Bulletin de veille risques biologiques N°123 – Septembre 2023

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

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

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

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

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

Sommaire :

Veille risque biologique

- ## Protection respiratoire : ajustement

Gunputh UF, Williams G, Leighton A, Carter W, Varasteh H, Pawlik M, et al.

Design and manufacture of one-size-fits-all healthcare face shields for the NHS during the COVID-19 pandemic.

Heliyon. 2023;9(9):13.

https://www.cell.com/heliyon/pdf/S2405-8440(23)06576-3.pdf

During the COVID-19 pandemic, there was a shortage of personal protective equipment, PPE, which resulted in non-certified PPE being used by healthcare staffs. These would not provide the appropriate protection against the SARS-CoV-2 virus. Together with the local NHS Trust (University Hospitals of Derby and Burton (UHDB) NHS Foundation Trust) and a local small and medium enterprise (SME), Riverside Medical Packaging Ltd, the University of Derby (UoD) developed test protocols for PPE with a one-size-fits-all concept. Building on best practice in reviewing the literature and current design requirements, key design parameters were identified such as a minimum strap width and comfort level for healthcare related Face Shield. Two strap headbands made from fabric and elastomer with linear stiffness of 44.1 & PLUSMN; 0.3 N/m and 149.1 & PLUSMN; 3.1 N/m respectively were tested with respect to fit and comfort on small and large arcshaped models. There was an exponential change in prssure from the side to the middle of the strap headbands. The high stiffness of the elastomer in a radial set-up influenced the pressure exerted on a wearer's head when the elastomer strap was used. Meanwhile the coefficient of friction between the fabric strap and arc-shaped model influenced the pressure exerted when a fabric strap was used. The ergonomics of the designed Face Shields supported the onesizefitsall concept, whereby various gender and head circumferences were considered. The findings in this paper will promote new standards in the design of PPE with a one-size-fits-all target.

- ## Protection respiratoire : Ebola

Obuhoro O, Jones RM.

Assessing patterns of body contamination after personal protective equipment removal among health care workers: A scoping review.

American Journal of Infection Control. 2023;51(7):812-20.

https://doi.org/10.1016/j.ajic.2022.09.008

Background: It is now widely recognized that health care personnel (HCP) are at risk of contamination with pathogens during personal protective equipment (PPE) doffing. Studies of this phenonemona, have utilized a variety of PPE ensembles, doffing methods, and experimental methods.Methods: A scoping review was performed, consistent with PRISMA guidance. The PubMed and sciVerse Sco-pus databases were searched using an a priori search strategy. Data were extracted for analysis using the matrix method, and then a narrative analysis was performed. Articles were classified based on PPE ensemble.Results: Only 19 of 151 articles were included in the final analysis. All included studies reported some post-doffing contamination, and this contamination was most frequently observed on

the hands, wrist, face, and neck. Reviewed studies used a variety of tracer contaminants, PPE ensembles, doffing protocols, tracer assessment locations, and methods, making it difficult to identify patterns across studies.Discussion & Concluisons: Additional research is needed to improve the study methodology related to the selection and placement of tracers to ensure sensitive detection of post-doffing contamination, compare how specific doffing procedures or pieces of PPE influence post-doffing contamination, and to understand what post-doffing contamination means for patient and HCP infection risk.& COPY; 2022 The Author(s). Published by Elsevier Inc. on behalf of Association for Professionals in Infection Control and Epidemiology, Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/)

- ## Zoonoses : pathologies émergentes

Ayalew S, Habtamu G, Melese F, Tessema B, Ashford RT, Chothe SK, et al.

Zoonotic tuberculosis in a high bovine tuberculosis burden area of Ethiopia.

Frontiers in public health. 2023;11:10.

https://doi.org/10.3389%2Ffpubh.2023.1204525

Background: Tuberculosis (TB) is a major cause of ill health and one of the leading causes of death worldwide, caused by species of the Mycobacterium tuberculosis complex (MTBC), with Mycobacterium tuberculosis being the dominant pathogen in humans and Mycobacterium bovis in cattle. Zoonotic transmission of TB (zTB) to humans is frequent particularly where TB prevalence is high in cattle. In this study, we explored the prevalence of zTB in central Ethiopia, an area highly affected by bovine TB (bTB) in cattle.Method: A convenient sample of 385 patients with pulmonary tuberculosis (PTB, N = 287) and tuberculous lymphadenitis (TBLN, N = 98) were included in this cross-sectional study in central Ethiopia. Sputum and fine needle aspirate (FNA) samples were obtained from patients with PTB and TBLN, respectively, and cultures were performed using BACTEC (TM) MGIT (TM) 960. All culture positive samples were subjected to quantitative PCR (qPCR) assays, targeting IS1081, RD9 and RD4 genomic regions for detection of MTBC, M. tuberculosis and M. bovis, respectively.Results: Two hundred and fifty-five out of 385 sampled patients were culture positive and all were isolates identified as MTBC by being positive for the IS1081 assay. Among them, 249 (97.6%) samples had also a positive RD9 result (intact RD9 locus) and were consequently classified as M. tuberculosis. The remaining six (2.4%) isolates were RD4 deficient and thereby classified as M. bovis. Five out of these six M. bovis strains originated from PTB patients whereas one was isolated from a TBLN patient. Occupational risk and the widespread consumption of raw animal products were identified as potential sources of M. bovis infection in humans, and the isolation of M. bovis from PTB patients suggests the possibility of human-to-human transmission, particularly in patients with no known contact history with animals.Conclusion: The detected proportion of culture positive cases of 2.4% being M. bovis from this region was higher zTB rate than previously reported for the general population of Ethiopia. Patients with M. bovis infection are more likely to get less efficient TB treatment because M. bovis is inherently resistant to pyrazinamide. MTBC species identification should be performed where M. bovis is common in cattle, especially in patients who have a history of recurrence or treatment failure.

del Giudice P, Freychet F, Kopec L, Fenollar F, Eldin C, Velin M, et al.

Erythema Migrans Caused by Borrelia spielmanii, France.

Emerging Infectious Disease journal. 2023;29(11):2366.

https://wwwnc.cdc.gov/eid/article/29/11/23-0149_article

https://wwwnc.cdc.gov/eid/article/29/11/pdfs/23-0149.pdf

We describe a rare case of early Lyme borreliosis in France caused by Borrelia spielmanii, which manifested as a large erythema chronicum migrans rash. The patient completely recovered after a 15-day course of amoxicillin. Absence of pathognomonic signs prevented distinguishing B. spielmanii from other etiologies as cause in this case-patient.

Heger F, Schindler S, Pleininger S, Fueszl A, Blaschitz M, Lippert K, et al.

Three Cases of Tickborne Francisella tularensis Infection, Austria, 2022.

Emerging Infectious Disease journal. 2023;29(11):2349.

https://wwwnc.cdc.gov/eid/article/29/11/23-0460_article

https://wwwnc.cdc.gov/eid/article/29/11/pdfs/23-0460.pdf

Tularemia is increasing in Austria. We report Francisella tularensis subspecies holarctica isolated from 3 patients who had been bitten by arthropods. Next-generation sequencing showed substantial isolate similarity. Clinicians should consider bloodstream F. tularensis infections for patients with signs/symptoms of ulceroglandular tularemia, and surveillance of potential vectors should be intensified.

Laine C, Johnson V, Scott HM, Arenas-Gamboa A.

Global Estimate of Human Brucellosis Incidence.

Emerging Infectious Disease journal. 2023;29(9):1789.

https://wwwnc.cdc.gov/eid/article/29/9/23-0052_article

https://wwwnc.cdc.gov/eid/article/29/9/pdfs/23-0052.pdf

Brucellosis is a major public health concern worldwide, especially for persons living in resource-limited settings. Historically, an evidence-based estimate of the global annual incidence of human cases has been elusive. We used international public health data to fill this information gap through application of risk metrics to worldwide and regional at-risk populations. We performed estimations using 3 statistical models (weighted average interpolation, bootstrap resampling, and Bayesian inference) and considered missing information. An evidence-based conservative estimate of the annual global incidence is 2.1 million, significantly higher than was previously assumed. Our models indicate Africa and Asia sustain most of the global risk and cases, although areas within the Americas and Europe remain of concern. This study reveals that disease risk and incidence are higher than previously suggested and lie mainly within resource-limited settings. Clarification of both misdiagnosis and underdiagnosis is required because those factors will amplify case estimates.

McCormick D, Brown C, Bjork J, Cervantes K, Esponda-Morrison B, Garrett J, et al.

Characteristics of Hard Tick Relapsing Fever Caused by Borrelia miyamotoi, United States, 2013–2019.

Emerging Infectious Disease journal. 2023;29(9):1719.

https://wwwnc.cdc.gov/eid/article/29/9/22-1912_article

https://wwwnc.cdc.gov/eid/article/29/9/pdfs/22-1912.pdf

Borrelia miyamotoi, transmitted by Ixodes spp. ticks, was recognized as an agent of hard tick relapsing fever in the United States in 2013. Nine state health departments in the Northeast and Midwest have conducted public health surveillance for this emerging condition by using a shared, working surveillance case definition. During 2013–2019, a total of 300 cases were identified through surveillance; 166 (55%) were classified as confirmed and 134 (45%) as possible. Median age of case-patients was 52 years (range 1–86 years); 52% were male. Most cases (70%) occurred during June–September, with a peak in August. Fever and headache were common symptoms; 28% of case-patients reported recurring fevers, 55% had arthralgia, and 16% had a rash. Thirteen percent of patients were hospitalized, and no deaths were reported. Ongoing surveillance will improve understanding of the incidence and clinical severity of this emerging disease.

Minhaj F, Singh V, Cohen S, Townsend M, Scott H, Szumowski J, et al.

Prevalence of Undiagnosed Monkeypox Virus Infections during Global Mpox Outbreak, United States, June–September 2022.

Emerging Infectious Disease journal. 2023;29(11):2307.

https://wwwnc.cdc.gov/eid/article/29/11/23-0940_article

https://wwwnc.cdc.gov/eid/article/29/11/pdfs/23-0940.pdf

Since May 2022, mpox has been identified in 108 countries without endemic disease; most cases have been in gay, bisexual, or other men who have sex with men. To determine number of missed cases, we conducted 2 studies during June–September 2022: a prospective serologic survey detecting orthopoxvirus antibodies among men who have sex with men in San Francisco, California, and a retrospective monkeypox virus PCR testing of swab specimens submitted for other infectious disease testing among all patients across the United States. The serosurvey of 225 participants (median age 34 years) detected 18 (8.0%) who were orthopoxvirus IgG positive and 3 (1.3%) who were also orthopoxvirus IgM positive. The retrospective PCR study of 1,196 patients (median age 30 years; 54.8% male) detected 67 (5.6%) specimens positive for monkeypox virus. There are likely few undiagnosed cases of mpox in regions where sexual healthcare is accessible and patient and clinician awareness about mpox is increased.

Nyamota R, Maina J, Akoko J, Nthiwa D, Mwatondo A, Muturi M, et al.

Seroprevalence of Brucella spp. and Rift Valley fever virus among slaughterhouse workers in Isiolo County, northern Kenya.

PLoS neglected tropical diseases. 2023;17(10):12.

https://journals.plos.org/plosntds/article/file?id=10.1371/journal.pntd.0011677&type=printable

Brucella spp. and Rift Valley fever virus (RVFV) are classified as priority zoonotic agents in Kenya, based on their public health and socioeconomic impact on the country. Data on the pathogen-specific and co-exposure levels is scarce due to limited active surveillance. This study investigated seroprevalence and co-exposure of Brucella spp. and RVFV and associated risk factors among slaughterhouse workers in Isiolo County, northern Kenya. A cross-sectional serosurvey was done in all 19 slaughterhouses in Isiolo County, enrolling 378 participants into the study. The overall seroprevalences for Brucella spp. and RVFV were 40.2% (95% CI: 35.2-45.4) and 18.3% (95% CI: 14.5-22.5), respectively while 10.3% (95% CI 7.4%-13.8%) of individuals were positive for antibodies against both Brucella spp. and RVFV. Virus neutralisation tests (VNT) confirmed anti-RVFV antibodies in 85% of ELISA-positive samples. Our seroprevalence results were comparable to community-level seroprevalences previously reported in the area. Since most of the study participants were not from livestock-keeping households, our findings attribute most of the detected infections to occupational exposure. The high exposure levels indicate slaughterhouse workers are the most at-risk population and there is need for infection, prevention, and control programs among this high-risk group. This is the first VNT confirmation of virus-neutralising antibodies among slaughterhouse workers in Isiolo County and corroborates reports of the area being a high-risk RVFV area as occasioned by previously reported outbreaks. This necessitates sensitization campaigns to enhance awareness of the risks involved and appropriate mitigation measures.

Prinsen G, Baker M, Benschop J, Collins-Emerson J, Douwes J, Fayaz A, et al.

"We don't really do doctors." messages from people diagnosed with occupational leptospirosis for medical professionals on infection, hospitalisation, and long-term effects.

Heliyon. 2023;9(9):11.

https://www.cell.com/heliyon/pdf/S2405-8440(23)06511-8.pdf

Leptospirosis is largely an occupational disease for people working with livestock in Aotearoa New Zealand. Introduction of livestock vaccination and use of personal protective equipment has been associated with a reduction in the incidence. However, the incidence of occupational leptospirosis remains high, with significant burdens for affected families and healthcare system. For this article, a subset of thirteen participants from a nationwide leptospirosis case-control study (2019-2021) who were diagnosed with leptospirosis and worked with livestock at the time of illness were invited and agreed to a semi-structured interview. Interviewees reflected on their experiences as messages for medical professionals. The analysis of transcripts reveals widely shared experiences with infection, hospitalisation, and treatment, as well as long-term effects and recovery. Conclusions for medical professionals include that ill workers continue to have their diagnosis of leptospirosis delayed. This delay may contribute to more than half the people ill with leptospirosis hospitalised. Further, medical professionals' communication and relationship with ill people strongly colours the latter's experience, for good or for bad. Moreover, most interviewees experienced a recovery process that took several months of feeling tired, which undermined professional performance and emotional wellbeing.

Safir A, Safir M, Henig O, Nahari M, Halutz O, Levytskyi K, et al.

Nosocomial transmission of MPOX virus to health care workers -an emerging occupational hazard: A case report and review of the literature.

American Journal of Infection Control. 2023;51(9):1072-6.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9891803/pdf/main.pdf

We present an unusual case of monkeypox (MPOX) virus transmission to a dermatology resident during examination of affected patients. Viral DNA sequencing led to the identification of the most likely

contact. This case, along with a review of all published cases so far, emphasizes the possible hazard of MPOX transmission to health care personnel, even when wearing personal protective equipment. It also emphasizes the need for maintaining high index of suspicion when examining patients with new dermatological lesions and strict compliance with the revised Centers for Disease Control and Prevention recommendations for specimen collection from such patients.& COPY; 2023 Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. All rights reserved.

• Légionellose

McBee DB, Mizu R, Hamdi AM.

A Case of Severe, Difficult-to-Diagnose Legionnaires' Disease in a Young Welder.

Cureus J Med Sci. 2023;15(7):5.

https://assets.cureus.com/uploads/case_report/pdf/140569/20230820-18455-1s2k5zd.pdf

Legionellosis among welders and other metalworkers is a rare but potentially underappreciated occupational hazard. The same mechanisms that predispose welders to severe pneumonia from Streptococcus pneumoniae and Bacillus cereus may similarly predispose them to Legionella pneumophila infection. We present a case of a previously healthy, immunocompetent 31-year-old male welder presenting with three days of shortness of breath, hypoxia, high-grade fever, and blood-tinged sputum. Chest computed tomography (CT) revealed a lobar consolidation of the right middle and lower lobes. Laboratory evaluation showed borderline hyponatremia, hypophosphatemia, and elevated liver enzymes. The patient was ultimately intubated and started on broad-spectrum antibiotics. Multiple respiratory cultures were negative and Legionella urine antigen testing was also negative. Eventually, bronchial Legionella culture was positive for Legionella pneumophila, and a blood next-generation sequencing test also confirmed the diagnosis. He was extubated six days following admission and subsequently discharged.

• Endotoxines

Lopez DJ, Alif S, Dharmage S, Lodge CJ, Bui DS, Le Moual N, et al.

Exploration of associations between occupational exposures and current adult eczema.

Occup Environ Med. 2023;80(10):564-71.

https://oem.bmj.com/content/80/10/564.long

OBJECTIVES: There is a scarcity of evidence on occupational exposures that may increase eczema in adults. We aimed to investigate potential associations between occupational exposures and eczema in middle-aged adults. METHODS: A lifetime work history calendar was collected from the Tasmanian Longitudinal Health Study participants when they were at age 53. Their work history was collated with the occupational asthma-specific job exposure matrix to define ever-exposure and cumulative exposure unit-years since no eczema job exposure matrix is available. Eczema was determined using the report of flexural rash that was coming and going for at least 6 months in the last 12 months. Skin prick tests were used to further subgroup eczema and atopic eczema (AE) or non-AE (NAE). Logistic and multinomial regression models were used to investigate the associations. RESULTS: Eczema prevalence

was 9.1%. Current occupational exposure to animals (adjusted OR, aOR=3.06 (95% CI 1.43 to 6.58)), storage mites (aOR=2.96 (95% CI 1.38 to 6.34)) and endotoxin (aOR=1.95 (95% CI 1.04 to 3.64)) were associated with increased risk of current eczema. Furthermore, increased odds of NAE were associated with current exposure to animals (aOR=5.60 (95% CI 1.45 to 21.7)) and storage mites (aOR=5.63 (95% CI 1.45 to 21.9)). Current exposures to isocyanates (aOR=5.27 (95% CI 1.17 to 23.7)) and acrylates (aOR=8.41 (95% CI 1.60 to 44.3)) were associated with AE. There was no evidence of associations between cumulative exposures and eczema prevalence. Cumulative exposure to metalworking fluids (aOR=1.10 (95% CI 1.01 to 1.22)) was associated with NAE and acrylates (aOR=1.24 (95% CI 1.04 to 1.46)) with AE. CONCLUSIONS: In this exploratory assessment, multiple occupational exposures were associated with current eczema in middle-aged adults. Raising awareness and limiting these exposures during an individual's productive working life will likely have various health benefits, including reducing eczema prevalence.

Pileco Cappelleti C, Santos Silva KT, Rodrigues-Conrad K, Grams KC, Kottwitz da Silva I, Frielink AP, et al.

Cytotoxic and oxidative changes in individuals occupationally exposed to recyclable municipal solid waste.

Journal of toxicology and environmental health Part A. 2023;86(23):898-908.

https://doi.org/10.1080/15287394.2023.2256782

Waste collectors are exposed to a wide variety of bacteria, endotoxins, fungi, allergens, particulate matter, irritating inhalants, and vehicle exhaust, making them more prone to development of chronic diseases. Although several studies described the impact of occupational exposure on the overall health of waste collectors, few investigations were conducted regarding cellular and molecular changes that may occur due to exposure. The aim of this study was to assess biomarkers of oxidative stress such as levels of reactive oxygen species (ROS), lipoperoxidation, total antioxidant capacity (TAC), apoptosis, butyrylcholinesterase (BChE) activity and mitochondrial function (MitoTrackerTM Green FM and MitoTrackerTM Red) using the peripheral blood from individuals occupationally exposed to recyclable solid waste in Southern Brazil. The study included 30 waste collectors and 30 control individuals, who did not perform activities with recognized exposure to biological and chemical substances. Waste collectors were found to exhibit in peripheral blood leukocytes (PBL) higher rates of apoptosis, increased production of ROS, and reduced mitochondrial membrane potential (MMP), associated with decreased total antioxidant capacity (TAC) and elevated activity of BChE in plasma. Therefore, evidence indicates that cytotoxicity, oxidative stress, and inflammatory responses may be involved in the multiplicity of adverse health outcomes related to contaminant exposure in waste collectors. It is thus necessary to implement and/or improve occupational health programs aimed at workers as well as mandatory inspections for the use of personal protective equipment.

Biotechnologies

- ## Nouveaux procédés

Henderson EA, Lukomski S, Boone BA.

Emerging applications of cancer bacteriotherapy towards treatment of pancreatic cancer.

Front Oncol. 2023;13:15.

https://doi.org/10.3389/fonc.2023.1217095

Pancreatic cancer is a highly aggressive form of cancer with a five-year survival rate of only ten percent. Pancreatic ductal adenocarcinoma (PDAC) accounts for ninety percent of those cases. PDAC is associated with a dense stroma that confers resistance to current treatment modalities. Increasing resistance to cancer treatments poses a challenge and a need for alternative therapies. Bacterial mediated cancer therapies were proposed in the late 1800s by Dr. William Coley when he injected osteosarcoma patients with live streptococci or a fabrication of heat-killed Streptococcus pyogenes and Serratia marcescens known as Coley's toxin. Since then, several bacteria have gained recognition for possible roles in potentiating treatment response, enhancing anti-tumor immunity, and alleviating adverse effects to standard treatment options. This review highlights key bacterial mechanisms and structures that promote anti-tumor immunity, challenges and risks associated with bacterial mediated cancer therapies, and applications and opportunities for use in PDAC management.

Jin XF, Yang GY.

Pathophysiological roles and applications of glycosphingolipids in the diagnosis and treatment of cancer diseases.

Progress in lipid research. 2023;91:25.

https://www.sciencedirect.com/science/article/pii/S0163782723000310?via%3Dihub

Glycosphingolipids (GSLs) are major amphiphilic glycolipids present on the surface of living cell membranes. They have important biological functions, including maintaining plasma membrane stability, regulating signal transduction, and mediating cell recognition and adhesion. Specific GSLs and related enzymes are abnormally expressed in many cancer diseases and affect the malignant characteristics of tumors. The regulatory roles of GSLs in signaling pathways suggest that they are involved in tumor pathogenesis. GSLs have therefore been widely studied as diagnostic markers of cancer diseases and important targets of immunotherapy. This review describes the tumor-related biological functions of GSLs and systematically introduces recent progress in using diverse GSLs and related enzymes to diagnose and treat tumor diseases. Development of drugs and biomarkers for personalized cancer therapy based on GSL structure is also discussed. These advances, combined with recent progress in the preparation of GSLs derivatives through synthetic biology technologies, suggest a strong future for the use of customized GSL libraries in treating human diseases.

Nishshanka G, Thevarajah B, Nimarshana PHV, Prajapati SK, Ariyadasa TU.

Real-time integration of microalgae-based bioremediation in conventional wastewater treatment plants: Current status and prospects.

J Water Process Eng. 2023;56:15.

https://doi.org/10.1016/j.jwpe.2023.104248

With rising water scarcity leading to a risk of affecting 1.69 to 2.37 billion people in urban residents, the treatment and reuse of wastewater have been identified as one of the main avenues to preserve global water resources. Thus, wastewater treatment plants with capacities ranging from 8000 to 200,000 tons/day have been implemented to treat wastewater and discharge effluent with improved quality parameters. Nonetheless, the generation of 160,000-210,000 tons/year of sludge and the requirement for advanced treatment to achieve nondetectable residues are significant concerns for highly effective wastewater treatment. In this context, microalgae with the potential of effective nutrient removal from wastewater streams have been exploited in wastewater treatment at primary, secondary and tertiary treatment stages. Microalgae-based bioremediation generates valuable biomass with metabolites, namely lipids, proteins, and carbohydrates, which could be utilized in the value-added production of biofuels, biofertilizers, etc. Moreover, microalgae integrated wastewater treatment systems would substantially remove residual pollutants, nutrients, and pathogens with high removal efficiencies. Hence, the integration of microalgae into the conventional wastewater treatment process enhances the process sustainability while contributing to the concept of a circular bioeconomy. Nevertheless, limited studies are available on the potential of integrating microalgae in the conventional wastewater treatment plants for realworld applications, although several reviews are available in the literature focusing the microalgae-based wastewater treatment in a general context. Thus, the current review aims to address this gap in the literature by comprehensively assessing the prospects of integrating phycoremediation as the secondary and tertiary/ advanced wastewater treatment processes, while discussing the challenges and future perspectives in the research domain.

Song TY, Kong B, Liu R, Luo Y, Wang YA, Zhao YJ.

Bioengineering Approaches for the Pancreatic Tumor Organoids Research and Application.

Adv Healthc Mater. 2023:24.

https://doi.org/10.1002/adhm.202300984

Pancreatic cancer is a highly lethal form of digestive malignancy that poses significant health risks to individuals worldwide. Chemotherapy-based comprehensive treatment is the primary therapeutic approach for midlife and late-life patients. Nevertheless, the heterogeneity of the tumor and individual genetic backgrounds result in substantial variations in drug sensitivity among patients, rendering a single treatment regimen unsuitable for all patients. Conventional pancreatic cancer tumor organoid models are capable of emulating the biological traits of pancreatic cancer and are utilized in drug development and screening. However, these tumor organoids can still not mimic the tumor microenvironment (TME) in vivo, and the poor controllability in the preparation process hinders translation from essential drug screening to clinical pharmacological therapy. In recent years, many engineering methods with remarkable results have been used to develop pancreatic cancer organoid models, including bio-hydrogel, co-culture, microfluidic, and gene editing. Here, this work summarizes and analyzes the recent developments in engineering pancreatic tumor organoid models. In addition, the future direction of improving engineered pancreatic cancer organoids is discussed for their application prospects in clinical treatment.

Organismes français et internationaux - Actualités

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

- ## Antibiorésistance

ANSES, Transmission de l'antibiorésistance à l'être humain : quelles bactéries surveiller chez l'animal, 11/10/2023.

- ## Infections à streptocoque du groupe A

HCSP, Conduite à tenir autour d'un cas d'infection à streptocoque de groupe A, 20/09/2023.

- ## Infections respiratoires (dont COVID-19)

COVARS, Avis du 15 septembre 2023 relatif à la campagne de vaccination automnale anti-Covid-19. Saisine relative aux infections respiratoires aiguës, 15/09/2023.

HCSP,

Prévention des infections respiratoires virales, 09/10/2023.

Infections respiratoires aiguës : validation de la stratégie nationale de prévention, 09/10/2023.

Santé Publique France,

Infections respiratoires aiguës (grippe, bronchiolite, COVID-19). Bulletin du 25 octobre 2023, 25/10/2023.

Surveillance intégrée des infections respiratoires aiguës, 05/10/2023.

Coronavirus : circulation des variants du SARS-CoV-2, 29/09/2023.

- ## Zoonoses

ANSES,

Fièvre Hémorragique de Crimée-Congo : première détection du virus dans des élevages bovins dans le sud de la France, 24/10/2023.

Clôture du programme conjoint européen One health, 11/09/2023.

ARS Ile-de-France, Lutte anti-vectorielle : l'ARS confirme un 1er cas autochtone de dengue en Île-de-France et engage deux actions de démoustication à Limeil-Brévannes (94), 17/10/2023.

HCSP,

Foyer de fièvre Q dans le Vaucluse : sécurisation des produits issus du corps humain, 26/09/2023.

Sécurisation des produits issus du corps humain dans le cadre de la circulation active du virus West-Nile en Gironde, 10/09/2023.

Santé Publique France,

Fièvre Hémorragique de Crimée-Congo : première détection du virus sur des tiques collectées dans des élevages bovins dans le sud de la France, 24/10/2023.

Chikungunya, dengue et zika - Données de la surveillance renforcée en France métropolitaine en 2023, 23/10/2023.