Topic: Comparing BART™ tester generated predictive active cells per ml (pac/ml) to the conventional colony forming units per ml (cfu/ml)

BART testers work on the concept that specific bacteria within a given sample would be able to generate activities or reactions in which the time lapse generated reflects the active population of those bacteria. Here it would be the longer the time lapses before activity and reactions that would be generated by smaller populations. Further it would be this active bacterial population that would generate the time lapse. In predicting the active population of bacteria, replicate testing was undertaken on many water samples of known populations to determine time lapses. These analyses generated statistical relationships between the time lapse and the size of the active population of bacteria in those samples. To achieve these relationships, correlations were made with data from conventional agar spreadplate technologies employing serial dilution to obtain comparable populations as colony forming units.

Measurements using colony forming units per ml (cfu/ml) have been around for more than a century and this data has been based on the convenience of being able to count the numbers of distinct growths (called colonies). The more colonies that are counted then the higher the population of detectable culturable bacteria determined. This has become a standard for reporting in bacteriology with colony forming units per ml (cfu/ml) being accepted as the standard term. Using the agar spreadplate methods has a number of drawbacks which include: (1) the common need to dilute the sample so that the sample being tested contains between 30 and 300 culturable cells which limits scope; (2) the agar surface provides an unfriendly environment for many bacteria to grow on and form a colony with those bacteria that are not culturable being not counted since they did not form colonies; (3) agar generates a restrictive environment in which the water is bound up under highly oxidative conditions; and (4) spreadplates do not offer a variety of environmental sites within which colonies can form. These factors all limit the sensitivity of the agar culture media due to the inability of bacteria to form colonies and be counted.

BART testers offer a variety of environments within which the bacteria in the undiluted sample can become active. These environments are generated primarily along oxidation-reduction and selective nutrient culture medium diffusion gradients. The water within the tester is basically from the sample and so there is no trauma for the bacteria that would otherwise have been caused by dilution. This means that the BART test begins immediately the sample is added to the tester and positive detection relates to the time lapse before recognized activities and reactions are observed. These activities or reactions relate to the type of bacteria detected while the time lapse can now be statistically converted to the population expressed as predicted active cells per ml (pac/ml). In generating pac/ml the statistics have been established using pure bacterial cultures, natural samples commonly employing the agar spreadplate techniques in which the data is generated in cfu/ml. There is therefore a direct link between the cfu/ml in the statistical formulation of the pac/ml using the BART tester technologies. For this reason it may be taken that pac/ml can be considered equivalent to cfu/ml on the understanding that is some ways the BART tester offers improved sensitivity and better precision.

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