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Minimum Inhibitory Concentration

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Description

In microbiology, the minimum inhibitory concentration is the lowest concentration of a chemical, usually a drug, which prevents visible growth of a bacterium or bacteria. MIC depends on the microorganism, the affected human being and the antibiotic itself. It is often expressed in micrograms per milliliter or milligrams per liter.

The MIC is determined by preparing solutions of the chemical in vitro at increasing concentrations, incubating the solutions with separate batches of cultured bacteria, and measuring the results using agar dilution or broth micro dilution. Results have been graded into susceptible often called sensitive increased exposure or resistant to a particular antimicrobial by using a breakpoint. Breakpoints are agreed upon values, published in guidelines of a reference body, such as the U.S. Clinical and Laboratory Standards Institute the British Society for Antimicrobial Chemotherapy or the European Committee on Antimicrobial Susceptibility Testing. There have been major discrepancies between the breakpoints from various European countries over the years, and between those from the European Committee on Antimicrobial Susceptibility Testing and the US Clinical and Laboratory Standards Institute 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. 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 the is 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.

While is the lowest concentration of an antibacterial agent necessary to inhibit visible growth, minimum bactericidal concentration is the minimum concentration of an antibacterial agent that results in bacterial eath compound.

The first step in drug discovery is often the screening of a library drug candidate for against bacteria of interest. As such, are usually the starting points for larger pre-clinical evaluations of novel antimicrobial agents? The purpose of measuring the minimum inhibitory concentration is to ensure that antibiotics are chosen efficiently to increase the success of treatment.

History

After the discovery and commercialization of antibiotics, microbiologist, pharmacologist, and physician developed the broth dilution technique using the turbidity of the broth for assessment this is commonly believed to be the conception point of minimum inhibitory concentrations. Later in the Clinical and Laboratory Standards Institute has consolidated the methods and standards for MIC determination and clinical usage. Following the discovery of new antibacterial, pathogens and their evolution, the protocols by CLSI are also continually updated to reflect that change. The protocols and parameters set by CLSI are considered to be the "gold standard" in the United States and are used by regulatory authorities, such as the FDA, to make evaluations.

Typically, are used as screening assays and are performed on a large number of client selected test articles. Once successful candidates are identified through the minimum bactericidal concentration assays are performed is defined as the lowest concentration of antimicrobial that results in reduction in the initial microbial density. The is a complimentary assay to an. In an assay the lowest level of antimicrobial agent that inhibits bacterial growth is determined, while determines the lowest level of antimicrobial agent that results in microbial death. This means that even if a particular MIC assay shows inhibition, culturing the bacteria in media might still result in organism proliferation because the antimicrobial did not completely kill the bacteria. Thus, an assay is necessary to determine if an antimicrobial was truly bactericidal and killed of the bacteria.

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