Antibiotic-resistant bacteria

- Healthcare-Associated Infections: The Role of Microbial and Environmental Factors in Infection Control-A Narrative Review
- Spotlight on the epidemiology and antimicrobial susceptibility profiles of Vibrio species in the MENA region, 2000-2023
- Antibiotic misuse in neurosurgery: a threat to patient safety and surgical outcomes
- Draft genome sequences of antibiotic-resistant Serratia and Enterobacter species isolated from imported fresh produce in Georgia, USA
- Multidrug-resistant pathogens contaminate river water used in irrigation in disenfranchised communities
- Effect of antibiotic prophylaxis in the prognosis of Post-neurosurgical meningitis patients
- Treatment of antibiotic-resistant bacteria colonizing diabetic foot ulcers by OLED induced antimicrobial photodynamic therapy
- Identification of Cutibacterium modestum in Spondylitis by Metagenomics Analysis

Antibiotic-resistant bacteria, often referred to as “superbugs,” are bacteria that have developed the ability to withstand the effects of antibiotics that were once effective in treating bacterial infections. This resistance can make it challenging or even impossible to treat infections caused by these bacteria with commonly used antibiotics. Antibiotic resistance is a significant global public health concern due to its potential to lead to more severe and difficult-to-treat infections, increased healthcare costs, and higher mortality rates.

Key points

Mechanisms of Resistance: Antibiotic resistance can develop through various mechanisms. Some common mechanisms include the production of enzymes that inactivate antibiotics, changes in bacterial cell walls or membranes to prevent antibiotics from entering the cell, and mutations that alter the target sites of antibiotics within bacteria.

Causes of Resistance: The main drivers of antibiotic resistance include the overuse and misuse of antibiotics in both human medicine and agriculture. When antibiotics are used unnecessarily or not taken as prescribed, bacteria have a greater chance to develop resistance.

Types of Resistant Bacteria: There are various types of antibiotic-resistant bacteria, including methicillin-resistant Staphylococcus aureus (MRSA), extended-spectrum beta-lactamase (ESBL)-producing bacteria, carbapenem-resistant Enterobacteriaceae (CRE), and multidrug-resistant tuberculosis (MDR-TB), among others.

Healthcare-Associated Infections: Antibiotic-resistant infections are often associated with healthcare settings, such as hospitals and long-term care facilities. Patients in these environments may have compromised immune systems and are at greater risk of acquiring resistant infections.

Community-Acquired Infections: Antibiotic-resistant bacteria can also cause infections in the community, outside of healthcare settings. For example, drug-resistant strains of Streptococcus pneumoniae and Neisseria gonorrhoeae have emerged as public health concerns.

Global Impact: Antibiotic resistance is a global issue that affects people worldwide. It can lead to

treatment failures for common infections and limit the effectiveness of important medical procedures, such as surgeries, chemotherapy, and organ transplants.

Prevention and Control: Strategies to combat antibiotic resistance include appropriate antibiotic use (only when necessary and as prescribed by healthcare providers), vaccination to prevent bacterial infections, infection prevention measures in healthcare settings, and the development of new antibiotics and alternative treatment options.

One Health Approach: Addressing antibiotic resistance requires a “One Health” approach, recognizing the interconnectedness of human health, animal health, and the environment. Efforts to combat resistance involve collaboration among healthcare professionals, veterinarians, researchers, policymakers, and the pharmaceutical industry.

Research and Development: Encouraging research and development of new antibiotics and alternative treatments is crucial for staying ahead of antibiotic-resistant bacteria. This includes incentives for the pharmaceutical industry to invest in antibiotic development.

Patient Education: Educating patients about the appropriate use of antibiotics, the importance of completing prescribed courses of antibiotics, and the risks of antibiotic resistance is essential in reducing the spread of resistant bacteria.

Antibiotic resistance is an ongoing and evolving challenge that requires a multifaceted approach to reduce its impact on public health. It underscores the importance of responsible antibiotic use, infection prevention, and ongoing research into new treatment options.

Antibiotic prophylaxis plays an important role in the prognosis of post-neurosurgical meningitis patients and has a significant function in improving prognosis. The prevention of post-neurosurgical meningitis with antibiotics prior to neurosurgery should be emphasized in clinical practice, and appropriate selection of antibiotics is necessary to prevent the occurrence of infection and inhibit the emergence of antibiotic-resistant bacteria [1)].

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Zheng G, Shi Y, Sun J, Wang S, Li X, Lv H, Zhang G. Effect of antibiotic prophylaxis in the prognosis of Post-neurosurgical meningitis patients. Eur J Med Res. 2023 Oct 4;28(1):396. doi: 10.1186/s40001-023-01399-7. PMID: 37794524.