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Antimicrobial Bioassays - Procedures and Problems

Antibiotic sensitivity testing (ABST) is routinely used in diagnostic laboratories to guide antibiotic therapy. The interpretation of the results of testing provided as sensitive, resistant or intermediate resistant is dependent on the minimum inhibitory concentration (MIC) of the antibiotic for the pathogen in question as well as the achievable serum/tissue levels of the antibiotic in the human host.

MIC of an antibiotic can be determined using the standard tube dilution method. This method is labour intensive. A well or disk diffusion method where the antimicrobial agent is placed in wells cut in an agar plate or incorporated in a paper disc placed on the agar surface have replaced the MIC for routine testing. One disadvantage of this latter method is that the antimicrobial agent may not diffuse easily through the agar, giving an erroneous impression of resistance. An agar diffusion method where the antimicrobial agent is mixed with the agar and the organisms inoculated on the surface deals with this problem and offers the advantage of using several isolates with one agar plate.

Bioassay for antimicrobial activity of plant products requires a series of steps. Initially, screening of the plant products for activity against a range of pathogens is required. The screening step could be carried out using a well diffusion method for both crude extracts as well as chemical derivatives of the plant. Diluent activity against the test bacterial strains has to be tested as a control. If negative on well diffusion method, it is useful to carry out a plate assay to exclude the possibility of negative results due to poor diffusion of the product. Having established evidence of antibacterial activity, the next step would be to determine the MIC of the product against the tested bacterial species. For this, culture collections of test organisms which have been characterized is necessary. The establishment of a reliable culture collection for this purpose is an urgent necessity.