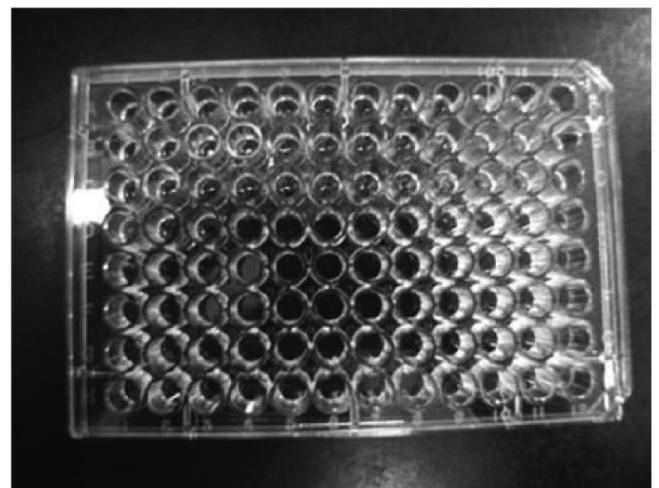


Minimum inhibitory concentration (MIC)

The MIC is the minimum (lowest) concentration of an antibiotic that will inhibit the growth of a bacterial strain. Conventionally, this is determined using a series of doubling dilutions of the antibiotic in liquid culture medium, to produce a range of concentrations in test tubes (macrodilution) or in a microtiter tray (microdilution). After inoculation of the test strain into each antibiotic concentration, bacterial growth is determined by visible turbidity after 18–24 h of incubation. The MIC is the lowest concentration of antibiotic with no visible bacterial growth.



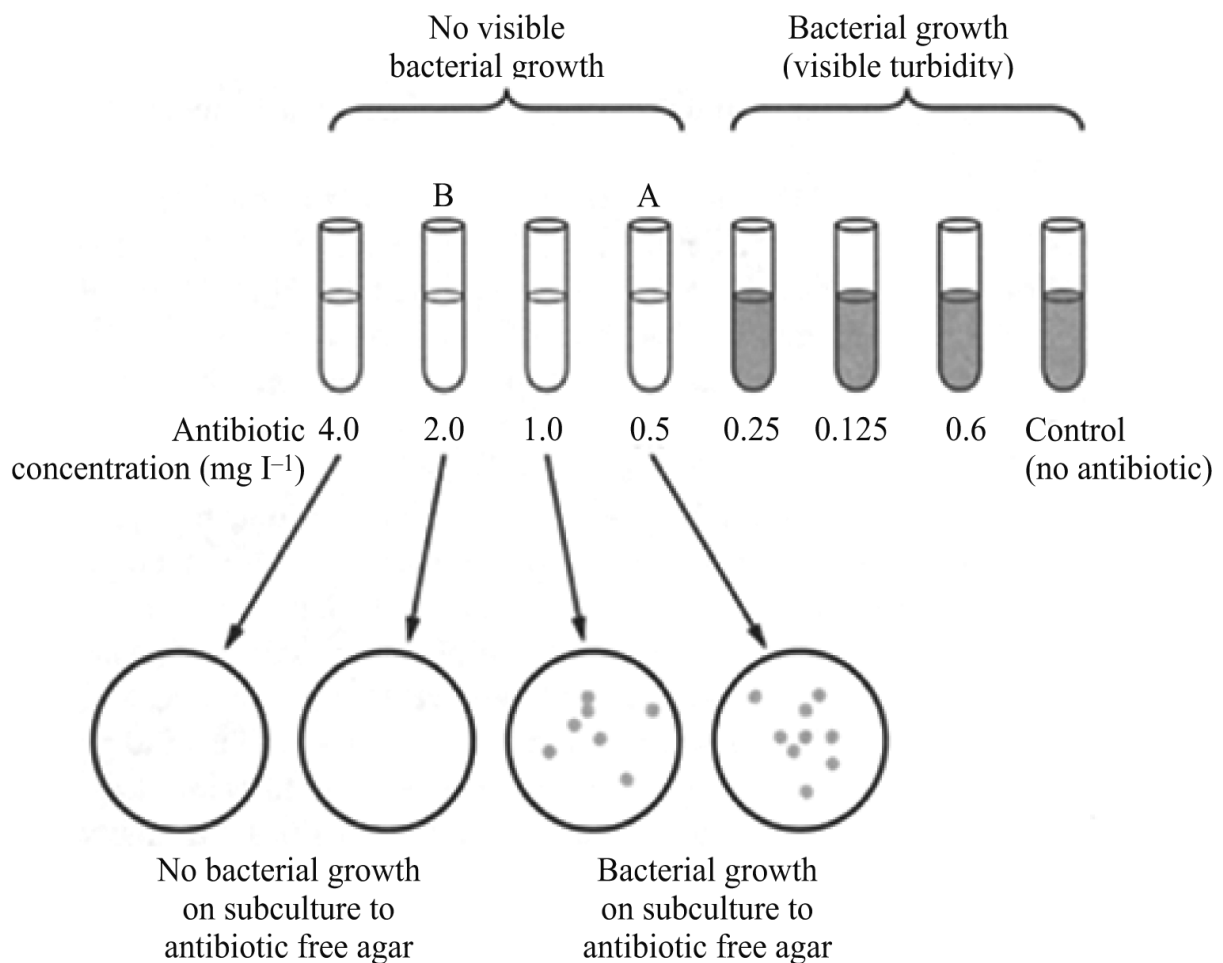
Broth Dilution test



Micro broth dilution Test

Antibiotic MIC tests are usually performed only in certain situations in a clinical bacteriology laboratory. They are most commonly used when a very precise assessment of the *in vitro* susceptibility of a bacterial strain is required, for instance in the treatment of pneumococcal meningitis (topic f3) or Streptococcal endocarditis. MIC tests are also used to assess the overall degree of activity of antibiotics against different strains

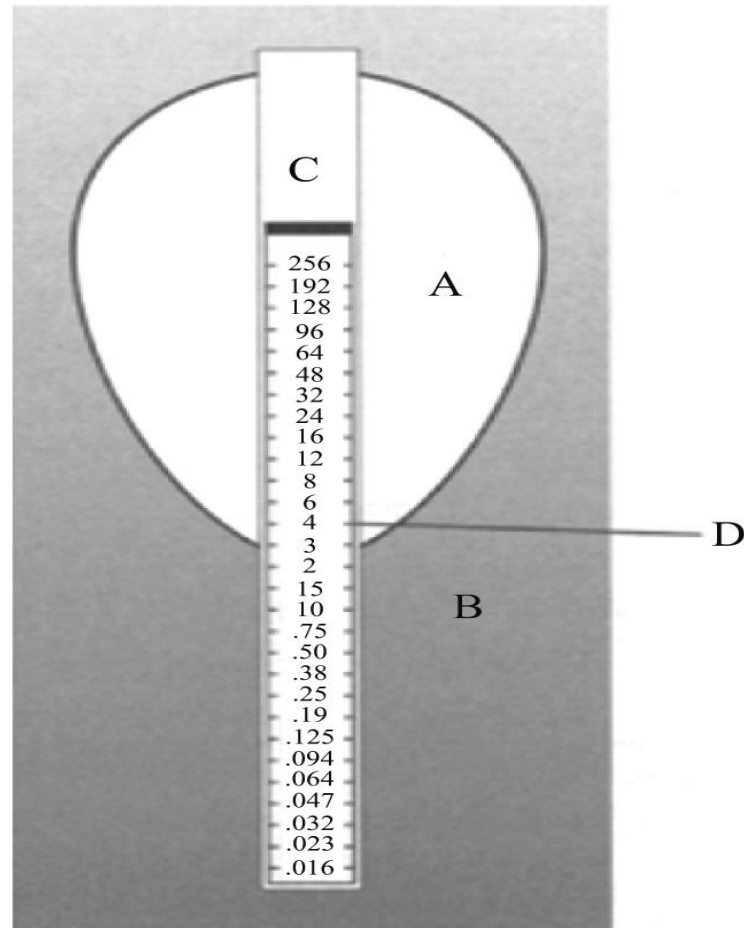
of the same bacterial species, particularly when evaluating or developing new antimicrobial agents. A simple way of describing the relative activity of an antibiotic against a group of organisms, is by using the terms mic50 and mic90. These are the lowest concentrations of the antibiotic that inhibit 50 and 90% of the bacterial strains tested , respectively.



E-test strips

An alternative method is by use of commercially available **E-test** strips . These are specialized antibiotic-impregnated strips which, like disk testing, are placed on the surface of inoculated agar plates. During incubation, antibiotic diffuses into the agar forming a zone of inhibition.

There is a manufactured concentration gradient within the strip, and numerical gradations are marked along the edge of the strip to reflect this. The MIC is determined by measuring the point at which the edge of the zone of inhibition crosses the e-test strip .



Determination of MIC by E-test. A – Zone of inhibition; B – Bacterial growth ;C – E-test strip; D – the MIC is the point at which the edge of the zone crosses the E – test strip – in this example it is 3 mg/l .

Minimum bactericidal concentration (MBC)

The MBC is the lowest concentration of the antibiotic that will ‘kill’ a bacterial strain. The definition of ‘killing’ is a 99.9% reduction in viable bacteria . The MBC test is an extension of an MIC test . The simplest method for determining the MBC is to perform a subculture from antibiotic concentrations with no visible growth in the MIC test on to antibiotic-free agar . This will determine whether the bacteria have been inhibited from growing but are still viable, or whether they have been killed .

Some antibiotics are highly **bactericidal**. In this case the MIC and MBC are usually very similar. **Bacteristatic** antibiotics on the other hand have much higher MBC than MIC. Occasionally a bacterial strain may have a high MBC but low MIC with a normally bactericidal antibiotic (e.g. Penicillin). This is described as bacterial ‘**tolerance**’ to the antibiotic. MIC occasionally performed to guide antibiotic therapy in some difficult cases of infection .