Commentary Article
Volume 4:9, 2021

Journal of Biomedical and Pharmaceutical Sciences

Open Access

Clinical Usage of Minimum Inhibitory Concentration

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Commentary

Nowadays, the is used in antimicrobial susceptibility testing. The is reported by providing the susceptibility interpretation next to each antibiotic. The different susceptibility interpretations are: S Sensitive, I Intermediate, and These interpretations were created and implemented by the Clinical and Laboratory Standards Institute [1]. In clinics, more often than not, exact pathogens cannot be easily determined by symptoms of the patient. Then, even if the pathogen is determined, different serotypes of pathogens, such as Staphylococcus aureus, have varying levels of resistance to antimicrobials. As such, it is difficult to prescribe correct antimicrobials. The determined in such cases by growing the pathogen isolate from the patient on plate or broth, which is later used in the assay [2]. Thus, knowledge of the MIC will provide a physician valuable information for making a prescription. Accurate and precise usage of antimicrobials is also important in the context of multi-drug resistant bacteria. Microbes such as bacteria have been gaining resistance to antimicrobials they were previously susceptible to. Usage of incompatible levels of antimicrobials provides the selective pressure that has driven the direction and evolution of resistance of bacterial pathogens [3]. This has been seen at sub levels of antibiotics. As such, it is increasingly important to determine the in order to make the best choice in prescribing antimicrobials.

MIC is used clinically over because is more easily determined. Minimum bactericidal concentration, which is the minimum antibacterial concentration resulting in microbial death, is defined by the inability to re-culture bacteria [4]. In addition, drug effectiveness is generally similar when taken at both and concentrations because the host immune system can expel the pathogen when bacterial proliferation is at a standstill. When much higher than the MIC, drug toxicity makes taking the of the drug detrimental to patient. Antimicrobial toxicity can come in many forms, such as immune hypersensitivity and off-target toxicity. It is determined by evaluation of turbidity of tubes with constantly increasing concentration of antimicrobial agent. There are three main reagents necessary to run this assay: the media, an antimicrobial agent, and the microbe being tested [5]. The most commonly used media is cation-adjusted Mueller Hinton Broth, due to its ability to support the growth of most pathogens and its lack of inhibitors towards common antibiotics. Depending on the pathogen and antibiotics being tested, the media can be changed and/or adjusted. The antimicrobial concentration is adjusted into the correct concentration by mixing stock antimicrobial with media. The adjusted antimicrobial is serially diluted into multiple tubes (or wells to obtain a gradient. The dilution rate can be adjusted depending on the breakpoint and the practitioner's needs. The microbe, or the inoculating agent, must come from the same colony-forming unit, and must be at the correct concentration. This may be adjusted by incubation time and dilution. For verification, the positive control is plated in a hundred fold dilution to count colony forming units. The microbes inoculate the tubes or plate and are incubated for hours. There is generally determined by turbidity. After the required incubation period, when an even lawn of growth is distinctly visible, the value is read where the pointed end of the inhibition ellipse intersects the side of the strip. Etests can also be used as an alternative method to determine minimal inhibitory concentration values of a wide range of antimicrobial agents against different organism groups which has been widely used in microbiology laboratories around the world. Manufactured by bioMérieux, Etests are a ready-to-use, non-porous plastic reagent strip with a predefined gradient of antibiotic, covering a continuous concentration range.

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How to cite this article: Hai ai, Xiang. "Clinical Usage of Minimum Inhibitory Concentration." *J Biomed Pharm Sci* 4 (2021) : 324

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Received: 06 October, 2021; **Accepted:** 20 October, 2021; **Published:** 27 October, 2021