UCDAVIS
VETERINARY MEDICINE
California Animal Health and Food Safety Laboratory System

MINIMUM INHIBITORY CONCENTRATION (MIC) GUIDELINES FOR INTERPRETATION

Lab Locations:

CAHFS – Davis

University of California
620 West Health Sciences Dr.
Davis, CA 95616
Phone: 530-752-8700
Fax: 530-752-6253
daviscahfs@ucdavis.edu

CAHFS – San Bernardino

105 W. Central Ave.
San Bernardino, CA 92408
Phone: 909-383-4287
Fax: 909-884-5980
sanbernardinocahfs@ucdavis.edu

CAHFS – Tulare

18830 Road 112
Tulare, CA 93274
Phone: 559-688-7543
Fax: 559-686-4231
tularecahfs@ucdavis.edu

CAHFS – Turlock

1550 Soderquist Road
Turlock, CA 95381
Phone: 209-634-5837
Fax: 209-667-4261
turlockcahfs@ucdavis.edu

MIC testing is a method of assessing antimicrobial susceptibility by evaluating how bacteria respond to contact with specific concentrations of antibiotics in the laboratory. Once we know if/which drug concentrations stop bacterial growth, we use this information to help predict if a drug is likely to produce a clinical response (cure) in the animal or animals being treated. This method is more useful and scientifically valid than previous methods because it provides quantitative data on drug effects, allows clinicians to adjust therapeutics for treatment, and permits monitoring susceptibility and resistance over time.

Below is some information on how to use the information presented in the MIC report.

MIC values on the report—quantitative data, what it represents:

1. MIC values represent the minimum concentration of a drug that inhibits growth of a bacterium when cultured in the laboratory.

2. These values determine whether a bacteria can be inhibited by drug concentrations that are achievable in the blood stream.

3. Although the concentrations tested are achievable in the blood stream of some animal species, they may NOT be achievable in other species, tissues, or body sites. Pharmacokinetic behavior of a drug is used to determine if it might be effective in treating a specific bacterium in a specific species and location.

4. Sites that are particularly difficult to access/penetrate include prostate, CNS, and the eye. For sites such as these, pharmacokinetic evaluations tend to be limited.

Category abbreviations on the report—qualitative data:

1. The interpretations of susceptible (S), Intermediate dose-dependent (I), and resistant (R) are clinical predictions of if a drug may or may not work.

2. The designations for the interpretations of “S”, “I”, and “R” are called “breakpoints” and are determined using in vitro information, pharmacokinetic and pharmacodynamic data, and clinical studies.

3. All interpretations are based on a “drug:bacteria” combination. This is because the structure and pharmacokinetic behavior of a drug help predict if it may or may not result in a good clinical outcome for the patient (species) for a specific drug:bacteria combination.

4. CAHFS uses animal species-specific interpretations if they are available. Human interpretations are used if we have no other choice; HOWEVER, we know that humans and animal species metabolize drugs differently so the drug may not effectively eliminate the infection in all animal species.

5. Interpretations are established from standards developed by an international organization, Clinical and Laboratory Standards Institute (CLSI), that works to ensure consistent performance and similar results across diagnostic labs.

6. CLSI expert documents are reviewed every year and interpretations may be adjusted based on results of clinical outcomes. A MIC value that was listed as "susceptible" in the past may be changed to "intermediate, dose-dependent" or "resistant" due to reports of treatment failures.

What does N/A ("None Available") mean?

1. Overall, N/A means that there is no or insufficient published data to predict if a drug may work against a certain bacterium.

2. This may mean that there is no information about this specific organism for the drugs listed. For example, *Bibersteinia trehalosi* has no interpretations for any of the drugs available.

   a. If there are closely related bacteria we may include comments about "extrapolating" from these bacteria.

   b. If there are no closely-related bacteria or if the bacteria are genetically ALWAYS resistant then we can't extrapolate.

3. This may mean that even if a bacterium has low MIC's in the lab, it may have been shown or known not to work in the animal. For example, aminoglycosides may appear effective against Salmonella under lab conditions but are not effective in the animal in a low- or no-oxygen environment.

4. This may mean that there is no data on how this drug will perform at the site of infection. For example, there is NO pharmacokinetic data on drug concentrations in the eye so there are no interpretations for Moraxella isolates.

5. This may mean that the drug was not designed to act against the bacteria. For example, erythromycin was designed primarily against Gram positive organisms so it frequently is not effective against Gram negative organisms.

6. This may mean that the drug has been studied in some animals (like dogs) but not others (like cattle or horses) or in mammals but not avian species.

7. Intestinal bacteria may have very limited, if any, interpretations because there is no information on how most drugs behave in the intestinal tract.

How can I use the MIC data?

1. Isolates that have:

MIC of "**< a specific value**"

had no growth in any of the concentrations tested; bacteria may be controlled by this drug IF it can reach the site of infection.

2. Isolates that have:

MIC of "**> a specific value**"

had growth in all of the concentrations tested; bacteria will most likely not be controlled by this drug.

3. Bacteria that are in the "I" range may respond to treatment with alternate dosages of time-dependent or concentration-dependent drugs.