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Infection Prevention 2017: Opportunities for development of new anti-infective medicines - Tomislav Kostyanev - University of Antwerp

Tomislav Kostyanev
University of Antwerp, Belgium

Antibiotic resistance (ABR) has now been recognized as a worldwide public health threat, causing a minimum of 700,000 death cases per annum. Therefore, it's essential that new and rapid solutions are found to effectively overcome the results of ABR. Many pharmaceutical companies have found difficulties to take a position in antibiotic discovery and development within the last 20 years, mainly due to low economic return of investment. The innovative medicines initiative joint undertaking (IMI JU) has addressed this issue by investing quite 660 million euro in seven projects clustered within the New Drugs for Bad Bugs programme. These projects encompass all aspects of drug development from basic science and drug discovery, through clinical development to new business models and responsible use of antibiotics. The main objectives of the COMBACTE consortia are to deliver clinical trials in conjunction with pharmaceutical companies and to form clinical and laboratory networks to optimise scientific evaluation of latest antimicrobials within Europe. The COMBACTE consortium now consists of 55 academic and eight industrial partners and spreads in 42 countries, including quite 800 hospitals. The main objective of LAB-Net, one of the four pillars of COMBACTE is to work out a European-wide network of laboratories that plays a key role in clinical trials on anti-infective. By being a part of LAB-Net, laboratories can enjoy training programmes and activities to create laboratory capacity and infrastructure. One of the last word goals of COMBACTE is to evolve into a self-sustainable clinical trial infrastructure which may support trials of anti-infective after the formal close-out of the IMI-funded programme. The vision of such a network would be to efficiently generate rigorous evidence for brand fresh or improved diagnosis, prevention and treatment of infections and to raise answer disease threats. This would be facilitated by a multidisciplinary clinical network and innovative research approaches. Most of human history, infectious diseases have been a leading cause of death. However, by the late 20th century, infectious diseases caused by bacteria fell off the public's radar in wealthier regions as society and medicine erected an effective four-walled fort: sanitation, nutrition, immunization, and antibacterial drugs because infectious diseases remain the leading cause of loss of disability-adjusted life years. Much of the pharmaceutical industry has withdrawn from its effort to rebuild the wall, whereas the food industry is inadvertently helping to tear it down, using more than half of our antibiotic output to promote growth in healthy animals and plants, hastening the spread of resistance. The complacency with which much of society has met this onrushing calamity may stem from two factors. First, everyone shares the risk. Second, in contrast to people infected by HIV (the cause of AIDS), those who go on to suffer from untreatable bacterial infections are rarely acquainted before infection and, once infected, may die quickly. The goal is not to return to a golden age when antibiotics held sway over bacterial diseases. After antibiotic use became widespread in the United States and life expectancy raised, the U.S. Surgeon. Regain, maintain, and extend substantial control over bacterial infections would require continuous development and application of fresh approaches supported new knowledge, practices, and policies. We need to find out more about how antibiotics work, how bacteria resist them, and the way to get, test, approve, and conserve them.

However, most bacteria cannot currently be cultured. Indeed, a number of diseases once considered to be non-infectious in origin, such as gastric and duodenal ulcers and Whipple's disease disorder of absorption in the small intestine. Virulence is not an intrinsic property of a microbe but is context-dependent. A particular microbe may colonize the host harmlessly or cause disease, depending on the status of the host's immune system and epithelia. Bacterial pathogens from a single species express a changing ensemble of mRNAs. In the middle ear, the lung, sinuses, teeth, intravenous lines, and urinary catheters, and on heart valves, artificial joints, and implanted devices, bacteria aggregate in antibiotic-tolerant biofilms that favour horizontal gene transfer because of their high population density and Assuming we know which microbe causes a disease and which of its gene products are required to sicken the host, how can we tell that an appropriately targeted antibiotic has killed it. Death is more commonly assessed at the level of bacterial populations by numerical reduction in colony-forming units (CFUs) of bacteria growing in or on agar, a method introduced by Koch. However, for unknown reasons, many antibiotics are markedly less effective when tested against dense bacterial cultures than against dilute cultures.

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