Diagnostic Update

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Fall, Winter & Spring Hours: Monday to Friday - 8:00 am to 5:00 pm
Summer Hours (July 4-September 1, 2017): Monday to Friday - 8:00 am to 4:30 pm
Saturday - Bacteriology 9:00 am to 12:00 pm & Clinical Pathology 8:00 am to 4:00 pm

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In this Issue:

How to use your Bacteriology Report to Choose an Antimicrobial Drug

By Matthew Saab, Veterinary Bacteriology Technologist and Anne Muckle, Veterinary Clinical Bacteriologist

It has been over one year since the Atlantic Veterinary College (AVC) Diagnostic Services Bacteriology Laboratory switched to minimum inhibitory concentration (MIC) determination for antimicrobial susceptibility testing (AST) of bacterial isolates. This follow-up article is to help veterinary practitioners understand and use our laboratory reports to select the optimal antimicrobial therapy for their patients.

The first page of your report will display the organisms that have been isolated. Note that AST is not always warranted for all organisms isolated. The veterinary clinical bacteriologist and technologists make case-by-case decisions as to whether an organism isolated is clinically significant. This decision is based on the bacterial species and its likely role as a pathogen, along with the disease suspected and clinical history, site of infection, and the collection method.

The AST results will be displayed on the first or second page of the report (Figure 1). The AST data are shown in a table, where the antimicrobials are grouped by interpretative categories as sensitive, intermediate or resistant (Figure 1A). The MIC value (in µg/mL) for each antimicrobial is listed next (Figure 1B). The MIC is the lowest concentration of an antimicrobial required to kill or inhibit the *in vitro* (laboratory) growth of a bacterial organism. You may notice that sensitivity data for certain antimicrobials are listed below the organism name. This is only due to limitations of our reporting system, and these are not drugs that we recommend as more effective or appropriate.

On the same or following page, you will see a recently added **Comments** section.

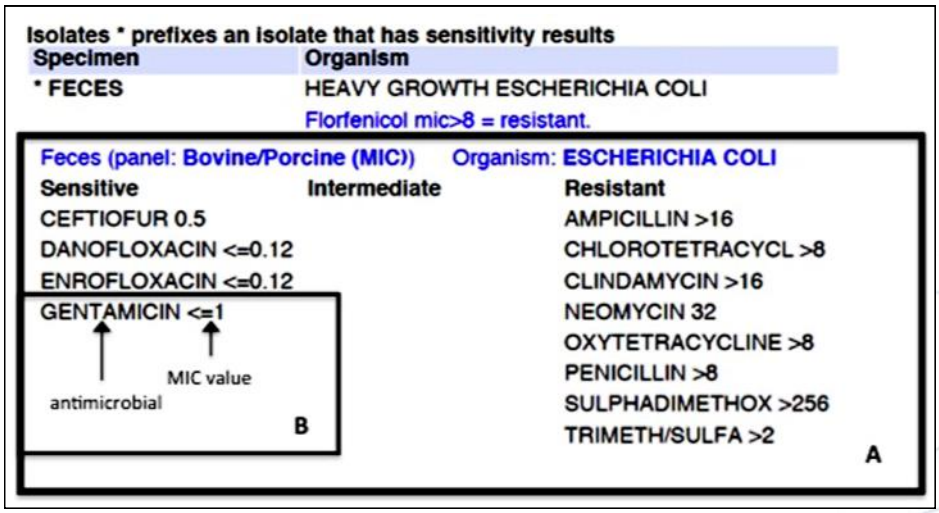


Figure 1: Isolation and antimicrobial susceptibility results for an *Escherichia coli* recovered from feces of a neonatal calf. (**A**) AST results. (**B**) Antimicrobial and corresponding MIC value.

Here you will find the susceptibility breakpoint MIC values (Figure 2), as well a description of our methods, and information that we feel is pertinent to your submission. **The antimicrobial susceptibility breakpoint MIC value should not be confused with the test organism's MIC value for that antimicrobial.** Breakpoint MIC values define interpretative categories, which are specific for each antimicrobial and organism (e.g. ampicillin against *E. coli*), and in some cases they are animal host or body site specific (e.g. ampicillin against *E. coli* in canine urine). We provide susceptibility breakpoint values, meaning that we list the MIC value defining the upper limit MIC of the sensitive category. Breakpoints are set and updated by the Clinical Laboratory Standards Institute. Generalized breakpoint data for dogs and cats can be found in *TARGET – The Veterinary Antimicrobial Reference Guide to Effective Treatment*.

Comments
All MICs are reported in ug/mL.
Susceptibility breakpoint criteria for Enterobacteriaceae isolated from food producing animals:
Ampicillin <=0.25
Ceftiofur <=2
Chlortetracycline <=4
Danofloxacin <=0.25
Enrofloxacin <=0.5
Florfenicol <=4
Gentamicin <=2
Neomycin <=2
Oxytetracycline <=4
Sulfadimethoxine <=256
Trimeth/Sulfa <=2

Figure 2: The comments section contains susceptibility breakpoint MIC values and other important information about your submission (not shown).

The MIC report helps you select the most susceptible drug for the organism being tested based on *in vitro* testing results. A drug with an MIC farthest from its susceptibility breakpoint means that the bacteria are more susceptible to this drug than another drug whose MIC is closer to its susceptibility breakpoint. In the example shown in Figure 1, there are four antimicrobials with sensitive MIC values: ceftiofur, danofloxacin, enrofloxacin, and gentamicin. By comparing the MIC value for each drug against its susceptibility breakpoint value in the comments section (Figure 2), ceftiofur or enrofloxacin would be appropriate choices since their MIC value is at least 2 dilutions below the breakpoint value. Danofloxacin and gentamicin could still be chosen if appropriate for your patient, but the one dilution between their MIC value and breakpoint value indicates the organism is less sensitive to these antimicrobials.

Clinical and Laboratory Standards Institute interpretative guidelines are not always available for a particular drug or organism and animal species combination. Certain drugs are class representative drugs tested to predict the activity of other drugs in the same class (e.g. ampicillin for amoxicillin, ceftiofur for cefovecin, or cephalothin for cephalexin but not cefazolin). Therefore, although you may not see an MIC value for a specific drug, you can use the class representative MIC result.

Key points on using the MIC values and breakpoints for your patients:

You cannot simply select a drug based on a low MIC value, thinking that this drug is better than another drug with a higher MIC value. You must compare the MIC of a drug for the test isolate to the MIC susceptibility breakpoint for this drug. Be aware that these are *in vitro* test results to help guide your drug selection decision. A susceptible result does not guarantee that a drug will actually be effective *in vivo* (in the body), whereas a resistant result is more conclusive.

As always, please do not hesitate to contact the Bacteriology Laboratory (902-566-0821) if you have any questions on your antimicrobial susceptibility results or for questions regarding appropriate treatment.

Retirement of Dr. Scott McBurney

By Cornelia Gilroy, Veterinary Clinical Pathologist

Dr. Scott McBurney, after being at the Atlantic Veterinary College (AVC) for 30 years, retired in December 2016. Originally from Newfoundland, he obtained a Bachelor of Science (Honours Wildlife Biology) from the University of Guelph and completed his Doctor of Veterinary Medicine degree at the AVC, graduating with the first class in 1990. Following this, he finished a residency in wildlife pathology in 1994. Since June 1994, Dr. McBurney has been working as a veterinary clinical professional wildlife pathologist with AVC Diagnostic Services and the Canadian Wildlife Health Cooperative (CWHC), Atlantic Region and has held a position as Adjunct and Graduate Faculty member with the Department of Pathology and Microbiology.

Dr. McBurney has thoroughly enjoyed his work with the CWHC network across Canada because it provided countless exciting professional opportunities at the regional, national and international level. Some highlights of his career were diagnosing emerging and/or

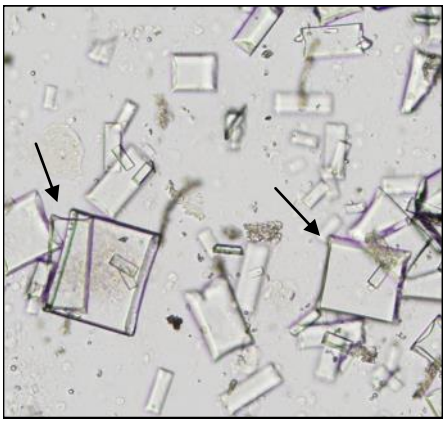
zoonotic diseases in wild animals in Atlantic Canada, including bat white-nose syndrome, finch trichomonosis, cryptococcosis due to *Cryptococcus gattii* and rabies. Dr. McBurney's other passions involved working with endangered species, such as the piping plover and mainland Nova Scotia moose, to ensure health issues were not contributing to their decline. Lastly, outreach and education of veterinary and biology students, wildlife professionals, veterinarians and the general public about the importance of wildlife health surveillance were activities that he was dedicated to throughout his career.

Although officially retired, Dr. McBurney is not yet ready to completely leave the Atlantic Veterinary College. He plans to continue as an adjunct and graduate faculty member in the Department of Pathology and Microbiology and an associate of the CWHC, Atlantic Region, so that he can continue working on aspects of wildlife health throughout Atlantic Canada. In particular, he hopes to leave his desk and spend more time outdoors enjoying the fieldwork component of various projects. Furthermore, retirement will give him the freedom and time to pursue interests apart from work. These include spending time with his wife, Kim, and his four children (Shilo, Tessa, Liam and Aiden), travelling, skiing, biking and, in the short term, restoring a canvas covered cedar strip canoe that was recently rescued from an old garage.

We wish Dr. McBurney all the best!

What's Your Diagnosis?

What are the square structures indicated by the arrows? For optimal viewing, please refer to the online color version at http://www.upei.ca/avc/diagnostic-services/newsletters.



Urine sediment from a dog. Unstained, x 40 objective.

See page 4 for the answer.

Laboratory News

By Cornelia Gilroy, Veterinary Clinical Pathologist

Here are some recent happenings in the Diagnostic Services Laboratory:

- Welcome to Stephen Wedge, our new bacteriology technologist, who began his position in December 2016.
- Kathleen Jones, who has worked at the Atlantic Veterinary College for many years, began her position as a histopathology technologist in May 2016.
- Dr. Kimberley Foote began a combined Master of Veterinary Science and residency in veterinary clinical pathology under the supervision of Drs. Shelley Burton and Cornelia Gilroy in August 2016.
- Congratulations to Dr. Laura Ross, anatomic pathology resident, on receiving a 2016 Charles Louis Davis and Samuel Wesley Thompson DVM Foundation Award recently in New Orleans at the American College of Veterinary Pathologists/American Society for Veterinary Clinical Pathology (ACVP/ASVCP) annual meeting. This is a trainee award for excellence in diagnostic pathology.
- Dr. Scott McBurney, wildlife anatomic pathologist, retired at the end of December 2016 after 23.5 years of service (please see full article on page 2).
- We bid fond farewell to Dr. Enrique Aburto, an anatomic pathologist with the Department of Pathology of Microbiology for the past 8 years, as he leaves for a job at the Western College of Veterinary Medicine in Saskatchewan. All the best!

Staff Focus

Dr. Chelsea Martin

By Cornelia Gilroy, Veterinary Clinical Pathologist

Dr. Chelsea Martin has been an integral member of the anatomic pathology team at the Atlantic Veterinary College (AVC) for several years.

Dr. Martin was born in Vancouver, British Columbia, but at a very young age moved to Porters Lake, Nova Scotia and so considers herself a Maritimer. She attended the Nova Scotia Agricultural College for 3 years before being accepted as a student at the AVC, graduating with honors in 1999. After gaining invaluable experience during her 5 years in mixed animal practice in Newaygo, Michigan, Dr. Martin started graduate school at The Ohio State University studying bone-invasive cancer and also began residency training in anatomic pathology. She graduated with a PhD and became board certified in Anatomic Pathology by the American College of Veterinary Pathologists in 2010. Subsequently Dr. Martin spent 3 years in a post-doctoral fellowship at The Ohio State University Comprehensive Cancer Center performing research evaluating genetic mouse models of human cancer. Dr. Martin returned to the AVC as an Assistant Professor in Anatomic Pathology in 2013.

At the AVC, Dr. Martin's responsibilities are diverse. She has a keen interest in research, especially in the areas of inflammation and oral squamous cell carcinoma in cats and humans. She is currently co-supervising two graduate students. In addition, she teaches in the 1st and 2nd year anatomic pathology courses, as well as 4th year clinical rotations. In her diagnostic endeavours, Dr. Martin has a special interest in cancer-related pathology as well as diseases of bone.

When not at work, Chelsea enjoys spending time with her husband, Dr. Luke Heider, and their two young sons, Sam and Ian. She also enjoys playing the clarinet in a local community band, painting and walking with Benno, the family's German Shepherd dog. Whenever possible, Chelsea enjoys visiting family in Nova Scotia along the Bay of Fundy.

Reader Feedback: The ***Diagnostic Update*** group invites comments or suggestions for future topics in the newsletter. Please submit your comments to *Dr. Cornelia (Cora) Gilroy* (cgilroy@upei.ca), Diagnostic Services Laboratory, Atlantic Veterinary College, UPEI, Charlottetown, PE, C1A 4P3 and they will be forwarded appropriately.

Answer to What's Your Diagnosis on page 3: Struvite crystals, also called triple phosphate or magnesium ammonium phosphate crystals. These are common in healthy dogs and cats. Although most have a classic coffin lid shape (see arrowhead in diagram below), they can have a variety of shapes, including the square ones seen in the photo on page 3, sometimes called the chicklet form as they are the same shape as this brand of chewing gum.