Critical physiological factors influencing the outcome of antimicrobial testing according to ISO 22196 / JIS Z 2801.

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Abstract

Bactericidal materials gained interest in the health care sector as they are capable of preventing material surfaces from microbial colonization and subsequent spread of infections. However, commercialization of antimicrobial materials requires proof of their efficacy, which is usually done using in vitro methods. The ISO 22196 standard (Japanese test method JIS Z 2801) is a method for measuring the antibacterial activity of daily goods. As it was found reliable for testing the biocidal activity of antimicrobially active materials and surface coatings most of the laboratories participating in this study used this protocol. Therefore, a round robin test for evaluating antimicrobially active biomaterials had to be established. To our knowledge, this is the first report

on inaugurating a round robin test for the ISO 22196 / JIS Z 2801. The first round of testing showed that analyses in the different laboratories yielded different results, especially for materials with intermediate antibacterial effects distinctly different efficacies were noted. Scrutinizing the protocols used by the different participants and identifying the factors influencing the test outcomes the approach was unified. Four critical factors influencing the outcome of antibacterial testing were identified in a series of experiments: (1) incubation time, (2) bacteria starting concentration, (3) physiological state of bacteria (stationary or exponential phase of growth), and (4) nutrient concentration. To our knowledge, this is the first time these parameters have been analyzed for their effect on the outcome of testing according to ISO 22196 / JIS Z 2801. In conclusion, to enable assessment of the results obtained it is necessary to evaluate these single parameters in the test protocol carefully. Furthermore, uniform and robust definitions of the terms antibacterial efficacy / activity, bacteriostatic effects, and bactericidal action need to be agreed upon to simplify communication of results and also regulate expectations regarding antimicrobial tests, outcomes, and materials.

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