51(1):7-15.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11706576/pdf/CCDR-51-7.pdf>

BACKGROUND: Ugandan health authorities declared an outbreak of Ebola disease (EBOD), caused by the Sudan virus, in September 2022. A rapid review was conducted to update the Public Health Agency of Canada's guidelines for infection prevention and control measures for EBOD in healthcare settings to prepare for potential introduction of cases. OBJECTIVE: Summarize the available evidence on personal protective equipment (PPE) use by healthcare workers (HCWs) to prevent exposure to and transmission of viral hemorrhagic fevers (VHFs), including Ebola virus. METHODS: Electronic databases were searched to identify peer-reviewed evidence published from July 2014-October 2022. Peer-reviewed primary studies and literature reviews, in English or French, reporting on PPE for VHFs and filoviruses in the healthcare context were eligible for inclusion. Literature review processes were conducted by two reviewers using DistillerSR® systematic review software and the Public Health Agency of Canada's Infection Prevention and Control Critical Appraisal Toolkit. An environmental scan of grey literature was also conducted to inform the rapid review. RESULTS: The database search yielded 417 citations and 29 studies were considered eligible for critical appraisal. In total, 20 studies were included in the narrative synthesis of evidence. The evidence base was limited regarding comparative effectiveness of types of PPE for preventing exposure to and transmission of VHFs to HCWs. Four studies reported on exposure to and transmission of a VHF. Sixteen studies provided data on other relevant topics, such as simulated contamination and lab-based tests of PPE integrity. CONCLUSION: There is limited evidence with which to draw conclusions on the comparative effectiveness of PPE to prevent exposure to and transmission of VHFs to HCWs. Additional research is required to determine the optimal PPE to protect HCWs from exposure to and transmission of VHFs.

Sprague RM, Ladd M, Ashurst JV.

EMS Resuscitation During Contamination While Wearing PPE.

StatPearls. Treasure Island (FL): StatPearls Publishing

Copyright © 2025, StatPearls Publishing LLC.; 2025.

<https://europepmc.org/article/NBK/nbk534092>

In a world of evolving disease, accidental industrial or commercial contamination, as well as foreign and domestic terrorism, emergency providers must be able to provide safe and efficient resuscitation procedures to victims while wearing personal protective equipment (PPE). Contamination events can take the form of chemical, biological, radiological, or nuclear threats (CBRN) that are often compounded by explosions and trauma (ET). Resuscitation follows the emergency medicine mantra of managing the airway, breathing, and circulation (ABC) to sustain life, and regarding contamination

gives preference to antidotes (AABCs). The most common schema for PPE is the United States Occupational Safety and Health Administrations (OSHA) PPE protection levels A, B, C, and D. CBRN threats are common; they have been well documented throughout history. The nature of evolving viruses that cause Ebola, severe acute respiratory syndrome (SARS), and Middle Eastern respiratory syndrome (MERS) has required the use of PPE by emergency providers to avoid natural or nosocomial inoculation from airborne or contact means. In developed countries like the United States, industrial production, transportation, and storage of chemicals can all be potential areas for accidental exposure. In April 2013, Adair Grain Fertilizer Company in Texas had hundreds of tons of ammonium nitrate erupt, which killed 15 people and injured or contaminated 160 others. Foreign terrorists have plagued the globe by causing such acts as the 2013 sarin gas release in Damascus, Syria, where at least 36 persons were required to be evacuated by United Nations emergency providers. Domestic terrorism is also present, for example, in 1984, an Oregon cult released Salmonella typhimurium causing 751 casualties. These historical examples illustrate the ever-present CBR and ET threats worldwide necessitating the need for highly trained and prepared emergency providers.

- **Protection respiratoire : ajustement**

Chapman D, Strong C, Kaur P, Ganesan AN.

Evaluation of a point-of-use kiosk for improving the fit of N95/P2 respirators in health care settings: A randomized controlled trial.

American Journal of Infection Control. 2025;53(1):36-43.

<https://www.sciencedirect.com/science/article/pii/S0196655324006412?via%3Dihub>

Background: Fit of N95/P2 half-face respirators is critical. No objective ways exist to evaluate their implementation at use. Previously, we showed 26% of health care workers achieve appropriate fit at point of use. Methods: 657 quantitative fits were conducted on 166 subjects, using 4 different respirator styles. Randomization was performed; controls employing standard "fit-check" and intervention using a infrared video kiosk. Primary outcome was passing rates of quantitative fit, with secondary outcomes of respirator type, gender, race, and previous experience. Results: Intervention demonstrated significantly higher pass rate (50.6%) compared with controls (30.8%). Odds of passing with kiosk was 2.3 (odds ratios [OR] 2.3, 95% confidence intervals [CI] 1.8-2.9, $P < .001$). Duckbill style improved the greatest (OR 4.1, 95% CI 2.1-7.9, $P < .001$), and Tri-fold also showing substantial benefit (OR 2.66, 95% CI 1.4-5.2, $P < .001$). Gender and race did not influence outcomes when using the kiosk, nor did previous experience. Conclusions: A custom point-of-use kiosk improved odds of achieving a satisfactory fit of common respirator styles, independent of participant demographics. These findings open the door to addressing a gap in respiratory protection programs by providing individual assessment and interventions that improve worker safety at the time of highest risk. (c) 2024 Published by Elsevier Inc. on behalf of Association for Professionals in Infection Control and Epidemiology, Inc.

Gakhal MK, Bakshi A, Gu M, Khambay BS.

A study to determine the three-dimensional (3D) facial shape characteristics for a successful FFP3 mask fit.

Scientific reports. 2024;14(1):28683.

https://pmc.ncbi.nlm.nih.gov/articles/PMC11577019/pdf/41598_2024_Article_80001.pdf

A reported 20% of dental staff will fail their fit test for a disposable FFP3 respirator. This needs to be factored into future pandemic workforce and PPE supply planning. At present there are no scientifically

or universally accepted facial shape criteria to design and produce facial masks that will fit the entire work force. This study presents differences in facial shape, volume and surface area between individuals who passed on several FFP3 masks (pass group) and participants who passed on only one FFP3 mask (fail group). Three dimensional images of 50 individuals, 25 in each group, were taken at rest and at maximum smile using a DI4D SNAP 6200 camera system. The images were processed, and four "average faces" were produced-pass group at rest, fail group at rest, pass group at maximum smile and fail group at maximum smile. Simple Euclidian linear and angular measurements, geodesic surface distances and volume and surface area enclosed within the mask were analysed. The results of the study show that individuals who are more likely to pass a mask fit test have longer faces, wider mouths, greater geodesic surface distances and a greater volume and surface area of soft tissue enclosed within the mask boundary. This would suggest that some manufactures masks may be too large, and they need to reduce the size of their masks or produce a category of sizes, accepting the fact that one size does not fit all.

Oboho IK, Hanna J, Silva-Rodriguez D, Christie-Smith A, Psenicka A, Khongmongkhon A, et al.

Management of a COVID-19 outbreak using a multidisciplinary approach and infection prevention control practices at a community living center in Veterans Administration Hospital, North Texas.

Antimicrob Steward Healthc Epidemiol. 2025;5(1):6.

<https://doi.org/10.1017/ash.2024.491>

Background: The increase in severe acute respiratory coronavirus virus 2 (SARS-CoV-2) cases due to the omicron strain led to reduced acute care hospital beds at the Veterans Administration (VA) Hospital, North Texas; veterans with non-severe coronavirus disease 2019 (COVID-19) disease were managed at a community living center (CLC), a VA nursing home. The management of non-severe COVID-19 in VA nursing homes has not been extensively described. Methods: We describe resident characteristics and outcomes, and infection control practices implemented during 2 COVID-19 outbreak periods (January 12-February 15, 2022, June 28-July 14, 2023). Serial testing of all CLC residents was conducted, and residents with polymerase chain reaction-confirmed SARS-CoV-2 (COVID-19) infection were included in the analysis. Resident data were ascertained from the COVID-19 facility dashboard and medical record system. Results: From January 12 to February 15, 2022, and June 28-July 14, 2023, 62 adults residing at the CLC were diagnosed with COVID-19. Overall, the median age was 75 years [interquartile range, 71-80], and 57 (91.9%) were men. Residents were cohorted by COVID-19 test results. A multidisciplinary team was convened, and staff were fit tested for appropriate personal protective equipment (PPE) and received refresher training on hand hygiene, donning, and doffing of PPE. Thirty-seven (59.7%) residents were symptomatic. Overall, 55 (88.7%) residents were documented to have received the SARS-CoV-2 primary vaccination series. Most residents were managed at the CLC, while 12 (19.3%) were hospitalized in acute care. Conclusions: It is feasible to manage high-risk residents with non-severe COVID-19 disease in a CLC utilizing a multidisciplinary approach and implementing Infection Prevention and Control strategies.

Reade SJ, Bassam A, Al-Bassam W, Kadam U.

N95 respirator seal integrity following extended-use by healthcare workers in the intensive care unit: A cohort study.

Aust Crit Care. 2025;38(1):6.

<https://www.sciencedirect.com/science/article/pii/S1036731424002091?via%3Dihub>

Aim/objectives: Fit testing of N95/FFP2 respirators is universally recommended before exposure to airborne infectious diseases such as COVID-19. Respirator supply shortage in the COVID-19 pandemic encouraged extended-use for up to 4 h, despite uncertainty about seal integrity over time. The aim of our study was to assess N95 seal integrity after at least 2 h of continuous clinical use in the intensive care unit (ICU). We hypothesised that seal integrity would deteriorate over time, with variability between respirator shapes. Methods: A prospective cohort study of healthcare workers in a metropolitan ICU setting in Australia between April 2021 and August 2022. Following consent and screening, participants underwent qualitative fit testing in the ICU, and fit tests were repeated following a continuous period of at least 2-h usage. The primary outcome was N95 fit-test failure rate measured by qualitative fit testing of >2 h compared to baseline. Secondary outcomes evaluated effects of respirator shape, demographic characteristics, and duration of respirator use on respirator fit after 2 h use. Results: Fifty-one participants were recruited and consented. Six participants were excluded; four failed baseline fit test, one could not taste saccharin, and one did not complete 2 h of usage. Fourteen of 45 participants (similar to 31%) failed the extended-use fit test (median duration: 2 h 10 min [interquartile range: 2:07-2:20]). Fit-test rates differed between respirator shapes; three-piece fiat-fold respirators had lower failure rates (6/32; 19%) than duckbill-shaped respirators (6/11; 55%) $p = 0.046$. No other demographic characteristic or respirator shape was significantly associated with increased failure rate. Conclusions: Following 2 h of use, approximately 30% of participants failed repeat fit testing, suggesting incomplete respiratory protection. Three-piece fiat-fold respirators outperformed duckbill respirators. Extended use of respirators, even without respirator reuse, may put healthcare workers at risk of inadequate respiratory protection, in particular when using duckbill-shaped respirators. (c) 2024 Australian College of Critical Care Nurses Ltd. Published by Elsevier Ltd. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

Riutord-Sbert P, Pereira TC, Szupiany-Janeczek T, de Pedro-Gómez JE, González-Carrasco D, Gil PT, et al.

Clinical trial on the level of respiratory protection of IIR surgical and FFP2 filtering face masks with and without a peripheral sealing device against COVID-19.

Med Balear. 2025;40(1):126.

<https://dialnet.unirioja.es/servlet/articulo?codigo=9934516>

Introduction ad aim: A significant number of professionals in high-risk situations have been infected by COVID-19, due to a lack of adequate respiratory protective equipment or to poor peripheral sealing fits. The main aim of this study was to determine whether there are statistically significant differences in the level of respiratory protection in high-risk situations against contagion from COVID-19 or other harmful biological agents regarding the use of type IIR surgical face masks (SFM) and filtering face masks (FFP2) used either individually with or without the ADEMA MAS SAFER sealing device (AMS) or simultaneously, through qualitative fit tests. Methods: The device proposed is a thermoplastic resin ring composed of a reusable, biodegradable polylactic acid designed to be used in a healthcare environment. Qualitative fit tests were conducted using a sodium saccharin solution to evaluate respiratory protective equipment in professionals in hospital, emergency, and early childhood centers. Results: Only 5% of individuals who carried out the fit test on the SFM with the AMS sealing device and 7.5% of those who used the FFP2 with the AMS sealing device perceived the sweet taste of the sodium saccharin; whereas 100% of those who carried out the test with the SFM without the AMS sealing device, 100% of those who used the double FFP2 and SFM simultaneously, and 95% of those who used the FFP2 without the AMS sealing device perceived the sweet taste of the sodium saccharin ($p\text{-value} < 2.2 \times 10^{-16}$). Conclusions: Therefore, the use of a personalized polylactic acid peripheral sealing device together with a filtering or surgical mask significantly provides a high level of

respiratory protection in high-risk situations against contagion from COVID-19 or other biological agents.

- **Zoonoses : pathologies émergentes**

Adams SN, Bestul NC, Calloway KN, Kersh GJ, Salzer JS.

National Surveillance of Human Ehrlichiosis Caused by *Ehrlichia ewingii*, United States, 2013-2021.

Emerging infectious diseases. 2025;31(2):222-7.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11845156/pdf/24-0279.pdf>

Human ehrlichiosis is a potentially fatal tickborne disease caused by 3 species: Ehrlichia chaffeensis, E. ewingii, and E. muris eauclairensis. In the United States, 234 confirmed cases of E. ewingii ehrlichiosis were reported to the Centers for Disease Control and Prevention through the National Notifiable Diseases Surveillance System during 2013-2021; average annual incidence was 0.08 cases/1 million population. E. ewingii ehrlichiosis was reported more commonly among older, White, non-Hispanic, and male patients. Incidence and case counts generally increased yearly, except for 2020 and 2021. The highest number of cases were reported from Missouri and Arkansas. We report the geographic expansion of E. ewingii ehrlichiosis and the continued public health challenge of clarifying clinical manifestations of this infection. Clinician education will be essential to implement molecular assays to properly diagnose E. ewingii infection in patients and gain a better understanding of the epidemiology of this emerging disease.

Bbosa N, Nabirye S, Namagembe H, Kiiza R, Ssekagiri A, Munyagwa M, et al.

Case Reports of Human Monkeypox Virus Infections, Uganda, 2024.

Emerging Infectious Disease journal. 2025;31(1):144.

https://wwwnc.cdc.gov/eid/article/31/1/24-1269_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682813/pdf/24-1269.pdf>

Mpox is a zoonotic disease caused by the monkeypox virus. We report on human mpox cases in Uganda identified by PCR and confirmed by deep sequencing. Phylogenetic analysis revealed clustering with other clade Ib sequences associated with recent outbreaks in the Democratic Republic of the Congo.

Benea SN, Moroti R, Deaconu T, Ciont C, Benea MA, Savulescu Fiedler I.

Streptococcus suis: A Possible Emerging Zoonotic Pathogen in Romania.

Microorganisms. 2025;13(2).

https://mdpi-res.com/d_attachment/microorganisms/microorganisms-13-00335/article_deploy/microorganisms-13-00335.pdf?version=1738662071

Streptococcus suis is a common germ in pig populations, with high carrier rates. Recent studies identify it as an emerging zoonotic pathogen, particularly in Southeast Asia, where raw pork is traditionally

consumed. Data on *Streptococcus suis* infection in Europe, especially Eastern European countries like Romania, are limited. Our study reviewed data from an infectious diseases tertiary hospital in Bucharest between 2001 and 2024, including eight patients diagnosed with a *Streptococcus suis* invasive infection. The median age was 53.3 years, with a male-to-female ratio 3:1. Three patients had risk factors such as contact with pigs or handling fresh pork. Seven patients were initially diagnosed with meningitis and one with endocarditis. During hospitalization, an additional endocarditis case was identified among the meningitis patients. Laboratory samples indicated bacterial infection, with *Streptococcus suis* isolated from CSF in six cases and blood cultures in two cases. All strains tested were susceptible to beta-lactam antibiotics, but resistant to lincosamides and macrolides. There were no deaths, but half of our patients experienced severe meningitis-related sequelae, mainly hearing loss. Clinicians should be aware of *Streptococcus suis* as an etiologic agent of meningitis in non-endemic areas like Romania, especially in patients with risk factors (contact with pigs, pork).

Filipovic MR, Trobonjaca Z, Grbesa DC, Filipovic M, Kukuljan M, Masic E, et al.

Outbreak of hantavirus disease caused by Puumala virus, Croatia, 2021.

Eurosurveillance. 2025;30(3):11.

<https://doi.org/10.2807/1560-7917.es.2025.30.3.2400127>

In 2021, a large outbreak of hantavirus disease (HAviD) in Croatia with 334 notified cases coincided with a COVID-19 wave and included patients from areas previously not considered endemic, challenging HAviD recognition and patient management. We analysed clinical and epidemiological data on all 254 patients with HAviD treated in the Clinical Hospital Center Rijeka (CHC Rijeka) between February and November 2021. Most patients ($n = 246$; 96.9%) had antibodies against Puumala virus, 212 (83.5%) were residents of endemic areas for HAviD, 93 (36.6%) reported occupational exposure and 86 (33.9%) had observed rodents or rodent excreta. Thirty-seven (14.6%) patients were not notified to the public health authorities. Most patients ($n = 177$; 69.7%) were male. The median age of the patients was 43 years (range: 17-79 years) in males and 54 years (range: 14-77 years) in females. More severe courses of disease were observed in males aged < 45 years than in older males and females of any age ($OR = 2.27$; 95% CI: 1.21-4.24; $p < 0.005$). Measures to prevent exposure, early detection and notification of cases and close collaboration between primary and secondary healthcare teams with public health personnel are essential to improve surveillance and prevent hantavirus outbreaks.

Gajda-Sawicka E, Kowalec M, Sienko A, Ochab A, Zuk M, Bielat U, et al.

Assessment of occupational exposure of soldiers to Lyme disease and *Borrelia miyamotoi* disease in selected military training areas from northern Poland.

Exp Appl Acarol. 2025;94(1):25.

<https://link.springer.com/article/10.1007/s10493-024-00980-x>

Ixodes ricinus tick is a vector of bacteria of *Borrelia* genus and *Borrelia miyamotoi*. Exposure to ticks constitutes occupational risk to soldiers, but the current knowledge on this subject is still limited. Therefore, the aim of this study was to evaluate tick abundance and prevalence of infection with *Borrelia* spp. and/or *B. miyamotoi*. Ticks were collected from vegetation on Drawsko, Ustka and Orzysz military training areas. Additionally, ticks infesting soldiers were also obtained. Ticks were examined by nested PCR and sequencing of *flaB* gene fragment. General Linear Models of One Variable was used for analysis of mean tick abundance and Maximum Likelihood technique based on log-linear analysis of contingency tables was used for analysis of prevalence of pathogens in ticks. Molecular

phylogenetic analyses were also performed. 852 I. ricinus were collected from vegetation from three military areas. The overall mean abundance of ticks was almost 4 ticks/100 m². Season of study had a significant effect on density of total ticks, infected nymphs and females and infected nymphs, which were higher in spring-early summer. Total prevalence of pathogens was 25.7% in 711 questing ticks, and 16.0% in 282 I. ricinus collected from soldiers. Six species of Borrelia were identified with predominance of B. afzelii. It should be assumed that there is a risk for soldiers of acquiring infection after tick bite. The awareness of presence of pathogens in ticks should be raised in military.

Hassan A, Mühlemann B, Al-Subhi T, Rodon J, El-Kafrawy S, Memish Z, et al.

Ongoing Evolution of Middle East Respiratory Syndrome Coronavirus, Saudi Arabia, 2023–2024.

Emerging Infectious Disease journal. 2025;31(1):57.

https://wwwnc.cdc.gov/eid/article/31/1/24-1030_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682817/pdf/24-1030.pdf>

Middle East respiratory syndrome coronavirus (MERS-CoV) circulates in dromedary camels in the Arabian Peninsula and occasionally causes spillover infections in humans. MERS-CoV diversity is poorly understood because of the lack of sampling during the COVID-19 pandemic. We collected 558 swab samples from dromedary camels in Saudi Arabia during November 2023–January 2024. We found 39% were positive for MERS-CoV RNA by reverse transcription PCR. We sequenced 42 MERS-CoVs and 7 human 229E-related coronaviruses from camel swab samples by using high-throughput sequencing. Sequences from both viruses formed monophyletic clades apical to recently available genomes. MERS-CoV sequences were most similar to B5 lineage sequences and harbored unique genetic features, including novel amino acid polymorphisms in the spike protein. Further characterization will be required to understand their effects. MERS-CoV spillover into humans poses considerable public health concerns. Our findings indicate surveillance and phenotypic studies are needed to identify and monitor MERS-CoV pandemic potential.

Iglói Z, Soochit W, Munnink BBO, Anas A, von Eije K, van der Linden A, et al.

Oropouche Virus Genome in Semen and Other Body Fluids from Traveler.

Emerging Infectious Disease journal. 2025;31(1):205.

https://wwwnc.cdc.gov/eid/article/31/1/24-1452_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682789/pdf/24-1452.pdf>

Jakimovski D, Poposki K, Dimzova M, Cvetanovska M, Cana F, Bogdan I, et al.

Two Human Infections with Diverse Europe-1 Crimean-Congo Hemorrhagic Fever Virus Strains, North Macedonia, 2024.

Emerging infectious diseases. 2025;31(2):313-7.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11845147/pdf/24-1249.pdf>

Until 2023, North Macedonia had not reported a Crimean-Congo hemorrhagic fever (CCHF) case for >50 years. In 2024, increased clinical vigilance identified and characterized 2 novel CCHF cases. Genetic analysis and the identification of possible reassortment indicate North Macedonia as an interaction zone between CCHF virus isolates from Turkey and Kosovo.

Kasbergen LMR, de Bruin E, Chandler F, Sigfrid L, Chan XHS, Hookham L, et al.

Multi-antigen serology and a diagnostic algorithm for the detection of arbovirus infections as novel tools for arbovirus preparedness in southeast Europe (MERMAIDS-ARBO): a prospective observational study.

The Lancet Infectious diseases. 2025.

<https://www.sciencedirect.com/science/article/pii/S1473309924006546?via%3Dihub>

BACKGROUND: Arboviruses are increasingly affecting Europe, partly due to the effects of climate change. This increase in range and impact emphasises the need to improve preparedness for emerging arboviral infections that often co-circulate and might have overlapping clinical syndromes. We aimed to strengthen surveillance networks for four clinically relevant arboviruses in southeast Europe. **METHODS:** This study reports an in-depth analysis of the MERMAIDS-ARBO prospective observational study in adults (ie, aged ≥ 18 years) hospitalised with an arbovirus-compatible disease syndrome in 21 hospitals in seven countries in southeast Europe over four arbovirus seasons (May 1-Oct 31, 2016-19) to obtain arbovirus prevalence outcomes. The main objectives of the MERMAIDS-ARBO study, describing the clinical management and outcomes of four arboviruses endemic to southeast Europe, including Crimean-Congo haemorrhagic fever virus (CCHFV), tick-borne encephalitis virus (TBEV), Toscana virus, and West Nile virus (WNV), are reported elsewhere. In this analysis, given the challenges associated with arbovirus diagnostics, we developed a diagnostic algorithm accounting for serology outcomes and sample timing to study arbovirus prevalence in southeast Europe. Serum samples were collected on days 0, 7, 28, and 60 after hospital admission and tested for anti-CCHFV IgG and IgM antibodies with ELISAs (confirmed with an indirect immunofluorescence test) and for IgG and IgM antibodies specific to TBEV, Toscana virus, and WNV with custom-printed protein microarrays (confirmed with virus neutralisation tests). All acute-phase samples were tested by PCR for all four viruses. Descriptive analyses were performed for virus-reactive cases by geography and year, and possible factors (eg, age, sex, and insect bites) associated with virus reactivity were assessed. **FINDINGS:** Of 2896 individuals screened, 913 were eligible for inclusion, of whom 863 (514 men, 332 women, and 17 unknown) had samples sent to the study reference laboratories and were included in molecular and serological analyses. Some individuals had insufficient clinical data to be included in the clinical analysis, but met the eligibility criteria for and were included here. Serum sampling was incomplete (eg, samples missing from one or more timepoints or no data on time since symptom onset) for 602 (70%) patients, and the timing of collection was often heterogeneous after symptom onset up to 40 days (average median delay of 5-6 days across all timepoints), affecting the ability to diagnose arbovirus infection by serology. By use of an interpretation table incorporating timing and completeness of sampling, one (<1%) participant had a confirmed recent infection with CCHFV, ten (1%) with TBEV, 40 (5%) with Toscana virus, and 52 (6%) with WNV. Most acute confirmed infections of Toscana virus were found in Albania (25 [63%] of 40), whereas WNV was primarily identified in Romania (36 [69%] of 52). Albania also had the highest overall Toscana virus seropositivity (168 [60%] of 282), mainly explained by patients confirmed to be exposed or previously exposed (104 [62%] of 168). Patients without antibodies to WNV or Toscana virus were significantly younger than patients with antibodies (mean difference -8.48 years [95% CI -12.31 to -4.64] for WNV, and -6.97 years [-9.59 to -4.35] for Toscana virus). We found higher odds of Toscana virus reactivity in men (odds ratio 1.56 [95% CI 1.15 to 2.11]; $p=0.0055$), WNV reactivity with mosquito bites versus no mosquito bites (2.47 [1.54 to 3.97]; $p=0.0002$), and TBEV reactivity with tick bites versus no tick bites (2.21 [1.19 to 4.11]; $p=0.018$). **INTERPRETATION:** This study shows that despite incomplete and heterogeneous data, differential diagnosis of suspected arbovirus infections is possible, and the diagnostic interpretation algorithm we propose could potentially be used to strengthen routine diagnostics in clinical settings in areas at risk for arboviral diseases. Our data highlight potential hotspots for arbovirus surveillance and risk factors

associated with these particular arbovirus infections. **FUNDING:** European Commission and Versatile Emerging infectious disease Observatory. **TRANSLATIONS:** For the Greek, Albanian, Romanian, Bosnian, Serbian, and Croatian translation of the summary see Supplementary Materials section.

Leal Filho W, Nagy GJ, Gbaguidi GJ, Paz S, Dinis MAP, Luetz JM, Sharifi A.

The role of climatic changes in the emergence and re-emergence of infectious diseases: bibliometric analysis and literature-supported studies on zoonoses.

One Health Outlook. 2025;7(1):12.

https://pmc.ncbi.nlm.nih.gov/articles/PMC11853283/pdf/42522_2024_Article_127.pdf

Climate change (CC) is increasingly recognised as a critical driver in the emergence and re-emergence of infectious diseases. The relationship between CC and infectious diseases is complex and multifaceted, encompassing changes in temperature, precipitation patterns, and extreme weather events. This study describes the role of CC in the emergence and re-emergence of infectious diseases, emphasising zoonoses. It used a mixed methodology, including an initial literature contextualisation and a bibliometric analysis, to identify key thematic research areas related to CC and zoonotic diseases and show their connections. The research relied on the Scopus database for the identification of relevant source literature and focused the search query on publications in English. VOSviewer was used to discover clear thematic clusters that illustrate what research areas have been addressed in the literature and how they are interlinked. In addition, the research selected and analysed twelve literature-supported studies to investigate the relevance of the zoonoses involved in infectious disease emergence and re-emergence linked to CC impacts. Many pathogens and their vectors, such as mosquitoes, ticks, and rodents, are sensitive to temperature and moisture. CC can expand or shift the geographical distribution of these vectors, bringing diseases to new areas. Warmer temperatures may allow mosquitoes that transmit diseases like malaria and dengue fever to survive and reproduce in regions that were previously too cold. Also, extreme events such as floods, droughts, and hurricanes can lead to immediate increases in waterborne and vector-borne diseases (VBD) by facilitating the spread of pathogens. There is a need to better understand the connections between CC and zoonoses. To address the challenges posed by zoonoses linked to CC, international organizations like the WHO should coordinate a global response to provide clear guidance. Governments must integrate CC and zoonoses into national health policies, ensuring that health frameworks address these interconnected risks. Funding should be allocated for research on the root causes of CC and for strengthening defenses, particularly in developing countries with fragile health systems. Additionally, enhanced communication, education, and training for healthcare professionals about the links between CC and zoonoses are essential for raising awareness and promoting proactive measures.

Leal Filho W, Nagy GJ, Gbaguidi GJ, Paz S, Dinis MAP, Luetz JM, Sharifi A.

The role of climatic changes in the emergence and re-emergence of infectious diseases: bibliometric analysis and literature-supported studies on zoonoses.

One Health Outlook. 2025;7(1):12.

https://pmc.ncbi.nlm.nih.gov/articles/PMC11853283/pdf/42522_2024_Article_127.pdf

Climate change (CC) is increasingly recognised as a critical driver in the emergence and re-emergence of infectious diseases. The relationship between CC and infectious diseases is complex and multifaceted, encompassing changes in temperature, precipitation patterns, and extreme weather events. This study describes the role of CC in the emergence and re-emergence of infectious diseases, emphasising zoonoses. It used a mixed methodology, including an initial literature contextualisation and a

bibliometric analysis, to identify key thematic research areas related to CC and zoonotic diseases and show their connections. The research relied on the Scopus database for the identification of relevant source literature and focused the search query on publications in English. VOSviewer was used to discover clear thematic clusters that illustrate what research areas have been addressed in the literature and how they are interlinked. In addition, the research selected and analysed twelve literature-supported studies to investigate the relevance of the zoonoses involved in infectious disease emergence and re-emergence linked to CC impacts. Many pathogens and their vectors, such as mosquitoes, ticks, and rodents, are sensitive to temperature and moisture. CC can expand or shift the geographical distribution of these vectors, bringing diseases to new areas. Warmer temperatures may allow mosquitoes that transmit diseases like malaria and dengue fever to survive and reproduce in regions that were previously too cold. Also, extreme events such as floods, droughts, and hurricanes can lead to immediate increases in waterborne and vector-borne diseases (VBD) by facilitating the spread of pathogens. There is a need to better understand the connections between CC and zoonoses. To address the challenges posed by zoonoses linked to CC, international organizations like the WHO should coordinate a global response to provide clear guidance. Governments must integrate CC and zoonoses into national health policies, ensuring that health frameworks address these interconnected risks. Funding should be allocated for research on the root causes of CC and for strengthening defenses, particularly in developing countries with fragile health systems. Additionally, enhanced communication, education, and training for healthcare professionals about the links between CC and zoonoses are essential for raising awareness and promoting proactive measures.

McQuiston J, McCollum A, Christie A, Torres F, Mermin J, Jernigan D, Hutson C.

The Rise of Mpox in a Post-Smallpox World.

Emerging Infectious Disease journal. 2025;31(1):27.

https://wwwnc.cdc.gov/eid/article/31/1/24-1230_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682811/pdf/24-1230.pdf>

Reports of mpox are rising in Africa where the disease is endemic and in new countries where the disease has not been previously seen. The 2022 global outbreak of clade II mpox and an ongoing outbreak of the more lethal clade I mpox highlight the pandemic potential for monkeypox virus. Waning population immunity after the cessation of routine immunization for smallpox plays a key role in the changing epidemiologic patterns of mpox. Sustained human-to-human transmission of mpox is occurring widely in the context of insufficient population immunity, fueling genetic mutations that affect the accuracy of some diagnostic tests and that could lead to changing virulence. Additional research should address complex challenges for control of mpox, including improved diagnostics and medical countermeasures. The availability of vaccines should be expanded not only for outbreak response but also for broader routine use for persons in mpox-endemic countries.

Mishra P, Singh R, Patil A.

Epidemiology, Pathogenesis, and Treatment Options of Monkeypox: A Narrative Review.

Cureus. 2025;17(1):e77892.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11848695/pdf/cureus-0017-00000077892.pdf>

Recently, human mpox (monkeypox) has emerged as a global outbreak. This debilitating disease is the result of a zoonotic infection and often entails multiorgan involvement. The knowledge of

pathophysiology and treatment options is evolving. This review aims to summarise the pathophysiology and current treatment options of mpox. Prevention and vaccination strategies are out of the scope of this review. We performed a literature review to achieve this objective. Mpox is a zoonotic infection caused by the monkeypox virus, a double-stranded DNA virus. The virus, with debilitating complications, affects multiorgan functions, including skin and other systems. The available treatments for this widespread infection are limited. Only a few antivirals have been sanctioned and approved by the regulatory authorities. We have summarised the efficacy and safety of the three antiviral agents, namely, cidofovir (CDV), brincidofovir (BDV), and tecovirimat. The available limited evidence points towards promising efficacy and tolerability of tecovirimat.

Purcell R, Giles M, Crawford N, Buttery J.

Systematic Review of Avian Influenza Virus Infection and Outcomes during Pregnancy.

Emerging Infectious Disease journal. 2025;31(1):50.

https://wwwnc.cdc.gov/eid/article/31/1/24-1343_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682802/pdf/24-1343.pdf>

Human cases of avian influenza A(H5N2) and A(H5N1) viruses associated with outbreaks in birds and mammals are increasing globally, raising concerns about the possibility of a future avian influenza pandemic. We conducted a systematic review examining 30 reported cases of avian influenza in pregnant women. We found high mortality rates for mothers (90.0%, 27/30) and their babies (86.7%, 26/30) when women were infected with avian influenza virus during pregnancy. Despite being a high-risk population and having worse health outcomes across multiple pandemics, pregnant women are often excluded from vaccine trials. However, as the risk for a new pandemic increases and human vaccines against avian influenza are developed, early inclusion of pregnant women in clinical trials can inform the risk–benefit analysis for both the mother and their newborn infant. Early inclusion of pregnant women in public health vaccination programs is vital for protecting this high-risk population.

Santibáñez S, Ramos-Rincón JM, Santibáñez P, Cervera-Acedo C, Sanjoaquin I, de Arellano ER, et al.

***Rickettsia sibirica mongolitimonae* Infections in Spain and Case Review of the Literature.**

Emerging Infectious Disease journal. 2025;31(1):18.

https://wwwnc.cdc.gov/eid/article/31/1/24-0151_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682799/pdf/24-0151.pdf>

*Rickettsia sibirica mongolitimonae is an emerging cause of tickborne rickettsiosis. Since the bacterium was first documented as a human pathogen in 1996, a total of 69 patients with this infection have been reported in the literature. Because of the rising rate of *R. sibirica mongolitimonae* infection cases, we evaluated the epidemiologic and clinical features of 29 patients who had *R. sibirica mongolitimonae* infections confirmed during 2007–2024 at the Center for Rickettsiosis and Arthropod-Borne Diseases, the reference laboratory of San Pedro University Hospital–Center for Biomedical Research of La Rioja, Logroño, Spain. We also reviewed all cases published in the literature during 1996–2024, evaluating features of 94 cases of *R. sibirica mongolitimonae* infection (89 in Europe, 4 in Africa, and 1 in Asia). Clinicians should consider *R. sibirica mongolitimonae* as a potential causative agent of rickettsiosis, and doxycycline should be administered promptly to avoid clinical complications.*

Scheftel JM, Schenk KE, Bauck LJ, Bye ML, Ireland MJ, Klumb CA, et al.

Human Health Surveillance During Animal Disease Emergencies: Minnesota Department of Health Response to Highly Pathogenic Avian Influenza Outbreaks, 2015 and 2022-2023.

Journal of Agromedicine. 2025:12.

<https://doi.org/10.1080/1059924X.2024.2442406>

Objectives Highly pathogenic avian influenza (HPAI) poses an occupational risk for poultry workers, responders, and others in contact with infected birds. The objective of this analysis was to describe HPAI surveillance methods and outcomes, and highlight the challenges, successes, and lessons learned during the Minnesota Department of Health's (MDH's) public health response to HPAI outbreaks in Minnesota poultry flocks in the years 2015 and 2022-2023. *Methods* During both outbreaks, MDH staff attempted to contact all potentially exposed people and conduct a standardized interview. People were considered exposed and at risk if they had entered a barn with poultry on any HPAI test-positive premises. With their consent, exposed persons were entered into illness monitoring until 10 days from their last exposure. In 2015, MDH monitored the health of poultry workers only. In the 2022-2023 response, MDH monitored the health of poultry workers, backyard flock owners, responders, and private contract workers. In 2022-2023, interview responses were entered into a REDCap (Research Electronic Data Capture) database in real time, which automatically entered the person into monitoring if they consented. Through REDCap, they received an automated email with a unique link to a short survey asking about any symptom development. Where appropriate, interview responses from poultry workers collected in 2015 were compared to interview responses from poultry workers collected in 2022-2023. *Results* From March 3 to June 5, 2015, MDH epidemiologists interviewed and evaluated 375 (86%) of 435 poultry workers from 110 HPAI-infected flocks. From March 25, 2022 through December 31, 2023, MDH epidemiologists interviewed and evaluated 649 (65%) of 992 poultry workers, responders, contractors, and backyard flock owners associated with 151 HPAI-infected flocks. Among poultry workers, self-reported personal protective equipment (PPE) usage declined significantly from 2015 to 2022-2023 (full PPE usage 51.8% vs. 23.9%, $p < .01$). *Conclusion* MDH's long standing relationships with animal health officials and the poultry industry resulted in strong poultry worker participation rates in surveillance efforts during HPAI outbreaks in 2015 and 2022-2023. Self-reported PPE usage was low, particularly in 2022-2023. Improvements in PPE accessibility and technology are needed to protect workers and responders in the on-going HPAI outbreak.

Sigfrid L, Chan XHS, Kasbergen LMR, Hookham L, Wei J, Chen S, et al.

Prevalence, clinical management, and outcomes of adults hospitalised with endemic arbovirus illness in southeast Europe (MERMAIDS-ARBO): a prospective observational study.

The Lancet Infectious diseases. 2025.

<https://www.sciencedirect.com/science/article/pii/S1473309924006558?via%3Dihub>

BACKGROUND: Arboviruses have expanded into new regions in Europe, yet data indicate gaps in disease notifications and a risk of further spread. We aimed to report on prevalence, clinical management, and outcomes of endemic arbovirus infections in southeast Europe. *METHODS:* In this prospective observational study (MERMAIDS-ARBO), we enrolled adults (age ≥ 18 years) hospitalised with an arbovirus-compatible disease syndrome within 21 days of symptom onset across 21 hospitals in seven countries in southeast Europe over four arbovirus seasons (May 1-Oct 31, during 2016-19). We obtained data from case report forms completed by site investigators on admission and discharge. Participants were excluded if they had non-infectious CNS disorders, symptoms of another confirmed cause, an identified focal source of infection, or symptoms caused by recurrence of a pre-existing

condition. The primary outcome was the proportion of participants with confirmed or probable acute infections with West Nile virus (WNV), tick-borne encephalitis virus (TBEV), Crimean-Congo haemorrhagic fever virus (CCHFV), or Toscana virus (TOSV), per reference laboratory criteria. Secondary outcomes were the proportions of patients treated with antivirals, antibiotics, or corticosteroids; the proportion of patients requiring intensive care; hospital length of stay; and mortality. FINDINGS: Of 2896 adults screened for eligibility, 929 were recruited and 913 met protocol-defined eligibility criteria (median age 43.1 years [IQR 29.5-59.7]; 550 [60%] men, 361 [40%] women, and two [<1%] with missing data). 530 (58%) participants presented with suspected meningitis, encephalitis, or both, and 318 (35%) with fever plus myalgia, fever plus arthralgia, or both. 820 (90%) reported no international travel within 21 days before symptom onset. 727 (80%) were administered antibiotics, 379 (42%) corticosteroids, and 222 (24%) antivirals. The median length of hospital stay was 9 days (IQR 6-14), and 113 (12%) required intensive care. Of 847 participants with a reference laboratory sample who met full eligibility criteria for analysis, 110 (13%) were diagnosed with 114 confirmed or probable acute arbovirus infections (four had coinfections or cross-reactivity): one (<1%) with CCHFV, 16 (2%) with TBEV, 44 (5%) with TOSV, and 53 (6%) with WNV. There was one death (<1%) of an individual with WNV. Of the 110 participants, 49 (45%) had a local clinician-attributed arbovirus discharge diagnosis. INTERPRETATION: Our data highlight the need to strengthen arbovirus surveillance systems for the early detection of emerging and re-emerging outbreaks, including investments to increase awareness of arbovirus infections among clinicians, to improve access to specialist diagnostics, and to develop effective and accessible vaccines and treatments to protect populations and health systems in southeast Europe. FUNDING: European Commission and Versatile Emerging infectious disease Observatory. TRANSLATIONS: For the Greek, Albanian, Romanian, Bosnian, Serbian, and Croatian translation of the summary see Supplementary Materials section.

van der Ende J, Nipaz V, Carrasco-Montalvo A, Trueba G, Grobusch M, Coloma J.

Cocirculation of 4 Dengue Virus Serotypes, Putumayo Amazon Basin, 2023–2024.

Emerging Infectious Disease journal. 2025;31(1):202.

https://wwwnc.cdc.gov/eid/article/31/1/24-0888_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682814/pdf/24-0888.pdf>

Latin America is experiencing an unprecedented dengue outbreak, causing an increased health burden. We document the cocirculation of dengue viruses 1–4 in Putumayo, a remote, underserved region at the border between Ecuador and Colombia. Dengue circulation in this largely unexplored territory represents a threat to public health in Putumayo and neighboring areas.

Wójcik-Fatla A, Sawczyn-Domanska A, Kloc A, Krzowska-Firych J, Sroka J.

Seroprevalence of *Borrelia*, *Anaplasma*, *Bartonella*, *Toxoplasma*, *Mycoplasma*, *Yersinia*, and *Chlamydia* in Human Population from Eastern Poland.

Pathogens. 2025;14(1):12.

https://mdpi-res.com/d_attachment/pathogens/pathogens-14-00096/article_deploy/pathogens-14-00096.pdf?version=1737197907

The epidemiological situation related to infectious diseases is influenced by many factors. To monitor actual trends in selected zoonoses, a total of 473 serum samples from farmers, forestry workers, and veterinarians were collected for serological examination. Anti-Borrelia burgdorferi sensu lato (s.l.) antibodies were tested with ELISA and Western blot (WB) tests; the detection of anti-Toxoplasma gondii

antibodies was performed using an enzyme linked fluorescence assay (ELFA). Antibodies to bartonellosis, anaplasmosis, and chlamydiosis were determined by indirect immunofluorescent test (IFA), whereas antibodies to yersiniosis and mycoplasmosis were confirmed in the ELISA test. Positive or borderline results of antibodies against *B. burgdorferi* s.l. in the ELISA test were detected in 33.8% of the study population. The borderline or positive ELISA test results for at least one antibody class were confirmed by WB in 58.7% of cases. The IgG antibodies against *Anaplasma phagocytophilum*, *Toxoplasma gondii*, and *Mycoplasma pneumoniae* were detected in 9.6%, 51.7%, and 63.6% of samples, respectively. Antibodies against *Yersinia* spp., *Bartonella henselae*, and *Chlamydia pneumoniae* were found to vary between 43 and 47%.

Zé-Zé L, Nunes C, Sousa M, de Sousa R, Gomes C, Santos A, et al.

Fatal Case of Crimean-Congo Hemorrhagic Fever, Portugal, 2024.

Emerging Infectious Disease journal. 2025;31(1):139.

https://wwwnc.cdc.gov/eid/article/31/1/24-1264_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682786/pdf/24-1264.pdf>

We report a fatal case of Crimean-Congo hemorrhagic fever in Portugal. An 83-year-old man, initially suspected of having Mediterranean spotted fever, was later confirmed to have Crimean-Congo hemorrhagic fever by the detection of viral genome in the patient's serum and the presence of specific IgM antibodies.

- **Légionellose**

Fang JQ, Wang Z, Shen Y, Wu XN, Fang H, Sun XK, et al.

Case report: The value of early application of mNGS technology in the diagnosis and treatment of severe Legionnaires' disease: reports of two cases with different outcomes.

Front Med. 2025;12:10.

<https://www.frontiersin.org/journals/medicine/articles/10.3389/fmed.2025.1501192/pdf>

Background Legionnaires' disease has a high clinical mortality rate, and early diagnosis and treatment are critical. Increasing evidence shows that metagenomic next-generation sequencing (mNGS) has excellent potential for the early identification of pathogens. To help clinicians better recognize Legionnaires' disease in its early stage and to illustrate the diagnostic value of mNGS technology, we reviewed and summarized two cases of severe Legionnaires' disease. Methods and analysis We selected two patients with severe Legionnaires' disease who were admitted to our department in recent years. We discuss experience with them and the shortcomings in their treatment by summarizing their medical history, disease evolution, tests, and diagnostic and therapeutic processes. Results In both patients, the diagnosis of Legionnaires' disease was confirmed through analysis of the bronchoalveolar lavage fluid (BALF). The middle-aged male patient was cured and discharged due to early detection and diagnosis. The elderly immunocompromised patient died due to a delay in diagnosis. Conclusion This study highlights the importance of the early recognition and diagnosis of severe Legionnaires' disease and the advantages of mNGS in identifying the pathogen.

Mohamed H, Zielinski L, Diedhiou A, Clemmons N, Smith J, Rinsky J, et al.

Cluster of Legionellosis Cases Associated with Manufacturing Process, South Carolina, USA, 2022.

Emerging Infectious Disease journal. 2025;31(1):41.

https://wwwnc.cdc.gov/eid/article/31/1/24-0916_article

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11682818/pdf/24-0916.pdf>

Evolving technology and the development of new devices that can aerosolize water present a risk for new sources of Legionella bacteria growth and spread within industrial settings. We investigated a cluster of legionellosis among employees of a manufacturing facility in South Carolina, USA, and found 2 unique equipment sources of Legionella bacteria. The cluster of cases took place during August–November 2022; a total of 34 cases of legionellosis, including 15 hospitalizations and 2 deaths, were reported. Legionella pneumophila was isolated from 3 devices: 2 water jet cutters and 1 floor scrubber. L. pneumophila sequence type 36 was identified in environmental isolates and 1 patient specimen, indicating that those devices were the likely source of infection. Remediation was ultimately achieved through the development and implementation of a device-specific water management program. Manufacturing facilities that use aerosol-generating devices should consider maintaining updated Legionella water management programs to prevent Legionella bacterial infections.

Poopedi E, Singh T, Gomba A.

Respiratory and Enteric Bacterial Pathogens in Municipal Wastewater: A Potential Risk of Infection to Workers.

Water. 2025;17(2):19.

https://mdpi-res.com/d_attachment/water/water-17-00268/article_deploy/water-17-00268.pdf?version=1737192494

Investigating human pathogens in wastewater is crucial for identifying and predicting potential occupational health risks faced by wastewater treatment plant (WWTP) workers. This study aimed to determine the occurrence and levels of Legionella pneumophila, Mycobacterium spp., Arcobacter butzleri, and Aeromonas hydrophila in untreated municipal wastewater. Grab influent, activated sludge, and secondary settling tank (SST) effluent samples were collected bi-weekly over 6 months from 5 WWTPs in Tshwane, South Africa. Mycobacterium spp., A. butzleri, and A. hydrophila were detected using quantitative PCR (qPCR), while Legionella was detected using both a culture method and qPCR. The four pathogens were identified in most samples at varying levels. Legionella pneumophila had a positivity rate of 92%, ranging from 2 to 5.4 log₁₀ MPN/100 mL. Detection rates of Legionella spp., L. pneumophila, and L. pneumophila serogroup 1 were 97%, 75%, and 69%, respectively, with up to 5.3 log₁₀ gene copies (GC)/mL. Importantly, this study demonstrates molecular typing of L. pneumophila serogroup 1 in wastewater, a topic that has been rarely documented. Mycobacterium spp. were detected in all samples at varying levels (log₁₀ GC/mL) in influent (2.8–7.6), activated sludge (4.8–8.9), and SST effluent (3.8–8.9) samples. Arcobacter butzleri and A. hydrophila were detected in 96% and 82% of the samples, respectively, with GC levels in influent, activated sludge, and SST effluent ranging from 0.8 to 6.6, 1.5 to 6.5, and 0.7 to 6.6 log₁₀ GC/mL for A. butzleri, and similar levels for A. hydrophila. These findings underscore the presence of respiratory and enteric pathogens at various treatment points, suggesting potential occupational exposure for WWTP workers. This emphasises the need for microbiological risk assessments (RAs) or reviewing existing RAs and implementing necessary control measures to protect WWTP workers.

- **Endotoxines**

d'Errico A, Peraza S, Weiss I, Martinez W, Monge EA, Wouters IM, et al.

Occupational exposure to respirable and inhalable dust and its components in a Nicaraguan sugarcane plantation.

Occup Environ Med. 2025.

<https://oem.bmj.com/content/oemed/early/2025/02/19/oemed-2024-109604.full.pdf>

OBJECTIVE: To assess personal exposure to respirable and inhalable dust and its components endotoxin, black carbon and crystalline silica among sugarcane workers in Nicaragua. METHODS: Individual exposures to respirable (measurements=98) and inhalable (measurements=36) dust were collected in January and March 2020, with the month of March generally being hotter and less humid. Respirable dust and its components black carbon and crystalline silica, as well as inhalable dust and its component endotoxin, were personally measured. Linear mixed models were used to identify the determinants of occupational dust exposure considering different job tasks and meteorological conditions. RESULTS: Respirable dust and black carbon concentrations were higher in March among burned cane cutters compared with the other job groups (respirable dust geometric mean (GM)=1.9 mg m⁻³; black carbon GM=13.7 µg m⁻³), with considerably lower levels in January (respirable dust GM=0.2 mg m⁻³; black carbon GM=3.4 µg m⁻³). Almost all respirable crystalline silica measurements were below the limit of detection, except for four measurements, which ranged from 8 µg m⁻³ to 15 µg m⁻³. Seed cutters (GM=3.1 mg m⁻³) and weeders (GM=2.5 mg m⁻³) had the highest exposure to inhalable dust, while endotoxin concentrations were higher among seed cutters (GM=100 EU m⁻³) and burned cane cutters (GM=63 EU m⁻³) than the other work groups. CONCLUSIONS: Overall, exposure levels to the assessed agents varied across work groups, with higher levels observed among burned cane and seed cutters.

Ezennia SC, Beane Freeman LE, Chang VC, Xie S, Sandler DP, Andreotti G, et al.

Estimated exposure to endotoxin and circulating immunological markers among male farmers in the Biomarkers of Exposure and Effect in Agriculture study.

Occup Environ Med. 2025;81(12):635-8.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC11821429/pdf/nihms-2045032.pdf>

BACKGROUND: Occupational exposure to endotoxin has been associated with reduced lung cancer risk. The mechanisms underlying this association are unclear, though immunological alterations likely play a role. Farmers who perform certain tasks (eg, raising hogs) can be highly exposed to endotoxin. We, therefore, leveraged measurements of circulating immune markers from a prior investigation among male farmers in the Biomarkers of Exposure and Effect in Agriculture study to evaluate associations with newly developed estimates of endotoxin exposure. METHODS: Our investigation included 122 non-smoking farmers from Iowa, oversampling those raising hogs. Serum levels of 60 markers were measured using multiplex bead-based assays and ELISA. Based on an algorithm linking measurement-based task intensity estimates with self-reported task frequency, we estimated cumulative endotoxin exposure in the 30 days up to sample collection. We used multivariable linear regression to estimate geometric mean ratios of immune markers across exposure quartiles. RESULTS: Higher endotoxin exposure in the last 30 days was associated with increased levels of fibroblast growth factor-2, macrophage inflammatory protein-3 alpha/CCL20 and sIL-4R

($P(\text{trend}) \leq 0.02$) and decreased levels of macrophage-derived chemokine/CCL22 ($P(\text{trend}) = 0.02$). We also identified novel associations with several additional markers; those with the highest (vs lowest) exposure to endotoxin had decreased levels of TARC/CCL17, sCD27 and IL-1B. CONCLUSIONS: Several circulating immune markers were associated with endotoxin levels in an exposure-response manner. Our findings are consistent with prior work on hog farming and suggest possible biological mechanisms through which endotoxin may confer a reduced risk of lung cancer.

Sun Y, Kang J, Zhang FY, Wang H, Lai PS, Washko GR, et al.

Characterization of occupational endotoxin-related small airway disease with longitudinal paired inspiratory/expiratory CT scans.

Chest. 2025.

<https://doi.org/10.1016/j.chest.2024.12.037>

BACKGROUND: Although small airway disease has been recognized as a major contributor to obstructive respiratory diseases, the association between occupational endotoxin exposure and small airway disease, as characterized by CT scans, requires further investigation. RESEARCH QUESTION: What is the association between occupational endotoxin exposure and small airway disease, and which CT imaging biomarkers effectively detect pre-clinical airway dysfunction? STUDY DESIGN AND METHODS: This study includes 404 subjects from the Shanghai Textile Worker Cohort. We collected longitudinal inspiratory/expiratory CT scans, spirometry data, and endotoxin levels in 2011 and 2016. We evaluated the marginal association among endotoxin, small airway measures, and spirometry by Pearson correlation coefficient. We applied linear mixed models and linear regression models to understand the adjusted association among endotoxin, small airway measures, and spirometry. RESULTS: We found significant association between endotoxin and small airway disease and airflow obstruction, as quantified by small airway measures and spirometry, respectively. All small airway measures were marginally correlated with endotoxin, among which RVC(-856)(to)(-950) and Residual(-856) showed the strongest positive correlations. pp FEV(1) showed the strongest negative correlation with endotoxin. Adjusting for the confounders, E/I MLA, RVC(-856)(to)(-950), Residual(-856), FEV(1), and pp FEV(1) reported significant association with endotoxin. Workers who were exposed to 1,500 - 2,300 EU/m(3) endotoxin showed a significantly higher RVC(-856)(to)(-950) by 0.071 ($p = 0.006$) and a 8.57% lower pp FEV(1) ($p = 0.007$) compared to workers exposed to less than 50 EU/m(3) endotoxin. INTERPRETATION: We found that occupational endotoxin exposure was significantly associated with small airway disease and lower FEV(1). We identified Residual(-856) and E/I MLA as the imaging biomarkers for early detection of small airway dysfunction in pre-clinical individuals ($\text{FEV}(1)/\text{FVC} \geq 0.70$). These findings have important implications for identifying early-stage SAD and airflow obstruction with CT imaging biomarkers.

Biotechnologies

- Nouveaux procédés

Chary PS, Urati A, Shaikh S, Yadav R, Bhavana V, Rajana N, Mehra NK.

Nanotechnology-enabled approaches for combating diabetic foot ulcer.

J Drug Deliv Sci Technol. 2025;105:20.

<https://www.sciencedirect.com/science/article/pii/S1773224724012620?via%3Dihub>

Diabetic Foot Ulcer (DFU) remains a critical and increasingly prevalent complication of Diabetes Mellitus, affecting nearly 25 % of individuals with diabetes and contributing significantly to global healthcare burdens. Existing therapeutic modalities often fail to address the chronic and multifaceted nature of DFU, leaving many patients at risk of severe outcomes, including limb loss and reduced quality of life. This urgency is compounded by the growing diabetes epidemic, highlighting the pressing need for innovative and effective interventions. Nanoformulations, including silver nanoparticles and nanofibers, have emerged as effective tools for diabetic foot ulcer (DFU) management, offering targeted drug delivery and enhanced wound healing. Early in vivo studies indicate significant potential for nanoformulations to transform the DFU therapeutic landscape. Complementary advanced techniques, such as Negative Pressure Wound Therapy (NPWT), Hyperbaric Oxygen Therapy, Bioengineered Skin Substitutes, and Stem Cell Therapy, further enrich the treatment arsenal. Despite these advancements, regulatory hurdles remain a critical challenge to the broader adoption of nanoformulations. This review provides a comprehensive analysis of nanotechnology-enabled methodologies in DFU management, underscoring their potential to address unmet clinical needs and the urgency for their integration into contemporary practice amidst the escalating diabetes burden.

Chemla Y, Sweeney CJ, Wozniak CA, Voigt CA.

Design and regulation of engineered bacteria for environmental release.

Nature Microbiology. 2025;10(2):281-300.

<https://www.nature.com/articles/s41564-024-01918-0>

Emerging products of biotechnology involve the release of living genetically modified microbes (GMMs) into the environment. However, regulatory challenges limit their use. So far, GMMs have mainly been tested in agriculture and environmental cleanup, with few approved for commercial purposes. Current government regulations do not sufficiently address modern genetic engineering and limit the potential of new applications, including living therapeutics, engineered living materials, self-healing infrastructure, anticorrosion coatings and consumer products. Here, based on 47 global studies on soil-released GMMs and laboratory microcosm experiments, we discuss the environmental behaviour of released bacteria and offer engineering strategies to help improve performance, control persistence and reduce risk. Furthermore, advanced technologies that improve GMM function and control, but lead to increases in regulatory scrutiny, are reviewed. Finally, we propose a new regulatory framework informed by recent data to maximize the benefits of GMMs and address risks.

Chen HM, Xuan ZY, Yang L, Zhang S, Cao MJ.

Managing virus diseases in citrus: Leveraging high-throughput sequencing for versatile applications.

Hortic Plant J. 2025;11(1):57-68.

<https://www.sciencedirect.com/science/article/pii/S2468014124002036?via%3Dihub>

In this review, the advantages and advances in applying high-throughput sequencing (HTS) in the management of viral diseases in citrus, along with some challenges, are discussed to provide perspectives on future prospects. Since the initial implementation of HTS in citrus virology, a substantial number of citrus viruses have been identified, with a notable increase in the last 7 years. The acquisition of viral genomes and various HTS-based omics analyses serve as crucial pillars for advancing research in the etiology, epidemiology, pathology, evolution, ecology, and biotechnology of citrus viruses. HTS has notably contributed to disease diagnosis, such as the diagnoses of concave gum and impietratura, as well as to the surveillance of new virus risks and the preparation of virus-free materials. However, certain inherent defects in HTS and coupled bioinformatics analysis, such as challenges with sequence assembly and the detection of viral dark matter, require improvement to enhance practical efficiency. In addition, the utilization of HTS for the systematic management of citrus viral diseases remains limited, and drawing insights from other virus-plant pathosystems while integrating emerging compatible techniques and ideas may broaden its specific applications.

Ferreira-Filipe DA, Duarte AC, Hursthouse AS, Rocha-Santos T, Silva ALP.

Biobased Strategies for E-Waste Metal Recovery: A Critical Overview of Recent Advances.

Environments. 2025;12(1):30.

https://mdpi-res.com/d_attachment/environments/environments-12-00026/article_deploy/environments-12-00026.pdf?version=1737019926

The increasing e-waste volumes represent a great challenge in the current waste management landscape, primarily due to the massive production and turnover of electronic devices and the complexity of their components and constituents. Traditional strategies for e-waste treatment focus on metal recovery through costly, energetically intensive, and environmentally hazardous processes, such as pyrometallurgical and hydrometallurgical approaches, often neglecting other e-waste constituents. As efforts are directed towards creating a more sustainable and circular economic model, biobased alternative approaches to these traditional techniques have been increasingly investigated. This critical review focuses on recent advances towards sustainable e-waste treatment, exclusively considering studies using e-waste sources. It addresses, from a critical perspective, approaches using inactive biomass, live biomass, and biogenic compounds, showcasing the diversity of strategies and discussing reaction parameters, advantages and disadvantages, challenges, and potential for valorization of generated by-products. While ongoing research focuses on optimizing operational times and metal recovery efficiencies, bioprocessing approaches still offer significant potential for metal recovery from e-waste. These approaches include lower environmental impact by reducing energy consumption and effluent treatments and the ability to recover metals from complex e-waste streams, paving the way for a more circular economy in the electronics industry.

Jammes M, Tabasi A, Bach T, Ritter T.

Healing the cornea: Exploring the therapeutic solutions offered by MSCs and MSC-derived EVs.

Prog Retin Eye Res. 2025;105:32.

<https://www.sciencedirect.com/science/article/pii/S1350946224000909?via%3Dihub>

Affecting a large proportion of the population worldwide, corneal disorders constitute a concerning health hazard associated to compromised eyesight or blindness for most severe cases. In the last decades, mesenchymal stem/stromal cells (MSCs) demonstrated promising abilities in improving symptoms associated to corneal diseases or alleviating these affections, especially through their anti-inflammatory, immunomodulatory and pro-regenerative properties. More recently, MSC therapeutic potential was shown to be mediated by the molecules they release, and particularly by their extracellular vesicles (EVs; MSC-EVs). Consequently, using MSC-EVs emerged as a pioneering strategy to mitigate the risks related to cell therapy while providing MSC therapeutic benefits. Despite the promises given by MSC- and MSC-EV-based approaches, many improvements are considered to optimize the therapeutic significance of these therapies. This review aspires to provide a comprehensive and detailed overview of current knowledge on corneal therapies involving MSCs and MSC-EVs, the strategies currently under evaluation, and the gaps remaining to be addressed for clinical implementation. From encapsulating MSCs or their EVs into biomaterials to enhance the ocular retention time to loading MSC-EVs with therapeutic drugs, a wide range of ground-breaking strategies are currently contemplated to lead to the safest and most effective treatments. Promising research initiatives also include diverse gene therapies and the targeting of specific cell types through the modification of the EV surface, paving the way for future therapeutic innovations. As one of the most important challenges, MSC-EV large-scale production strategies are extensively investigated and offer a wide array of possibilities to meet the needs of clinical applications.

Katalevskiy AD, Smirnov KV, Smirnova NN.

MEMBRANES IN BIOTECHNOLOGY: CURRENT STATE AND PROSPECTS.

Izv Vyss Uchebnykh Zaved Khim Khimichesk Tekhnol. 2025;68(1):6-22.

<http://dx.doi.org/10.6060/ivkkt.20256801.7075>

Membranes have always been an important part of a diverse range of biotechnological processes. Nowadays, reverse osmosis, ultrafiltration, microfiltration, gas separation, chromatography, pervaporation, electrodialysis and other membrane-based processes are integral part of biotechnological production, enabling the resolution of various technological challenges. First membrane systems, used in biotechnology was taken from other fields. However, over the past 45 years, new materials and components have been developed for specific biotechnological applications. Membranes are highly suitable for use with biomolecules: relatively low temperature and pressure, no need for phase transitions or addition of chemical compounds. As a result, the risks of degradation, denaturation or inactivation of biotechnological products are reduced to a minimum. Currently, membrane-based technologies offer the best solutions for processes such as sterilizing filtration, clarification, cell culture cultivation, virus removal, and protein concentration and purification. Processes involving membrane bioreactors and membrane chromatography are becoming more and more common. In the review, the current state of development in membrane technology is presented, as well as the description of materials used for membranes and the characteristics of the membrane systems used in commercial production. Appliance for membrane separation processes can be quite expensive, but it is more energy-efficient than traditional separation methods. Due to their design, membrane systems are typically compact and have a modular structure, which allows to use of the same equipment to solve various tasks. It is discussed that future developments in membrane technology will be able to meet the increasing demands for higher productivity, lower production costs, and accelerate the development of the biotechnology.

Ma YF, Dong SY, Grippin AJ, Teng LS, Lee AS, Kim BYS, Jiang W.

Engineering therapeutical extracellular vesicles for clinical translation.

Trends in biotechnology. 2025;43(1):61-82.

<https://www.sciencedirect.com/science/article/pii/S016777992400218X?via%3Dihub>

Cell-based therapies are revolutionizing medicine by replacing or modifying dysfunctional cells with healthy cells or engineered derivatives, offering disease reversal and cure. One promising approach is using cell-derived extracellular vesicles (EVs), which offer therapeutic benefits similar to cell transplants without the biosafety risks. Although EV applications face challenges like limited production, inadequate therapeutic loading, and poor targeting efficiency, recent advances in bioengineering have enhanced their effectiveness. Herein, we summarize technological breakthroughs in EV bioengineering over the past 5 years, highlighting their improved therapeutic functionalities and potential clinical prospects. We also discuss biomanufacturing processes, regulation, and safety considerations for bioengineered EV therapies, emphasizing the significance of establishing robust frameworks to ensure translation capability, safety, and therapeutic effectiveness for successful clinical adoption.

Mawcha KT, Kinyanjui G, Berhe DH, Hategekimana A, Joelle K, Ndolo D.

An overview of sustainable management strategies for *Tuta absoluta*.

Int J Pest Manage. 2025:24.

<https://doi.org/10.1080/09670874.2025.2456590>

*The invasive tomato leafminer, *Tuta absoluta*, is one of the significant constraints to global tomato production. If not effectively controlled, it can cause yield losses of up to 100%. Tomato growers have relied heavily on routinely applying synthetic insecticides to mitigate *T. absoluta* infestations and damage. The indiscriminate application of synthetic pesticides is unsustainable and typically results in resistance, a resurgence of tomato pests, and other risks to human health and the environment. With the growing emphasis on sustainable agriculture, there is an urgent need to reduce overreliance on insecticides and adopt complementary pest management strategies. This paper explores practical and environmentally friendly pest management strategies and biotechnological advancements, including developing insect-resistant tomato cultivars and sterile insect techniques that can contribute to the sustainable control of *T. absoluta*.*

Naureen B, Ang BC, Muhamad F, Haseeb A, Basirun WJ.

Progress in degradable polyurethane scaffolds with variable degradation rates for tissue engineering applications.

Polym Eng Sci. 2025:19.

<https://doi.org/10.1002/pen.27090>

Global catastrophic consequences associated with wars, natural disasters, and accidents are increasing day by day. Tissue engineering (TE) regenerate damaged tissues by using growth factors, cells, or three-dimensional support biomaterials, that is, scaffolds. Scaffolds should degrade into resorbable, noncytotoxic, and excretable products in the physiological environment, along with successfully regenerating the damaged tissues. However, the requirement for scaffold degradation rate varies from patient to patient, depending on the nature, size, and cause of injuries. Thus, the synthesis and development of degradable scaffolds with focus toward variable degradation rates has become an engrossed research area. In this regard, multifunctional polymers such as polyurethane (PU) are suitable candidates. The degradation rate of PUs can be changed with the variations in the PU scaffold

composition, such as the selection of the isocyanate, polyol, or the chain extender. This review will fill the research gap by analyzing the state-of-the-art expansions of the degradable PU scaffolds with variable degradation rates based primarily on the selection and composition of polyol, isocyanate, and CE. It aims to guide the development of patient-specific/customized scaffolds with appropriate scaffold degradation and tissue regeneration rates, along with the recommendations for future work. Highlights The requirement for scaffold degradation rate varies from patient to patient. There is a need to synthesize scaffolds with variable/tunable degradation rates. Multifunctional polymers such as polyurethanes (PUs) are suitable candidates. PUs degradation rate can be tuned via isocyanates, polyols and chain extenders.

Pfeffer LK, Fischbach F, Heesen C, Friese MA.

Current state and perspectives of CAR T cell therapy in central nervous system diseases.

Brain. 2025;14.

<https://doi.org/10.1093/brain/awae362>

B cell-directed CAR T cell therapy has fundamentally changed the treatment of haematological malignancies, and its scope of application is rapidly expanding to include other diseases such as solid tumours or autoimmune disorders. Therapy-refractoriness remains an important challenge in various inflammatory and non-inflammatory disorders of the CNS. The reasons for therapy failure are diverse and include the limited access current therapies have to the CNS, as well as enormous inter- and intra-individual disease heterogeneity. The tissue-penetrating properties of CAR T cells make them a promising option for overcoming this problem and tackling pathologies directly within the CNS. First application of B cell-directed CAR T cells in neuromyelitis optica spectrum disorder and multiple sclerosis patients has recently revealed promising outcomes, expanding the potential of CAR T cell therapy to encompass CNS diseases. Additionally, the optimization of CAR T cells for the therapy of gliomas is a growing field. As a further prospect, preclinical data reveal the potential benefits of CAR T cell therapy in the treatment of primary neurodegenerative diseases such as Alzheimer's disease. Considering the biotechnological optimizations in the field of T cell engineering, such as extension to target different antigens or variation of the modified T cell subtype, new and promising fields of CAR T cell application are rapidly opening up. These innovations offer the potential to address the complex pathophysiological properties of CNS diseases. To use CAR T cell therapy optimally to treat CNS diseases in the future while minimizing therapy risks, further mechanistic research and prospective controlled trials are needed to assess seriously the disease and patient-specific risk-benefit ratio. B cell-directed chimeric antigen receptor (CAR) T cell therapy, which involves modifying a patient's T cells to target and destroy cancer cells, has transformed the treatment of haematological malignancies. Pfeffer et al. review the potential application of CAR T cell therapy to CNS disorders, including multiple sclerosis and brain tumours.

Praveen M, Brogi S.

Microbial Fermentation in Food and Beverage Industries: Innovations, Challenges, and Opportunities.

Foods. 2025;14(1):24.

https://mdpi-res.com/d_attachment/foods/foods-14-00114/article_deploy/foods-14-00114.pdf?version=1735877943

Microbial fermentation is a primary method by which a variety of foods and beverages are produced. The term refers to the use of microbes such as bacteria, yeasts, and molds to transform carbohydrates

*into different substances. Fermentation is important for preserving, enhancing flavor, and improving the nutritional quality of various perishable foods. Historical records clearly show that fermented foods and drinks, such as wine, beer, and bread, have been consumed for more than 7000 years. The main microorganisms employed were *Saccharomyces cerevisiae*, which are predominantly used in alcohol fermentation, and *Lactobacillus* in dairy and vegetable fermentation. Typical fermented foods and drinks made from yogurt, cheese, beer, wine, cider, and pickles from vegetables are examples. Although there are risks of contamination and spoilage by pathogenic and undesirable microorganisms, advanced technologies and proper control procedures can mitigate these risks. This review addresses microbial fermentation and clarifies its past importance and contribution to food preservation, flavoring, and nutrition. It systematically separates yeasts, molds, and bacteria and explains how they are used in food products such as bread, yogurt, beer, and pickles. Larger producers employ primary production methods such as the artisanal approach, which are explored along with future trends such as solid-state fermentation, the potential of biotechnology in developing new products, and sustainability in new product development. Future research and development strategies can lead to innovations in methods that improve efficiency, product range, and sustainability.*

Rezaei Z, Dinani AS, Moghimi H.

Cutting-edge developments in plastic biodegradation and upcycling via engineering approaches.

Metab Eng Commun. 2024;19:10.

<https://www.sciencedirect.com/science/article/pii/S2214030124000257?via%3Dihub>

The increasing use of plastics has resulted in the production of high quantities of plastic waste that pose a serious risk to the environment. The upcycling of plastics into value-added products offers a potential solution for resolving the plastics environmental crisis. Recently, various microorganisms and their enzymes have been identified for their ability to degrade plastics effectively. Furthermore, many investigations have revealed the application of plastic monomers as carbon sources for bio-upcycling to generate valuable materials such as biosurfactants, bioplastics, and biochemicals. With the advancement in the fields of synthetic biology and metabolic engineering, the construction of high-performance microbes and enzymes for plastic removal and bioupcycling can be achieved. Plastic valorization can be optimized by improving uptake and conversion efficiency, engineering transporters and enzymes, metabolic pathway reconstruction, and also using a chemo-biological hybrid approach. This review focuses on engineering approaches for enhancing plastic removal and the methods of depolymerization and upcycling processes of various microplastics. Additionally, the major challenges and future perspectives for facilitating the development of a sustainable circular plastic economy are highlighted.

Robusti CD, Farina MC.

Advances and applications of Biotechnology in Agribusiness: an analysis of scientific production.

Em Questao. 2025;31:27.

<https://www.scielo.br/j/emquestao/a/J4FmRMfzvYQGjdPKkHwmsdD/>

Biotechnology is a multidisciplinary area that uses biological systems, living organisms and derivatives to modify specific products and processes. In agribusiness, Biotechnology plays a fundamental role in large-scale food production, being considered essential to face food crises. This bibliometric study aims to analyze and present the advances and applications of Biotechnology in the agribusiness sector, using the scientific production available in the main Web of Science database from 2018 to 2023. Biotechnology applied to agriculture encompasses genetic engineering techniques to improve plants,

animals and microorganisms. In addition to contributing to food security, this area is aligned with several Sustainable Development Goals of the United Nations 2030 Agenda. It was found that Biotechnology is a transversal theme that covers more technical areas, with a mix of topics such as nanotechnology, genetic engineering, regulatory issues, risks and positive and negative impacts, innovation, forms of seed reproduction, sustainability and green applications. Authors, institutions and countries that stood out are from: United States, China, India, United Kingdom, Brazil, Korea, Poland, France and Germany. This research demonstrated advances and applications in order to reduce negative risks, innovations arising from new techniques and the technical and legal challenges faced by researchers in this field of study and provided valuable insights, contributing to the development of Biotechnology applied in agribusiness, promoting not only scientific and technological advances, but also addressing social and environmental issues. In addition to demonstrating that biotechnological applications in agribusiness range from genetic improvements in agricultural crops to the creation of biodegradable materials and sustainable solutions.

Sawant SS, Park HY, Sim EY, Kim HS, Choi HS.

Microbial Fermentation in Food: Impact on Functional Properties and Nutritional Enhancement-A Review of Recent Developments.

Fermentation. 2025;11(1):29.

https://mdpi-res.com/d_attachment/fermentation/fermentation-11-00015/article_deploy/fermentation-11-00015-v2.pdf?version=1735871743

The escalating global demand for nutritious and sustainable food sources has heightened interest in microbial biotransformation in food, a process in which microorganisms chemically modify food components to enhance their functional properties and nutritional content. This review provides a comprehensive overview of recent advancements in microbial fermentation, focusing on its impact on food quality, nutritional enhancement, and public health. Emphasizing both traditional fermentation practices and modern biotechnological innovations, this review highlights how beneficial microorganisms transform raw food substrates into products with superior nutrient bioavailability and functional benefits. Key developments include the synthesis of bioactive compounds, reduction of anti-nutritional factors, and improvement of sensory attributes, all of which collectively contribute to disease prevention, gut health, and overall well-being. Additionally, this review addresses safety concerns and challenges in microbial fermentation, including microbiological hazards, chemical contaminants, and strategies for their management. It also explores the difficulties in scaling up these processes for industrial applications and discusses future directions for sustainable food production. By consolidating current knowledge and identifying emerging trends, this review provides a comprehensive resource for researchers, industry professionals, and policymakers, offering insights into leveraging microbial biotransformation to create nutritionally enriched and functionally enhanced food products.

Sukma ACT, Budiyo B, Al-Baarri AN.

Recent Advances in Bioethanol Production from Rice Straw: Strategies, New Concepts, and Challenges.

Int J Environ Res. 2025;19(1):36.

<https://link.springer.com/article/10.1007/s41742-024-00681-8>

Second-generation bioethanol has garnered considerable interest among researchers due to its utilization of lignocellulosic biomass, such as rice straw, which is both cost-effective and readily

available. Nonetheless, the economic viability of large-scale production of second-generation bioethanol remains a significant challenge. There is an urgent need for cost efficiency across three critical stages: pretreatment, hydrolysis, and fermentation. This paper reviews recent advancements in bioethanol production from rice straw and proposes a novel approach to enhance economic feasibility. The inherent recalcitrance of rice straw necessitates the implementation of an appropriate pretreatment method, as this step is crucial for the success of the hydrolysis process. While chemical pretreatment is frequently employed, it often results in increased waste generation and maintenance costs, thereby elevating the overall production expenses. Optimizing reactor configurations for enzyme production, hydrolysis, and fermentation can lead to substantial reductions in production costs. Although enzymatic hydrolysis utilizing commercial enzymes is the predominant method, on-site enzyme production has demonstrated significant cost advantages. Consolidated bioprocessing (CBP) integrates enzyme production, hydrolysis, and fermentation within a single reactor using a single strain or microbial consortium. However, the productivity of bioethanol production from rice straw via CBP is currently low. The proposed novel CBP aims to address the limitations of the original CBP by integrating pretreatment, enzyme production, hydrolysis, and fermentation in a single reactor with a microbial consortium. This innovative approach is expected to minimize contamination risks and reduce equipment installation costs, thereby improving cost-effectiveness. Nevertheless, the implementation of the novel CBP presents challenges, including the establishment of a stable and efficient microbial consortium and the determination of optimal process parameters. Addressing these challenges is essential for the successful application of the novel CBP at an industrial scale.

Vasudhevan P, Ruoyu Z, Ma H, Singh S, Varshney D, Pu SY.

Biocatalytic enzymes in food packaging, biomedical, and biotechnological applications: A comprehensive review.

Int J Biol Macromol. 2025;300:16.

<https://www.sciencedirect.com/science/article/pii/S014181302500618X?via%3Dihub>

The increasing environmental concerns and health risks associated with synthetic chemicals have driven the demand for sustainable and eco-friendly solutions. Biocatalysis, employing enzymes or whole cells as biocatalysts, has emerged as a powerful alternative. This review provides a comprehensive analysis of the applications of biocatalytic enzymes in food packaging, biomedical sciences, and biotechnology. We highlight the potential of enzymes like laccase, glucose oxidase, lysozyme, protease, lipase, cellulase, and asparaginase to replace traditional chemical methods, driving innovation and sustainability. The global enzyme market is also analyzed, including current trends, emerging demands, and the impact of the COVID-19 pandemic. This review aims to bridge knowledge gaps, emphasize recent technological breakthroughs, and showcase the potential of biocatalytic enzymes to address critical industrial challenges while supporting environmental sustainability and economic growth.

Wheeler NE.

Responsible AI in biotechnology: balancing discovery, innovation and biosecurity risks.

Frontiers in bioengineering and biotechnology. 2025;13:10.

<https://www.frontiersin.org/journals/bioengineering-and-biotechnology/articles/10.3389/fbioe.2025.1537471/pdf>

The integration of artificial intelligence (AI) in protein design presents unparalleled opportunities for innovation in bioengineering and biotechnology. However, it also raises significant biosecurity concerns. This review examines the changing landscape of bioweapon risks, the dual-use potential of

AI-driven bioengineering tools, and the necessary safeguards to prevent misuse while fostering innovation. It highlights emerging policy frameworks, technical safeguards, and community responses aimed at mitigating risks and enabling responsible development and application of AI in protein design.

Xie XL, Zhai YH, Cheng H, Wei WH, Ren MZ.

From Taxus to paclitaxel: Opportunities and challenges for urban agriculture to promote human health.

Plant Physiol Biochem. 2025;220:10.

<https://www.sciencedirect.com/science/article/pii/S0981942825000300?via%3Dihub>

Conifers of the genus Taxus are environmentally friendly plants with significant medicinal and ecological value, contributing to the enhancement of urban living environments. Paclitaxel, a compound found in Taxus, has garnered particular research interest owing to its potent anti-cancer effects. However, traditional methods of extracting paclitaxel from Taxus are not only inefficient, but also destructive and unsustainable, posing the major risk of Taxus extinction. To address this, sustainable production using modern biotechnology is crucial for the mass production of paclitaxel. Therefore, this review revisits the potential of Taxus and sustainable paclitaxel production in the context of urban agriculture. It provides a comprehensive review of widespread research efforts targeting efficient and cost-effective paclitaxel biosynthesis. We also discuss a set of innovative strategies for paclitaxel biosynthesis and suggest approaches for its industrial production based on Taxus cell-based approaches.

Zwingelberg SB, Karabiyik G, Gehle P, von Brandenstein M, Eibichova S, Lotz C, et al.

Advancements in bioengineering for descemet membrane endothelial keratoplasty (DMEK).

npj Regen Med. 2025;10(1):18.

<https://www.nature.com/articles/s41536-025-00396-0.pdf>

Corneal diseases are the third leading cause of blindness worldwide. Descemet's Membrane Endothelial Keratoplasty (DMEK) is the preferred surgical technique for treating corneal endothelial disorders, relying heavily on high-quality donor tissue. However, the scarcity of suitable donor tissue and the sensitivity of endothelial cells remain significant challenges. This review explores the current state of DMEK, focusing on advancements in tissue engineering as a promising solution to improve outcomes and address donor limitations.

Organismes français et internationaux - Actualités

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

- **Biotechnologies**

INSERM,

[MICI : Les microARN dans le viseur](#), 20/01/2025.

[Les médicaments antiviraux pourraient contribuer à juguler une future pandémie](#), 13/02/2025.

Institut Pasteur, [Argobio et l'Institut Pasteur lancent Enodia Therapeutics : une société de biotechnologie à l'approche inédite en matière de dégradation protéique ciblée](#), 26/02/2025.

- **Coronavirus**

Santé Publique France, [Surveillance des variants du SARS-CoV-2 avec des systèmes de surveillance complémentaires : évaluation du risque du variant Omicron JN.1 en France, d'août 2023 à janvier 2024](#), 20/02/2025.

ECDC, [No evidence that the novel coronavirus identified in bats can be transmitted to humans](#), 25/02/2025.

- **Ebola**

OMS,

[Lancement aujourd'hui d'un essai révolutionnaire de vaccination contre la maladie à virus Ebola en Ouganda](#), 03/02/2025.

[L'OMS et ses partenaires facilitent l'accès à un vaccin et à des traitements candidats pour combattre l'épidémie de maladie à virus Ebola-Soudan en Ouganda](#), 31/01/2025.

- **Infections respiratoires aiguës**

Santé Publique France, [Infections respiratoires aiguës \(grippe, bronchiolite, COVID-19\). Bulletin](#), 26/02/2025.

- **Maladies bactériennes**

ANSES, [Mélioïdose : une maladie tropicale ignorée](#), 17/01/2025.

DGS-Urgent, [Augmentation des infections invasives à méningocoque en France](#), 21/02/2025.

HAS, [Pneumocoques : élargir la vaccination à tous les adultes de 65 ans et plus](#), 28/01/2025.

Santé Publique France, [Infections invasives à méningocoque en France au 31 janvier 2025](#), 19/02/2025.

Institut Pasteur, [Virulence de Listeria : le rôle clé de l'expression génétique](#), 17/01/2025.

- **Maladie non identifiée – Congo**

OMS Afrique, [Democratic Republic of the Congo deepens investigation on cluster of illness and community deaths in Equateur province](#), 27/02/2025.

- **Maladies vectorielles et zoonoses**

ANSES,

[Virus Influenza aviaire hautement pathogène \(IAHP\) : les autorités sanitaires françaises poursuivent leurs actions et renforcent leur coopération face au risque de circulation d'un virus adapté à l'Homme](#), 06/02/2025.

[Influenza D : une transmission possible des bovins aux porcs](#), 03/12/2025.

DGS-Urgent,

[Actualisation – Vigilance renforcée vis-à-vis du risque de transmission à l'homme des virus influenza d'origine zoonotique. Conduite à tenir](#), 24/02/2025.

[Vigilance renforcée vis-à-vis du risque de transmission à l'homme des virus influenza d'origine zoonotique. Conduite à tenir](#), 06/02/2025.

HAS, [Borréliose de Lyme et autres maladies vectorielles à tiques : la HAS actualise ses recommandations](#), 18/02/2025.

Institut Pasteur, [Mpox : mieux comprendre la résistance au tecovirimat](#), 12/02/2025.

Santé Publique France, [Gripes aviaire et porcine : l'évolution de la situation internationale sous surveillance renforcée](#), 10/02/2025.

ECDC,

[MERS-CoV worldwide overview. Situation update](#), 05/02/2025.

[Avian influenza: EU agencies track virus mutations and analyse response strategies](#), 29/01/2025.

[Epidemiological update, 14 January 2025: Mpox due to monkeypox virus clade I](#), 14/01/2025.

[Transmission of monkeypox virus clade I: overall risk remains low in the EU/EEA](#), 14/01/2025.

[Chikungunya worldwide overview. Situation update](#), 01/2025.

[Dengue worldwide overview. Situation update](#), 01/2025.

CDC (US),

[Highly Pathogenic Avian Influenza A\(H5N1\) Virus Infection of Indoor Domestic Cats Within Dairy Industry Worker Households — Michigan, May 2024](#), 20/02/2025.

[Notes from the Field: Seroprevalence of Highly Pathogenic Avian Influenza A\(H5\) Virus Infections Among Bovine Veterinary Practitioners — United States, September 2024](#), 13/02/2025.

[Oropouche in Parts of Brazil and Panama. Level 2 – Practice enhanced precautions](#), 31/01/2025.

OMS,

[L'OMS confirme que le Niger est le premier pays de la Région africaine à avoir éliminé l'onchocercose](#), 30/01/2025.

[La Guinée élimine la trypanosomiase humaine africaine en tant que problème de santé publique](#), 29/01/2025.

[La Géorgie est certifiée exempte de paludisme par l'OMS](#), 23/01/2025.

[L'OMS préqualifie un test de diagnostic pour une administration plus sûre des traitements contre le paludisme à P. vivax](#), 08/01/2025.

- **Mayotte – surveillance sanitaire suite cyclone Chido**

Santé Publique France, [Chido à Mayotte. Bulletin du 13 février 2025](#), 14/02/2025.

- **Poliovirus**

Santé Publique France, [Virus de la poliomyélite détectés dans les eaux usées en Europe : Santé publique France reste en vigilance](#), 17/02/2025.

ECDC, [Detections of poliovirus in sewage samples require enhanced routine and catch-up vaccination and increased surveillance](#), 30/01/2025.

CDC (US), [Global Polio. Level 2 – Practice enhanced precautions](#), 14/01/2025.

- **Rougeole**

Santé Publique France, [Épidémie de rougeole au Maroc : recommandations aux voyageurs et renforcement des mesures de précautions pour les professionnels de santé](#), 14/02/2025.

CDC (US), [Measles cases in 2025](#), 21/02/2025.

Texas DSHS (US), [Texas announces first death in measles outbreak](#), 26/02/2025.

- **VIH**

OMS, [Déclaration de l'OMS sur une menace mondiale potentielle pour les personnes vivant avec le VIH](#), 28/01/2025.