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*News*

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## URINE CULTURES

This newsletter is in response to numerous queries about the value and validity of urine cultures performed on transported specimens. For more detail, please refer to Antech News issues of January 1998, June and September 1999, September 2000, April and May 2001 ([www.antechdiagnostics.com](http://www.antechdiagnostics.com)).

### WHAT VALUE ARE URINE CULTURES?

Because of the relative insensitivity of routine urinalysis for detecting bacteriuria, occult cases of urinary tract infections (UTI) can be overlooked if not cultured. Urine culture is the most sensitive and specific test for diagnosing UTI.

Cultures on liquid urine are useful to diagnose or rule out UTI from conditions such as: vaginitis, prostatitis, urolithiasis, pyelonephritis, urethritis, ureteritis, vesicoureteral reflux, congenital disorders (e.g. ectopic ureter), trauma, chronic renal failure, endocrine disorders (e.g. Cushing's disease, diabetes mellitus), and neoplasia.

In a recent study of 101 dogs with hyperadrenocorticism, diabetes mellitus, or both disorders, 42% had UTI diagnosed by urine culture. UTI was present in 46% of dogs with hyperadrenocorticism, 37% of dogs with diabetes mellitus, and 50% of dogs with both disorders. *E. coli* was the most common bacterium isolated, present in 69% of dogs. Clinical signs of dysuria or pollakiuria were present in <5% of the dogs with UTI, and 19% of dogs with positive cultures had neither pyuria or bacteriuria on urinalysis.

Senior pets often have occult UTI. Of 90 clinically normal geriatric dogs studied at VCA West Los Angeles Animal Hospital in 1998 and 1999, 12 dogs had UTI in the absence of any clinical signs of lower urinary tract disease (LUTD).

Although UTI are an uncommon cause of LUTD in cats, urine culture should be performed in cats with multiple episodes, in those that have perineal urethrostomies or have been catheterized, and those with

urine specific gravity <1.035.

Chronic renal failure is a risk factor for UTI in cats, as up to 30% of cats with this disease have UTI. Similarly, according to Dr. Dennis Chew at Ohio State University, cats with perineal urethrostomies have a >50% incidence of UTI. Hence, cats with chronic renal failure or perineal urethrostomies should have urine cultures performed periodically to permit early detection of UTI.

### PREFERRED SPECIMENS

Urinalysis should be performed on freshly collected urine for any animal with suspected urinary tract disease, and for routine health screening of geriatric pets. Cystocentesis is the preferred method of urine collection, whenever possible. Urine for culture should be submitted in a sterile red top tube (RTT), **not** a serum separator tube. Only a small volume of urine (~0.5 mL) is needed. A separate container of urine should be submitted for routine urinalysis. Clients are encouraged to send a separate, sterile urine sample, along with each urinalysis, in case it is decided that an Add-On urine culture is needed.

Copan swabs of urine or urine submitted in broth are **not** preferred for urine culture, and enable reporting only of semiquantitative culture results.

As a general rule, pets should be off antibiotics for at least 48-72 hours prior to urine culture. However, urine cultures performed during antibiotic treatment for UTI (without stopping antibiotics) can be used to assess treatment efficacy.

### REPORTING RESULTS OF URINE CULTURES

Urine colony counts or quantification of urine cultures determines the number of bacterial colonies per mL of urine. This is helpful in assessing whether the bacteria isolated and identified on culture are possible contaminants, normal flora, or significant pathogens.

Results are reported as the number or range of

# URINE CULTURES (CONT'D.)

colony forming units (cfu) per mL of urine, along with identification of the organism and its antimicrobial sensitivity (see table).

*Interpretation of Quantitative Urine Cultures\**

Collection Method	Significant		Suspicious		Contaminant	
	Dog	Cat	Dog	Cat	Dog	Cat
Cystocentesis	>1,000	>1,000	1,000	1,000	NA	NA
Catherization	>10,000	>1,000	1,000-10,000	1,000	NA	NA
Voluntary Voiding	>50,000	>10,000	10,000-50,000	1,000-10,000	<10,000	NA
Manual Compression	>50,000	>10,000	10,000-50,000	1,000-10,000	<10,000	NA

\*cfu/mL urine, NA=not applicable

## Dogs

Our recent evaluation of dog urine cultures indicates that positive cultures become positive by 48 hours. Cultures negative at 48 hours remained negative at 72 hours. Thus, *all negative canine urine cultures will be reported as final at 48 hours.*

## Cats

A few (~1%) of feline urine cultures become positive at 72 hours after being negative at 48 hours. *Feline urine cultures will therefore continue to be held for 72 hours.*

## DOES TRANSPORTATION AFFECT URINE BACTERIAL VIABILITY?

Clients often ask about the preferred method of transporting urine samples to the laboratory for culture, and the effect of transport time and storage temperature on the viability of organisms.

To address these questions, the following study was performed: Urine samples with pyuria (n=18) submitted to Antech's Houston laboratory were divided into several aliquots. One aliquot was inoculated immediately onto blood/MacConkey agar and cultured aerobically for 72 hours in the Houston laboratory. The urine aliquots were also placed into 3 tubes: RTT, grey top urine culture tube (Transport Kit), and Copan Swab for transport to Antech's

Irvine laboratory, where they were stored at 4-8°C and at room temperature. They were next inoculated onto blood/MacConkey agar for aerobic culture and examined after 24, 48 and 72 hours.

Fourteen urine samples cultured positive for bacteria and 4 were negative. There was no observed effect of storage time, storage temperature, or type of storage tube on these culture results, or on the amount of bacterial growth (light, moderate or heavy).

*Conclusion:* Based on these findings, we consider RTT to be the preferred collection tube for urine culture. Routine transport time *does not* influence urine culture results.

## BENEFITS OF URINE MIC TESTING

To improve the predictability and clinical utility of antimicrobial treatment for UTI, Antech Diagnostics recently introduced the urine minimum inhibitory concentration (MIC) antibiotic sensitivity test which uses an automated microdilutional technique.

MIC testing guides antibiotic selection by determining whether the tested bacteria are likely to be **sensitive** or **resistant** to any given antibiotic.

Most antibiotics are tested over 3-5 doubling dilutions that represent a range of concentrations (in µg/mL) at which susceptible bacteria are either inhibited or killed and can be achieved in urine and serum following standard dosing regimens.

The concentration of antibiotic slightly greater than that required to kill sensitive strains of bacteria is called the **susceptibility break point**.

*Key points in using the urine MIC panel to choose an antibiotic and dose:*

- All other things being equal (cost, safety, ease of use, compliance), use the antibiotic with the lower MIC in its testing range.
- The higher the MIC in the testing range, the higher the dose needed and vice versa.

*References:* Forrester, et al., J Vet Int Med 13:557-560, 1999; Bruyette, et al., Antech News, April 2001; Aucoin, Antech News, May 2001.

## LAB TIPS

***Ionized Calcium Measurement*** Ionized calcium must be run on serum **not** previously exposed to air. Samples for ionized calcium or the PTH/ionized calcium combination test should be submitted in a spun and frozen SST, and sent to the laboratory on cold packs. Do **not** decant the serum. Serum that has been separated and transferred to a transport tube is **not** suitable for ionized calcium testing, because the measured concentration is falsely decreased in such samples. If other tests in addition to ionized calcium or PTH/ionized calcium tests are required, please submit a second serum sample.

***Coagulation Screening Tests and Active Bleeding*** During acute bleeding crises, the patients typically will demonstrate an "acute-phase" response which will elevate fibrinogen concentration, may elevate D-dimer, and will **shorten** the clotting times in PT and APTT assays. Platelet numbers may be high, normal, or low, and leukocytes are usually elevated. Therefore, in cases with significant bleeding, such as young hemophiliacs, the high fibrinogen will shorten the PT and APTT endpoints. **The APTT, which is expected to be prolonged in hemophilia, may then be only slightly elevated** (1-5 seconds above upper reference limit) **or even within the upper end of reference range, masking the true diagnosis.** This effect, along with the age, sex, and clinical history, must be considered when evaluating the PT and APTT from animals suspected of having coagulopathies. Specific clotting factor assays are needed to confirm the diagnosis.

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