Urinalysis

Amanda J. Callens, BS, LVT, Joseph W. Bartges, DVM, PhD*

KEYWORDS

• Urinalysis • Urine sediment examination • Urine chemistries • Urine specific gravity • Urine dipstick

KEY POINTS

- Urinalysis is a useful laboratory test in documenting urinary tract diseases, and it can also provide information about other systemic diseases, such as liver failure and hemolysis.
- The collection method and storage time and conditions are the most important preanalytical sample variables.
- Preanalytical patient variables include physiologic variables or introduced variables related to treatment or diagnosis.

Urinalysis is an important laboratory test that can be readily performed in veterinary practice and is considered part of a minimum database. It is useful in documenting various types of urinary tract diseases and may provide information about other systemic diseases, such as liver failure and hemolysis. Preanalytical sample variables and patient variables other than those related to disease may influence urinalysis results. Excellent resources are available for more comprehensive information about urinalysis in small animals.[1–3] Urine may be collected by cystocentesis, urethral catheterization, or voiding and should be evaluated within 30 minutes. If this is not possible, then it may be refrigerated for up to 24 hours or submitted to an outside diagnostic laboratory; however, this may result in crystal precipitation. Refrigeration does not alter urine pH or specific gravity.

IN-HOUSE VERSUS SEND-OUT TESTING

Most veterinary practices can and should do urinalysis in-house, from the standpoint of practice economics and quality of care. The test requires only basic laboratory supplies, including disposable supplies such as a specimen container, disposable pipettes, conical centrifuge tubes, urine dipsticks, glass slides and coverslips, and sediment stain, and equipment, including a centrifuge, a refractometer (preferably

The authors have nothing to disclose.
Department of Internal Medicine, Cornell University Veterinary Specialists, 880 Canal Street, Stamford, CT 06902, USA
* Corresponding author.
E-mail address: Joe.bartges@cuvs.org

Vet Clin Small Anim 45 (2015) 621–637
http://dx.doi.org/10.1016/j.cvsm.2015.02.001 **vetsmall.theclinics.com**
0195-5616/15/$ – see front matter

a temperature-compensated veterinary model with a feline-specific scale for specific gravity), a microscope, and optionally an automated dipstick reader.[4–6] It can be performed easily by clinic technical staff if they are properly trained, making it an inexpensive, technically feasible test to perform. In-house testing is preferred because of faster turnaround time and greater accuracy of results, because delayed analysis is a potential source of introduced error. Another advantage of in-house testing is that results can be correlated more easily with the rest of the patient's clinical picture.

Performing the Complete Urinalysis

A description of performing a urinalysis is provided. The sample should be identified on the sample container using the patient's clinic number or name and the date and should be matched to the reporting form. The reporting form should include patient identification, date, method and time of collection, and any current or recent medications or diagnostic agents. Transfer 0.5 to 1.0 mL of the sample using sterile technique to a sterile tube after mixing the sample and submit or store for aerobic bacteriologic culture. Record the time the urinalysis is performed and whether the sample was refrigerated on the reporting form. If the sample has been refrigerated, allow it to reach room temperature or warm it with mixing to either known patient body temperature or 38°C (101°F). Gently mix the sample by inverting it several times and transfer 3 to 5 mL to a clear conical centrifuge tube and record the color (yellow, brown, black, red, white), clarity (clear, cloudy, turbid, flocculent), and odor (normal or abnormal and describe if possible) on the reporting form. Perform semiquantitative biochemical analysis by immersing the urine dipstick so that all reagent pads are covered with urine, start timing the reactions, and drag edge of strip against rim of tube to remove excess urine. Perform semiquantitative biochemical analysis using a urine dipstick or automated dipstick reader following manufacturer instructions. Record results on reporting form. If the urine sample is grossly discolored (eg, gross hematuria) or turbid, the pigment discolors the reagent pads on the dipstick, making it difficult to read and giving erroneous interpretation. Attempt to clear the urine by centrifuging the sample first. If centrifugation results in a red sediment at the bottom of the conical tube and a clear supernatant, then the dipstick semiquantitative chemical analysis may be performed on the supernatant after transferring it to another tube using a pipette or by decanting. If the urine sample does not clear with centrifugation, then interpret results cautiously. Record results for protein, pH, glucose, ketones, and bilirubin on reporting form; results for specific gravity, urobilinogen, leukocytes, and nitrite are unreliable, inferior to other tests performed as part of the urinalysis, or of no clinical significance and should not be reported. Using an appropriate refractometer measure the specific gravity of the urine sample and report on form. If the sample is discolored or turbid, then the specific gravity can be measured on the supernatant after centrifugation. Centrifuge 3 to 6 mL of the sample in the conical tube for 5 minutes at 1500 to 2000 rpm (450 *g*). Do not use the brake to stop the centrifuge as this may result in suspension of the sediment. Transfer all but 0.5 to 1.0 mL of the supernatant depending on the volume of urine in the tube to another tube by using a pipette or by decanting. If the sample cleared with centrifugation, then dipstick semiquantitative chemical analysis and specific gravity determination may be performed as mentioned previously. Suspend the remaining sediment pellet in the 0.5 to 1.0 mL of supernatant by tapping the conical tip of the tube gently on the table top. Use less urine to suspend the sediment pellet if less urine was available for centrifugation. Transfer a drop of the suspension to a clean glass microscope slide using a pipette and place a glass coverslip over it. There should be enough fluid to