

# Antimicrobial resistance

Arun Kumar Pradhan, PhD

Pradhan AK Antimicrobial Resistance. J Microbiol Biotechnol Rep. 2017;1(1):2.

## EDITORIAL

Microorganisms are too minute organisms for the naked eye to visualize and can be found everywhere on Earth. Bacteria, viruses, fungi are some of the microorganisms which can be commensal to human beings and opportunistic to obligate pathogens as well. Due to compromised immune systems, the pathogenic microorganisms have been able to establish their domain inside the human body thus causing fatality to the system. Antimicrobial agents have been used for the last 70 years to treat patients who have infectious diseases. Antimicrobial molecules are probably the saviours of human beings on earth. Since their discovery, billions of lives have been saved from fatal diseases and have greatly contributed to reduce the infectious diseases. Antibiotic resistance is one of the most emerging threats to the medical community since treating patients with infections caused by drug resistant bacteria is increasing at a higher rate than it was expected earlier. With the prolonged exposure to unhygienic practices by people, have led them to become prone to many diseases ranging from malaria to HIV. With the prolonged use of drugs to treat such diseases, infectious organisms are getting adapted to them, making the drugs ineffective. Some of the well known causes of antimicrobial resistance are :i) the use of antibiotics in food animals leading to decreased pathogen evading activity help colonize bacteria like *Salmonella* and *Campylobacter*, causing food borne diseases when taken by the human being; ii) spreading of inherent antibiotic resistance gene through horizontal gene transfer; iii) incorrect diagnosis iii) the misuse of antibiotics-probably the most notorious cause. Several studies are available to support the fact that the overuse or misuse of antibiotics can lead to development of antimicrobial resistance in microorganisms. One example is the overuse of new generation cephalosporin group of antibiotics has led to evolution of methicillin resistance *Staphylococcus aureus* strains. *S. aureus* was one of the first organisms observed to exhibit drug resistance against lactam

group of antibiotics. Methicillin was an important antibiotic then which was prescribed to treat infections caused by penicillin resistant *S. aureus*. Several mechanisms are depicted in literatures but 4 most important mechanisms have been well understood by the scientific community: a) change in structural conformation of the drugs during interaction with microbes thus reducing its effectiveness or inactivating the molecule; ii) changing the active site thus inhibiting the binding of drug; iii) altering the metabolic pathway; iv) reducing the accumulation of correct amount of dosage required to kill the microorganism. Hospital acquired infections are now a days common in India and can be attributed to some of the commonly observed infectious agents such as *Staphylococcus aureus*, *Streptococci* (group B and group D); *Pseudomonas aeruginosa*, *Clostridium difficile*, members of Enterobacteriaceae family (carbapenem resistant species), *Acinetobacter baumannii*, *Campylobacter jejuni*, *Salmonella typhi*, *Shigella* spp. *Mycobacterium tuberculosis*; *Neisseria gonorrhoeae* and *N. meningitis*, influenza, herpes viruses, *Candida albicans*, *Cryptococcus neoformans* and *Aspergillus fumigatus*, Leishmaniasis causing protozoa etc. With the rapid evolution and emergence of multi drug resistant strains of microorganisms, developing new antibiotics and marketing may not be always the best option since designing/modifying drugs that would be beneficial requires lot of time and not every drug designed enters to the market. Hence, preventing drug resistance problems may be a feasible option for the community. Every member of the society whether a medical practitioner or a lay man (whether a patient or healthy) has an important role to play. Hygienic practices like avoiding the stagnancy of drainage, maintaining toilet facilities, keeping hospitals clean enough can be opted. Developing strong immune systems by proper health practices can also be helpful in preventing diseases and also being self aware not to spread communicable diseases when one is infected with can also lead toward suppression of spread of potential germs. Prescribing antibiotics in an effective manner will certainly help in stopping the development of drug resistance in pathogens

Center for Biotechnology (CBT), Siksha O Anusandhan University (SOA), Bhubaneswar, Odisha, India

Correspondence: Dr Arun Kumar Pradhan, PhD, Assistant Professor, Center for Biotechnology (CBT), Siksha O Anusandhan University (SOA), Bhubaneswar, Odisha, India, Telephone +91-9337727724, E-mail [anunpradhan83@gmail.com](mailto:anunpradhan83@gmail.com)

Received: August 09, 2017, Accepted: August 11, 2017, Published: August 11, 2017



This open-access article is distributed under the terms of the Creative Commons Attribution Non-Commercial License (CC BY-NC) (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits reuse, distribution and reproduction of the article, provided that the original work is properly cited and the reuse is restricted to noncommercial purposes. For commercial reuse, contact [reprints@pulsus.com](mailto:reprints@pulsus.com)