

IDEXX



IDEXX REFERENCE LABORATORIES

Specimen Collection Guidelines

+ + + CREATING CLARITY

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IMPORTANT: Specimen quality directly impacts results

We take pride in the quality and accuracy of our reference laboratory services. In order to ensure the most accurate results and the best possible service, proper collection and handling of specimens are critical.

There are many variables that can occur during the 3 phases of testing that can impact results, including:

- Preanalytical testing: Patient preparation (fasting) and identification, tube filling, specimen handling and storage
- Analytical testing: Analyzer functioning and performance
- Postanalytical testing: Data logging and reporting

Pre- and postanalytical steps of the total testing process (TTP) are more error-prone than the analytical phase.¹ Mindful practice and protocols will lead to a reduction in errors during this phase of testing.

This guide provides a variety of preanalytical resources to aid you and your team in specimen collection and transport. Visit the **IDEXX Learning Center** at [idexxlearningcenter.com](https://www.idexxlearningcenter.com) for other useful specimen collection information, educational videos, and more.



Reference

1. Plebani M. Exploring the iceberg of errors in laboratory medicine. *Clin Chim Acta*. 2009;404(1):16–23.

How to submit quality specimens

Quality results begin with proper specimen collection and handling. Please refer to these guidelines regarding sample collection and shipment to our reference laboratories. For specific test details, please consult the Online Test Directory on [vetconnectplus.com](https://www.vetconnectplus.com) for details on specimen collection protocols, interferences, storage, and stability concerns specific to each test.

1. Choose proper collection tubes and containers.

The wrong tube or container can affect results. See the “**Specimen collection tube and swab guide**” section for more information. For example, the gel in a serum separator tube (SST) can interfere with results of some specialized tests, including many endocrinology and drug tests. Consult the Online Test Directory on [vetconnectplus.com](https://www.vetconnectplus.com) to determine the proper collection tube or container for specific tests.

2. Use proper collection techniques.

Blood specimens

Filling syringes

- Choose the largest accessible vein possible to secure a good, free-flowing stick when filling the syringe.
- Slow draws and difficult sticks can rupture red cells, adversely affecting complete blood count (CBC) results and certain chemistries.

Transferring specimens

After collection, transfer blood as soon as possible to the appropriate blood collection tube to avoid risk of clumped platelets or clots, which may affect results.

- For vacuum tubes (e.g., Greiner VACUETTE® tubes), pierce the stopper with the needle and allow the specimen to draw naturally into the tube by vacuum. Avoid forcing clotted blood into a vacuum tube as cells will lyse, causing hemolysis and inaccurate results.
- For nonvacuum tubes (e.g., a screw-top or flip-top plastic tube), remove the top from the blood collection tube. Carefully remove the needle from the syringe and slowly depress the plunger of the syringe to allow the blood to trickle down the inside of the collection tube.



The jugular vein is always preferred unless contraindicated (i.e., coagulation problems or a fractious patient).

Specimens clotted during blood draw may result in:

- Platelet clumps.
- Falsely decreased cell counts (platelets, red blood cells [RBC], and white blood cells on CBC).
- Hemolysis (when forcing blood into tube).

EDTA contamination may cause:

- Falsely decreased calcium.
- Falsely increased potassium.
- Interference with many specialized tests.

Excess anticoagulant (underfilled tube) may result in:

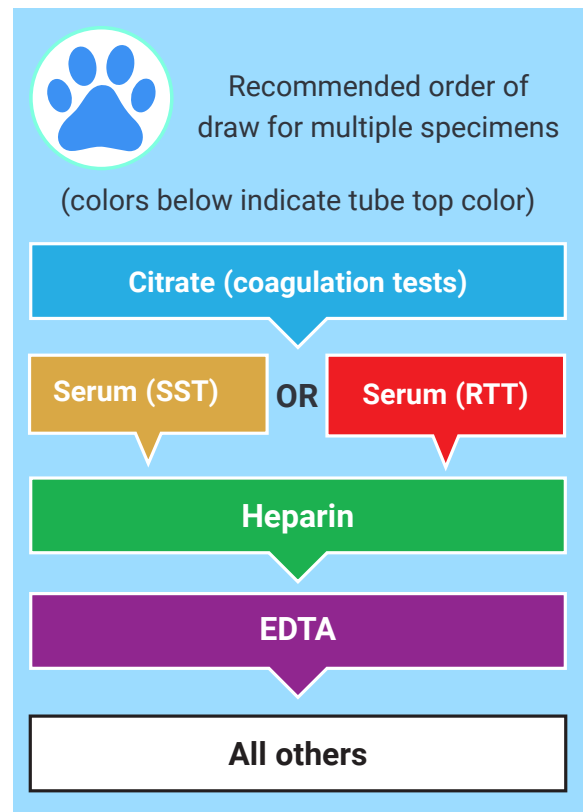
- Decreased RBC count and Hct due to dilution.
- Altered cell morphology.
- Inaccurate MCV, MCH, MCHC, and Hgb.
- Falsely prolonged clotting times.

Filling tubes with additives

- With the exception of blue-top tubes for coagulation testing, which should be filled first, always fill tubes without additives first to prevent carryover of tube additives. For example, if you are filling an EDTA tube and an SST, always fill the SST first. Even a small amount of EDTA can interfere with many chemistry results.
- Overfilling or underfilling tubes causes the wrong ratio of additives and will cause inaccurate results; therefore, fill lavender-top (EDTA) or blue-top (citrate) tubes as much as vacuum will allow.
- To mix with any additives and avoid clotting, always mix lavender-top (EDTA), blue-top (citrate), or green-top (heparin) tubes well immediately after filling.

Centrifuging

Proper centrifugation is just as important as proper collection technique. Make sure specimens are fully clotted before tubes are centrifuged; otherwise, the centrifuged specimen sent to the laboratory will be plasma rather than serum. Note that some specimens may take longer to clot than others.



Checking for hemolysis and lipemia

Before sending in your specimen, check for excessive hemolysis or lipemia. Hemolysis and lipemia can interfere with many tests. The reference laboratory will attempt to improve lipemic specimens by ultracentrifugation. However, lipemia can lead to hemolysis, which cannot be removed by ultracentrifugation. In addition, whole blood specimens cannot be ultracentrifuged, and CBC results can be altered by marked hemolysis or lipemia. If excessive lipemia is present upon specimen collection, consider redrawing the specimen or delaying elective testing until after an overnight fast.

Consult the Online Test Directory at vetconnectplus.com for detailed information on interferences.

Hemolysis can result in:*

- Increased RETIC-HGB, MCH, and MCHC.
- Inability to read CBC parameters in severe cases.
- Altered bilirubin values.
- Decreased RBC count, ALP, and GGT.
- Increased albumin, fructosamine, total protein, AST, ALT, CK, phosphorus, and potassium.
- Interference with specialized testing.

*Chemistry values affected vary depending on species, methodology, and degree of hemolysis.

Lipemia may result in:

- Secondary hemolysis.
- Decreased AST.
- Interference with specialized testing.
- Altered RBC morphology.
- Falsely increased Hgb, MCH, and MCHC.

Hemolysis



N

1+

2+

3+

>4+

Lipemia



N

1+

2+

3+

>4+

Urine specimens

A urinalysis is an important component of a minimum database for both healthy and sick animals. Depending on the findings of the urinalysis, additional urine tests such as urine culture and sensitivity or urine protein:creatinine ratio may be indicated. The accuracy of urine tests is impacted by several preanalytic factors, including correct tube type, time to analysis, and collection method.

Obtaining a quality specimen

- **Sample collection:** Cystocentesis is preferred; however, free catch and catheterized specimens are also acceptable (if cystocentesis is not possible or when contraindicated [e.g., bleeding disorder, transitional cell carcinoma]). **Don't forget to indicate the collection method on the requisition form.**
- **Sample preparation and storage:** Transfer 5 mL of urine to a white-top tube (WTT) or a plain sterile container (without clot activator, serum separator gel, or other additives). Ensure sample is tightly closed to prevent leaking. Refrigerate the urine sample at 2°C–8°C until it is submitted to IDEXX Reference Laboratories.

- **DO NOT** submit syringes with needles attached as they cannot be accepted by IDEXX Reference Laboratories.
- Clot activator in serum red-top tubes can interfere with urine sediment examination.
- A lavender-top tube is not recommended for urine cultures (may inhibit growth).
- Urine culture tubes (e.g. yellow top tube or CCM) contain a preservative to limit bacterial overgrowth when submission for culture will be delayed. These tubes:
 - Are acceptable for urine culture testing only
 - Are not suitable for urinalysis or urine chemistries.
 - Must not be underfilled (could result in false-negative urine cultures).
 - Are not recommended for routine urine cultures.



A WTT (sterile plastic tube with no additives) is the recommended tube for urine or fluid cultures.



Fecal specimens

Fecal testing is an important part of preventive care that can ensure pets are free of intestinal parasites. Proper specimen submission—such as sufficient sample size, appropriate packaging, and specimens with limited debris—contributes to the overall accuracy and reliability of results.



Compared to microscopic examination methods, the parasite proteins detected by antigen testing maintain their integrity and do not degrade significantly in specimens held for several weeks refrigerated or at room temperature, as well as at freezing temperatures.

Obtaining a quality specimen

1. Request that the pet owner bring a fresh fecal sample to their practice visit or use an IDEXX FecalChek® Home Collection Kit to allow the pet owner to collect the specimen at home after their visit.
 - Collect a minimum of 3–5 g feces (equivalent to 2 grapes or 1–2 tablespoons; see images below). Submission of smaller amounts of specimen greatly reduces sensitivity.
 - Avoid samples that have had contact with soil for longer than a few minutes to reduce contamination with free-living nematodes.
 - Avoid samples that have been sitting in cat litter.
2. Transfer sample to the fecal O&P tube or a clean, leakproof plastic container.
3. If submitting for a Fecal Ova and Parasites fecal flotation, refrigerate fecal specimen until it's shipped or picked up by the courier. Fecal specimens do not require shipment on ice.



For more information on IDEXX fecal testing, visit [idexx.com/orderfecal](https://www.idexx.com/orderfecal).

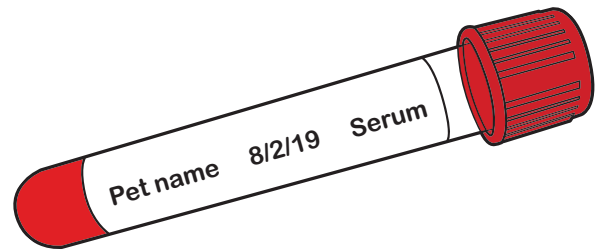
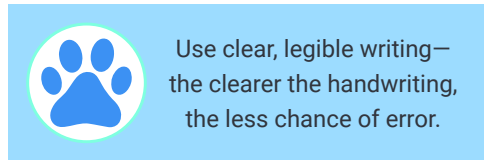
3. Label specimens properly.

Each specimen should be identified with:

- Patient first and last name
- Date
- Sample type

If using a label:

- Do not apply label over cap/lid.
- Do not wrap label around tube.
- Do not leave excess label hanging off/sticking out from tube.
- Do not cover contents of tube with label.
- Do not use tape to seal the tube shut.



4. Submit a slide with the tube.

Air-dried slides should be included with specimens submitted for fluid analysis or urine cytology for accurate cytologic interpretation. This will preserve cell morphology and help with accurate interpretation.

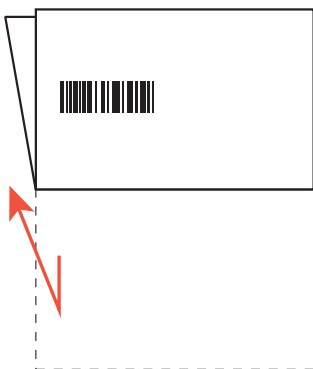
Note: Submission of blood film is not required when submitting for a CBC.

For your convenience, a hematology technician will prepare a blood film for all IDEXX CBC-Select™ runs upon receipt of the specimen at the reference laboratory. However, if you suspect blood-borne parasites, especially *Babesia*, submission of a blood film prepared from an ear-prick collection is recommended. Submission of an air-dried blood film is also still recommended for avian and reptilian CBCs.

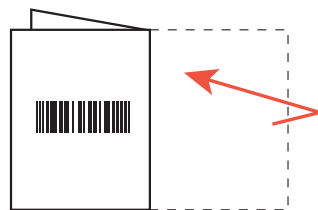
5. Include a test requisition form.

Complete and include an IDEXX Reference Laboratories test requisition form with all specimens. Fold the form in quarters as illustrated below. **IMPORTANT:** Place the form in the rear pocket of the specimen bag with the bar code facing out.

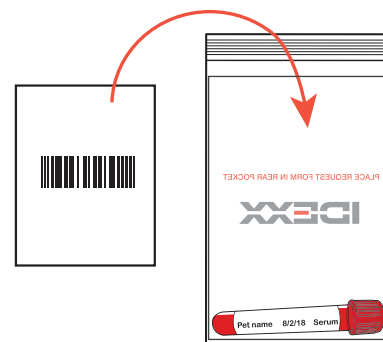
Save time and eliminate errors by using your practice information management system or VetConnect® PLUS to create an electronic requisition. For more information about VetConnect PLUS, call **1-888-433-9987, option 5** or visit idexlearningcenter.com/vetconnectplus.



Fold in half horizontally, so bar code is visible.



Fold in half again vertically, so bar code is visible.



Place form in specimen bag rear pocket, **bar code facing out.**

6. Prepare specimens for pickup.

Specimens may require refrigeration, freezing, or room-temperature storage. Consult the individual test guidelines for instruction on proper storage.

Make sure that specimens are not exposed to heat or direct sunlight in warm weather or allowed to freeze in cold weather. Do not place specimens directly on or near air vents. All specimens must be well insulated during transportation to the laboratory.

Packaging for transport

- Secure all caps and lids.
- Use one bag for each patient.
- Do not place cold or hot packs directly on LTTs. Direct exposure to extreme cold or heat can cause cell damage and make it difficult or impossible to accurately perform a CBC.
- Protect slides, blood smears, and cytologies from condensation by avoiding direct contact with cold packs. Use plastic slide containers for blood smears and cytology slides.
- Always package nonhistology specimens separately from histology as items may be compromised if they come into contact with moisture or formalin.
- If shipping via IDEXX-Direct®: Absorbent material (e.g., paper towels) may be placed in specimen bag to protect specimens from breaking and to absorb spills. Package specimen(s) in an IDEXX-Direct shipping box. More than one patient specimen can be packaged in the box if tubes/jars are properly labeled, bagged, and sealed. To order more specimen bags or boxes, call **1-888-79-IDEXX** (1-888-794-3399) or order online at [idexx.com/order](https://www.idexx.com/order).

Packaging for cold weather

- Keep specimens inside as long as possible.
- In the lockbox only: Place a bag of hot saline solution or a plastic bottle filled with hot water at the bottom of the lockbox (avoid direct contact with specimens).
- Lockboxes should be brought indoors each day and allowed to warm to room temperature before inserting samples and placing outside again.

Packaging for warm weather

- Keep specimens inside as long as possible.
- Place a wrapped cold pack in a separate sealed bag at the bottom of the lockbox or IDEXX-Direct shipping box (the cold pack should not be in direct contact with specimens).



When packaging samples, include one patient per bag.



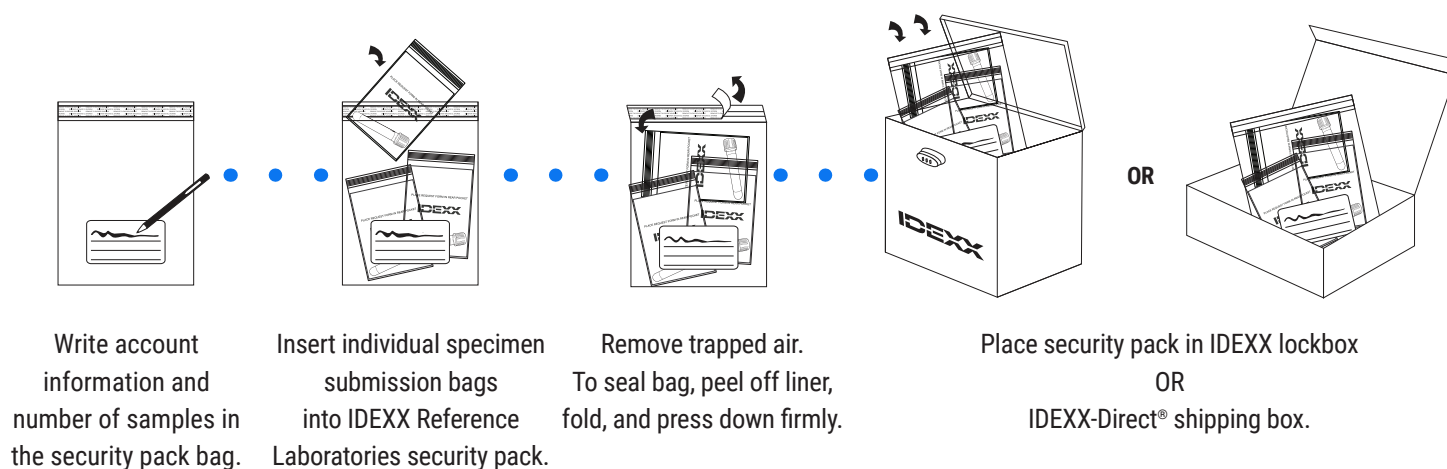
When shipping via IDEXX-Direct, including a cold pack in the box is strongly recommended.

7. Using security packs

Want extra protection for your sample submissions? Optional security packs add convenience and protect your sample submissions.

Security packs are large, tamper-proof bags that hold individual sample bags. These packs have an adhesive strip that provides a permanent seal, allowing for all the samples to travel as one to IDEXX Reference Laboratories. Security packs can be ordered directly from IDEXX Online Orders at idexx.com/order.

Here is how you use security packs:



Notes:

- Use a separate security pack for biopsy/histology specimens.
- Each specimen must be placed in a specimen bag before being placed in a security pack. If you have frozen samples, place those samples in their own security pack along with a frozen cold pack. If you have pathology samples, place those in their own security pack.

8. Ship your specimen (for IDEXX-Direct customers).

For FedEx customers

1. Categorize specimen.

- For Category B specimens* only: Category B specimens may include whole blood submitted for blood culture and fecal specimens submitted for fecal culture or fecal PCR testing. Refer to the IDEXX document *Classify Your Specimen for IDEXX Reference Laboratories* or visit the U.S. Department of Transportation website phmsa.dot.gov and search for UN 3373 to access their brochure about transporting infectious substances for more information on classifying your specimen.

2. Package specimen.

- For Exempt Animal specimens* only—place the IDEXX-Direct® box into a FedEx® Clinical Pak and seal. You must use the FedEx Clinical Pak for Exempt Animal specimens.
- For Category B specimens* only—place the IDEXX-Direct box into a FedEx® UN 3373 Pak and seal. You must use the FedEx UN 3373 Pak for Category B specimens.

3. Address—Attach a preprinted IDEXX-Direct return label to your package, or attach a FedEx Express® Billable Stamp for FedEx Priority Overnight® shipping.

4. Arrange pickup—Go to fedex.com or call **1-800-GoFedEx** (1-800-463-3339) and say “schedule a pickup.”



*Specimen categories:

Exempt Animal: Specimens unlikely to contain pathogens. Most specimens you send to IDEXX will be categorized as Exempt Animal. Example: Urine.

Category B: Infectious substances that are not transported in a form generally capable of causing disability or life-threatening disease. Only a few IDEXX tests require you to submit Category B specimens. Example: Blood culture.

Category A: Infectious substances transported in a form capable of causing disability or life-threatening disease. IDEXX does **not** accept Category A specimens. Example: *Bacillus anthracis* culture.

For more detailed information about specimen categories and shipping regulations, visit the U.S. Department of Transportation website at phmsa.dot.gov.

For UPS customers

1. Categorize specimen.

- For Category B specimens* only: Category B specimens may include whole blood submitted for blood culture and fecal specimens submitted for fecal culture or fecal PCR testing. Refer to the IDEXX document Classify Your Specimen for IDEXX Reference Laboratories or visit the U.S. Department of Transportation website phmsa.dot.gov and search for UN3373 to access their brochure about transporting infectious substances for more information on classifying your specimen.

2. Package specimen.

- For Exempt Animal specimens* only—place the IDEXX-Direct® box into a UPS® Laboratory Pak and seal. You must use the UPS Laboratory Pak for Exempt Animal specimens.
- For Category B specimens* only—place the IDEXX-Direct box into a UPS® UN3373 Laboratory Pak. You must use the UPS UN3373 Laboratory Pak for Category B specimens.

3. Address—Attach a preprinted IDEXX-Direct return label to your package.

4. Arrange pickup or drop-off:

Pickup

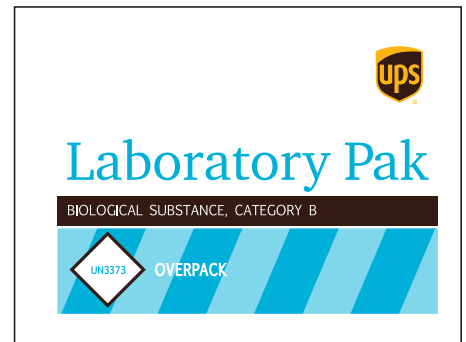
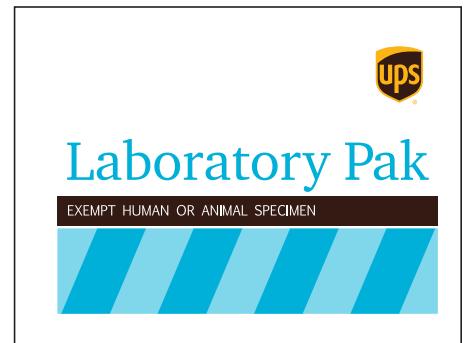
- Place the package at your designated UPS® Pickup Point at your practice, which should be located near your UPS shipping placard.
- To schedule the pickup, call the UPS U.S. laboratory support line at 1-844-4UPS-LAB (1-844-487-7522).

Drop-off

- Shipments of Exempt Animal specimens* are accepted at The UPS Store®, UPS® Customer Centers, and UPS® Drop Box locations.
- Shipments of Biological Category B specimens* are accepted at UPS Customer Centers and UPS Drop Box locations.

Step 9. Reorder your supplies.

IDEXX Reference Laboratories supplies can be ordered direct from IDEXX Online Orders at idexx.com/order.



*Specimen categories:







Exempt Animal: Specimens unlikely to contain pathogens. Most specimens you send to IDEXX will be categorized as Exempt Animal. Example: Urine.




Category B: Infectious substances that are not transported in a form generally capable of causing disability or life-threatening disease. Only a few IDEXX tests require you to submit Category B specimens. Example: Blood culture.





Category A: Infectious substances transported in a form capable of causing disability or life-threatening disease. IDEXX does **not** accept Category A specimens. Example: *Bacillus anthracis* culture.

For more detailed information about specimen categories and shipping regulations, visit the U.S. Department of Transportation website at phmsa.dot.gov.

Specimen collection tube and swab guide

Type			
	<p>BTT Blue-top tube Available in 2 mL; light blue cap.</p>	<p>SST Gold-top tube, serum separator tube Available in 4 mL, 5 mL, and 8 mL; gold cap with gel in the bottom of tube.</p>	<p>RTT Red-top tube, serum tube, RTT with clot activator. Available in 4 mL and 6 mL; red cap.</p>
Description	Contains sodium citrate anticoagulant.	Contains a gel medium that forms a barrier between the red blood cells and serum after centrifugation.	Plastic, silicone-coated plain red-top tube with clot activator.
Purpose	Citrated plasma for coagulation testing.	Serum for chemistries, immunology, serology, endocrinology. Do not use for transport of fluid specimens or urine.	Serum for chemistries, immunology, serology, endocrinology, therapeutic drug monitoring; also used for transport of separated serum or plasma.
Comments	Correct ratio of blood-to-anticoagulant very important. Specimen should be immediately centrifuged and plasma separated into a WTT (plain plastic tube without clot activator) and frozen.	Gel interferes with certain therapeutic drug monitoring tests (phenobarbital, digoxin, theophylline) and progesterone (use RTT with clot activator instead).	Centrifugation and separation of serum into a second RTT or a WTT is recommended. Clot activator will interfere with microscopic evaluation of urine or fluids submitted for cytology.
Type			
	<p>LTT Lavender-top tube (EDTA) Available in 2 mL and 6 mL; lavender cap.</p>	<p>WTT White-top tube (no additive); plain plastic tube without clot activator. Available in 6 mL; white cap.</p>	<p>Royal BTT Dark blue-top tube, trace element tube. Available in 6 mL; royal blue cap.</p>
Description	Plastic tube with EDTA anticoagulant.	Plain, no-additive, silicone-coated plastic tube without clot activator.	Plastic tube with clot activator; special stopper contains lower levels of trace elements.
Purpose	Whole blood for hematology; may also be used for submission of fluids for cytology.	Transport of serum or plasma for chemistries, endocrinology, immunology, serology, therapeutic drug monitoring, coagulation testing; urine for urinalysis, culture, or cytology; fluids for culture or cytology.	Use for collection of serum for trace elements, e.g., zinc.
Comments	Proper blood-to-anticoagulant ratio is important for accurate results. EDTA plasma is not acceptable for most chemistries.	After centrifugation, serum or plasma collected in other tube types can be transferred into a WTT for transport. Preferred tube type for submission of urine for urinalysis or urine culture. IMPORTANT: Be sure to label the tube with the specimen type.	

Type				
	Fecal culture transport media Enteric pathogen transport media	Fecal O&P tube	Oxoid Signal® blood culture bottle Available in 84 mL.	
	Description	Fecal culture media ideal for enteric pathogens.	Empty, sterile plastic tube with scoop.	Blood culture media ideal for both aerobic and anaerobic organisms.
	Purpose	Feces for culture.	Feces for fecal O&P, fecal antigen testing, or fecal PCR.	Whole blood for culture; use for patients >5 lb.
	Comments	Avoid contamination with urine and soil. Refrigerate promptly to prevent overgrowth.	Collect fresh specimens only. Specimens allowed to sit on soil may be contaminated with free-living nematodes from the environment. Avoid specimens that have been sitting in kitty litter.	Keep at room temperature. Collection using sterile technique is critical for accurate results. See the "Microbiology specimen collection guidelines" section.

Type					
	Culture swab in transport media Aerobic/anaerobic culture swab, regular tip.	Mini-tip culture swab Aerobic culture swab, mini-tip.	PCR swab	Chlamydia ELISA swab	
	Description	Plastic-stemmed, sterile, flocked swab with liquid-based culture media.	Wire-stemmed, sterile, mini-tip, yellow-capped swab with gel-based culture media (Amies without charcoal).	Plastic-stemmed, sterile, polyester swab.	Plastic-stemmed, sterile, mini-tip, DACRON® swab.
	Purpose	Use for collection, transport, and preservation of specimens for aerobic or anaerobic culture.	Use for collection, transport, and preservation of specimens for aerobic or anaerobic culture of small sites, such as respiratory, choanal, or cloacal specimens from exotics.	Use for collection of respiratory specimens or tissue aspirates for RealPCR™ tests.	Use for collection of choanal or cloacal specimens for <i>Chlamydomphila</i> (<i>Chlamydia</i>) Antigen by ELISA; use also for choanal or cloacal swabs for PCR where a mini-tip swab is preferred.
	Comments	Refrigerate culture swabs promptly following specimen collection to prevent overgrowth. For instructions on sampling specific sites, see the "Microbiology specimen collection guidelines," section.	Refrigerate mini-tip culture swabs promptly following specimen collection to prevent overgrowth. Note: If an oral/mouth sample is needed from an awake animal, it is recommended to utilize a bite block or mouth gag to prevent the animal from biting and potentially breaking the swab.	Submit swabs dry, without transport media, in an RTT or in an empty sterile tube. Keep refrigerated. For instructions on sampling specific sites, see the "RealPCR specimen collection guidelines," section.	Submit swabs dry, without transport media, in the provided shipping canister, or in an RTT, or in an empty sterile tube.










Note: To increase supply availability, IDEXX has partnered with multiple manufacturers. There may be slight variations in appearance but no impact to performance. Tube and swab images are representative of those supplied by IDEXX. Tubes from other manufacturers may have different tube-top colors.

Specimen collection guidelines reference chart

For information on specimen collection guidelines for avian/exotics, microbiology, pathology, and RealPCR, see their sections on the following pages.



If sample is not fully clotted when spun, it will result in plasma rather than serum.

Type of testing	Specimen	Container	Description	Protocol	Storage
Chemistry, immunology, endocrinology	Serum	SST (serum separator tube)  OR 	Gel to separate serum from clot and clot activator	Let specimen clot for 15–20 minutes or until a distinct clot has formed. Some specimens may take up to 30 minutes to fully clot. Centrifuge at 2,500 rpm for 10–15 minutes. Do not use SST for progesterone or therapeutic drug monitoring (phenobarbital, digoxin or theophylline).	Refrigerate
Chemistry, immunology, endocrinology, therapeutic drug monitoring	Serum	RTT (red-top tube, serum tube)  OR 	Sterile, empty with clot activator	Let specimen clot for 20 minutes or until a distinct clot has formed. Some specimens may take up to 30 minutes to fully clot. Centrifuge at 2,500 rpm for 10–15 minutes, pipette serum from clot and transfer to a second RTT or a WTT (plain plastic tube).	Refrigerate
Coagulation (PT, PTT, D-dimer, VWD, and quantitative fibrinogen)	Citrated plasma	Collect in BTT (blue-top tube), then transfer plasma to a WTT (plain plastic tube without clot activator) 	Sodium citrate anticoagulant	Correct blood-to-anticoagulant ratio is very important. Fill tube as much as vacuum will allow to obtain proper ratio. Invert gently several times after filling. Centrifuge immediately at 1,500 rpm for 15 minutes. Pipette plasma from cells and transfer to a WTT (plain plastic tube without clot activator). Label as citrated plasma and freeze.	Keep frozen and ship with cold pack.
Hematology	Whole blood	LTT (lavender-top tube) and air-dried unstained blood smears  OR 	EDTA anticoagulant	Fill tube as much as vacuum will allow to obtain proper blood-to-anticoagulant ratio. Invert gently several times. Air-dried blood smears preserve cell morphology.	Refrigerate; Do not freeze.
Parasitology (fecal O&P, fecal antigen tests)	Feces	Fecal O&P tube or clean plastic container	No additive	Collect fresh fecal specimen from bowel movement or fecal loop. Do not allow specimen to sit on soil or in kitty litter.	Refrigerate or room temperature.
Stone analysis	Urolith	Dry sterile container	No additive	Do not place in formalin or other liquid.	Room temperature
Urinalysis, urine culture	Urine	WTT (plain plastic tube without clot activator)  OR 	No additive	Do not submit a culture swab or syringe; transfer specimen to sterile tube and tightly seal. Indicate method of collection.	Refrigerate and prevent UV/sunlight exposure.

Avian/exotic specimen collection guidelines

Accurate results depend on quality specimens. Please follow the guidelines detailed below.

Specimen collection tubes

Type	Mini SST Gold-top tube	Mini GNTT Green-top tube	Mini light PST Light green-top (mint green-top) tube	Mini LTT Lavender-top tube
Description	Contains a gel medium that forms a barrier between the red blood cells and serum after centrifugation.	Plastic tube with lithium heparin anticoagulant.	Plastic tube with lithium heparin anticoagulant and a gel medium that forms a barrier between the red blood cells and plasma.	Plastic tube with EDTA anticoagulant.
Purpose	Serum for chemistries, immunology, serology, endocrinology.	Heparinized whole blood for avian/exotic hematology; heparinized plasma may be used for most chemistries.	Heparinized plasma can be used for most chemistries.	Whole blood for avian/exotic hematology.
Comments	Gel interferes with certain therapeutic drug monitoring tests (phenobarbital, digoxin, theophylline) and progesterone (use RTT with clot activator instead).	If plasma is desired, specimen must be spun and separated into a RTT or a WTT.	Use primarily for avian/exotic patients for which specimen volume is an issue. Cannot use for hematology.	Proper blood-to-anticoagulant ratio is important for accurate results. EDTA plasma is not acceptable for most chemistries.

Chemistry

- Serum (collected in a mini SST) or heparinized plasma (collected in a mini GNTT or mini light GNTT) may be submitted for avian/exotic chemistries.
- Use of a mini light GNTT (containing plasma-separator gel) is preferred for chemistries. The mini light GNTT should be spun but does not require separation.
- When using a mini GNTT or a mini SST, it is important to separate the serum or plasma after spinning to avoid artifactual changes in chemistry values.
- Mini GNTT: invert the mini GNTT 6–8 times immediately after adding blood and then spin down.
- Mini SST: allow the mini SST to clot for 15–20 minutes before spinning.

Hematology

- For differentials, immediately make an air-dried, unstained blood film using glass slides. Do not use coverslips. Use an individual slide holder for each patient.
- Submit blood in an EDTA lavender-top tube (LTT) or GNTT (without plasma-separator gel). Invert tube 6–8 times immediately after adding blood. Minimum blood volume in GNTT/LTT should be ≥ 0.3 mL.



DO NOT use an LTT with reptile, kookaburra, crow, ostrich, or emu specimens.

Guidelines for limited sample sizes

- If specimen size is limited, indicate priority of testing in case the specimen size is inadequate.
- If submitting a single specimen for both chemistry and hematology, submit an unspun GNTT (without plasma-separator gel) with an unstained, air-dried blood smear. Some chemistry values may be affected.



Always prioritize tests on your requisition form in case the specimen size is inadequate.

Microbiology

For avian cultures, organisms are categorized as nonpathogenic (reported as normal gram-positive flora), including A-hemolytic streptococci (alpha-strep) and G-hemolytic streptococci (gamma-strep), *Enterococcus*, *Corynebacterium*, *Lactobacillus*, nonhemolytic staphylococci, or pathogenic, including Enterobacteriaceae and other gram-negative rods, fungi, *Mycoplasma*, hemolytic staphylococci, *Pasteurella*, and yeast on respiratory and fecal samples. Yeast are noted as present but are not identified on routine bacterial culture.

Susceptibility testing is routinely performed on all Enterobacteriaceae, gram-negative rods, and hemolytic staphylococci. *Pasteurella* is NOT tested because it is predictably susceptible to many antibiotics used in birds.

Note: Antibiotics tested for avians are dependent on the organism and may include amikacin, ampicillin, amoxicillin/clavulanic acid, cefotaxime, ceftazidime, cephalixin, chloramphenicol, ciprofloxacin, enrofloxacin, gentamicin, piperacillin, tetracycline, tobramycin, and trimethoprim/sulfa. Other antibiotics available upon request.

Microbiology specimen collection recommendations

In birds, the major microbiology analyses are for respiratory infection, diarrhea, and abscesses.

Clinical presentation	Source	Tube/storage	Protocol	Test to request
Upper respiratory signs	Respiratory discharge, aspirate or flush	Culture swab in transport media or fluid in a sterile tube (WTT or RTT)	Sinus aspirate or flush using nonbacteriostatic saline; swab of choanal slit in cases of visible discharge/inflammation	Aerobic Culture–Avian/Reptile and/or Anaerobic Culture and/or Fungal Culture
Lower respiratory signs	Flush or swab of lower airways	Culture swab in transport media, fluid in a sterile tube, or tissue in a sterile tube (WTT or RTT)	Tracheal wash using nonbacteriostatic saline or swab taken through sterile ET tube; swab or biopsy of air sacs or lungs	Aerobic Culture–Avian/Reptile and/or Fungal Culture
Diarrhea	Fresh feces	Fecal culture media (preferred) or sterile tube (WTT or RTT)	Fresh feces	Fecal culture
Abscess	Abscessed material	Culture swab in transport media, fluid in a sterile tube, or tissue in a sterile tube (WTT or RTT)	Note: Avian abscesses often contain caseous material which may yield poor results. Submission of a combination of peripheral purulent material, as well as tissue from the margin or wall of the abscess will often provide the best results.	Aerobic and/or Anaerobic Culture
Wound	Infected tissue	Culture swab in transport media or tissue in a sterile tube	Flush wound with sterile nonbacteriostatic saline, then swab or collect biopsy of affected tissue.	Aerobic Culture–Avian/Reptile and/or Anaerobic Culture and/or Fungal Culture

Histology

Exotics species will be assigned to the IDEXX Reference Laboratories team of anatomic pathologists with special expertise in avian and exotic species.

Microbiology specimen collection guidelines

Special instructions

- Inform the laboratory if the animal is being treated with antimicrobial drugs.
- Indicate if the patient is immunocompromised.
- DO NOT submit syringes with needles.
- Clearly specify sites of all cultures, including method of collection for urine specimens.
- Urine, fluids, aspirates, and tissues may be submitted in a WTT (plain plastic tube) or an RTT. An LTT is not recommended for cultures as it may inhibit bacterial growth. An SST (serum separator tube) is not appropriate for cultures.
- Culture specimens should be refrigerated promptly to prevent overgrowth, with the exception of blood cultures, cerebrospinal fluid (CSF), and joint fluid, which should be kept at room temperature.
- Recent antibiotic therapy (within the previous 2 weeks) may result in lower yield or negative cultures. Withdrawal from antibiotics for a minimum of 72 hours, ideally 7–10 days, is recommended when culturing a patient following antibiotic administration.
- When submitting two swabs from different sites, submit each swab with its own requisition form to be plated separately. If you would prefer these swabs to be cultured together on the same plate under a single test code, submit together and indicate this on the requisition form.

Normal flora, predictable susceptibility patterns, and nonpathogenic organisms

IDEXX follows guidelines set by the Clinical and Laboratory Standards Institute (CLSI), as well as our own interpretive standards gained from years of experience in performing susceptibility testing. We believe these are the “best practice” microbiology techniques, and we would be happy to discuss the following policies with you:

- Susceptibilities will not be performed on normal flora or nonpathogenic organisms.
- Pathogens with predictable susceptibility patterns or with no CLSI interpretive standards will be reported with a recommended list of antimicrobials. Examples include β -hemolytic streptococci (beta-strep) and *Pasteurella* in nonsterile sites.
- Pathogens with atypical growth characteristics (i.e., slow-growing or anaerobic) render susceptibility testing inaccurate and misleading. Therefore, recommended antibiotics will be reported in an effort to guide therapy. Examples include *Corynebacterium pseudotuberculosis* and *Actinomyces*.

Direct Gram stains

- Aerobic cultures on avians and exotic species automatically receive Gram stains. (See test codes 415 [Aerobic and Fungal Cultures—Avian/Reptilian], 435 [Aerobic Culture—Avian/Reptilian], 437 [Aerobic Culture—Rabbit/Rodent], 4023 [Fecal Screen 1—Avian/Exotics], and 4027 [Fecal Screen 2—Avian/Exotics].)
- Direct Gram stains for other cultures must be requested and will incur an extra fee. (See test code 402 [Gram Stain, Direct Add-on to Culture].)
- Direct Gram stains for urinalysis must be requested and will incur an extra fee. (See test code 40910 [Gram Stain, Direct Add-on to Urinalysis].)
- The best sources for valuable direct Gram stain information are wounds, abscesses, fluids, tracheal washes, and sterile sites.

Microbiology site-specific guidelines

Source	Tube/storage	Protocol	Test to request
Abscess or wound	Culture swab in transport media or tissue/fluid in sterile tube*	Aseptically prepare collection site. Aspirate fluid or pus from abscess, pustule or vesicular wounds.	Aerobic and/or Anaerobic Culture
Blood	One blood culture bottle per time point. Do not submit swabs, serum or whole blood in LTT or RTT. For animals ≥5 lb, use 84 mL Oxoid Signal® blood culture bottle. For animals <5 lb, (and for add-on fungal culture if desired) use yellow-top Wampole® Isolator™ blood culture tube. Keep at room temperature.	Collection using sterile technique is critical for accurate results. Aseptically prepare venipuncture site. Disinfect the top of culture bottle with alcohol and let dry. Ideally two samples drawn approximately one hour apart from different venous sites should be submitted. • >40 lb, place 10 mL blood in one 84 mL bottle. • 20–40 lb, place 7.5 mL blood in one 84 mL bottle. • 5–20 lb, place 5 mL blood in one 84 mL bottle. • <5 lb or for fungal culture, place 1.5 mL blood in one Isolator blood culture tube.	Blood Culture with or without Fungal Culture Add-on
Bone marrow	Sterile tube (WTT or RTT)*	Aseptically prepare collection site.	Aerobic and/or Anaerobic Culture
<i>Brucella canis</i>	Specimens should not be submitted for culture if <i>Brucella canis</i> is suspected. See the “Submission of highly pathogenic zoonoses” section for additional details.		
Cerebrospinal fluid (CSF)	Sterile tube (WTT or RTT)* Keep at room temperature.	Collect CSF by aseptic subdural tap, ventricular aspiration or lumbar puncture.	Aerobic and/or Anaerobic Culture
Ears	Culture swab in transport media	Posterior pharyngeal cultures may also reveal organisms causing otitis media. Note: Topical treatments may inhibit bacterial growth.	Aerobic Ear Culture
Eyes	Culture swab in transport media	Use swab to collect suppurative material from cul-de-sac or medial canthus. Note: Topical anesthetic may inhibit bacterial growth.	Aerobic Culture
Feces	Fecal culture transport media (preferred) or sterile tube (WTT or RTT)*	Avoid contamination with urine and soil. If <i>Clostridium perfringens</i> and <i>Clostridium difficile</i> enterotoxin testing will be performed, include 3–5 g fresh feces in sterile container.	Fecal Culture



For help interpreting your culture results, visit [idexx.com/mic](https://www.idexx.com/mic).

Microbiology site-specific guidelines (continued)

Source	Tube/storage	Protocol	Test to request
Hair	Sterile tube (WTT or RTT)*	Hair should be plucked (not cut) in order to include roots.	Fungal Culture
Joint fluid	Sterile tube (WTT or RTT)* or blood culture bottle. Keep at room temperature.	Aseptically inject fluid into sterile tube or blood culture bottle. Specimens >48 hours old are not suitable for culture.	Aerobic and/or Anaerobic Culture
MRSA	Culture swab in transport media	If screening for nonclinical carrier, collect swabs from nasal passages and rectum. For clinical patients, collect specimen from lesion and submit for Aerobic Culture. Staphylococcus spp. isolated in routine cultures are screened for methicillin resistance and further identified to species level when indicated.	If screening for nonclinical carriers: MRSA Screen If lesion is present: Aerobic Culture
Nail or Skin	Sterile tube (WTT or RTT)*	Use sterile blade or swab to collect material from infected nail. Scrape or swab active border of skin lesions.	Aerobic and/or Fungal Culture
Sinus	Culture swab in transport media or tissue/fluid in sterile tube*	Aspirate from maxillary, frontal or other sinuses. Note: Chronic sinusitis often involves anaerobic bacteria.	Aerobic and/or Anaerobic Culture
Tissue	Sterile tube (WTT or RTT)*	Place tissue in sterile tube with small amount of sterile LRS to keep specimen hydrated.	Aerobic and/or Anaerobic Culture
Tracheal wash/BAL	Sterile tube (WTT or RTT)*	Place wash fluid in sterile tube. Best results can be expected when buffered solution, such as LRS, is used rather than acidic isotonic saline solutions.	Aerobic Culture
Urine	Sterile container (WTT [plain plastic tube] preferred)*	Indicate collection method. Cystocentesis is strongly recommended (except in large animals). Avoid contamination with feces. Swabs are not acceptable specimens for semiquantitative urine culture.	Urine Culture

*An LTT is not recommended for cultures as it may inhibit bacterial growth. An SST (serum separator tube) is not appropriate for cultures. Urine culture tubes (e.g. yellow-top or CCM) contain a preservative to inhibit overgrowth when culture is delayed. When underfilled, they may inhibit growth of pathogens and are not recommended for routine urine cultures.



A WTT (sterile plastic tube with no additives) is the recommended tube for urine or fluid cultures.



Submission of highly pathogenic zoonoses

There are no designated BSL-3 microbiology laboratories at IDEXX Reference Laboratories in the United States. Therefore, specimens suspected of containing organisms requiring BSL-3 containment should **NEVER** be sent for culture and will **NOT** be accepted for culture. These highly pathogenic zoonotic organisms include, but are not limited to, the following:

- *Bacillus anthracis*
- *Brucella abortus*
- *Brucella canis*
- *Brucella melitensis*
- *Brucella suis*
- *Burkholderia* (formerly *Pseudomonas*) *mallei*
- *Burkholderia* (formerly *Pseudomonas*) *pseudomallei*
- *Francisella tularensis*
- *Mycobacterium bovis*
- *Mycobacterium tuberculosis*
- Prions, such as bovine spongiform encephalopathy (BSE), etc.
- Rabies virus
- *Yersinia pestis*

If any of the previously listed organisms are suspected, contact your state veterinarian and/or state veterinary diagnostic laboratory. See the Centers for Disease Control and Prevention (CDC) website at [cdc.gov](https://www.cdc.gov) for more information on handling and diagnosing these highly pathogenic zoonotic organisms.

In addition, agar plates with fungal growth or environmental specimens suspected of containing the following organisms will **NOT** be accepted for culture testing:

- *Blastomyces dermatitidis*
- *Coccidioides immitis*
- *Coccidioides posadasii*
- *Histoplasma capsulatum*

Cytology or histology of affected sites or fungal serology tests may be more appropriate alternatives for the diagnosis of the above organisms.

Pathology specimen collection guidelines

Accurate results depend on quality specimens. Follow the guidelines detailed below:

- Provide patient signalment (including breed), relevant history, clinical signs, physical examination findings, therapies instituted, and the anatomic site sampled.



Patient history and clinical findings contribute to an accurate result.

- Include the following information, where applicable:
 - Gross lesion description, including size, shape, consistency, symmetry, and border definition (well demarcated vs. invasive)
 - Radiographic images (especially for bony lesions or oral masses) and/or ultrasonographic findings (especially for samples from internal organs)
 - References to prior laboratory results (prior cytology/biopsy, recent CBC), including accession numbers.
 - Any specific questions you would like answered
 - Working clinical diagnosis

To learn more, view the *Important Considerations in Cytology Sample Collection and Submission* and *Important Considerations in Histology Sample Collection and Submission* snippets at learn.idexx.com.

IMPORTANT! Only biopsy submissions submitted in a concentration of 10% buffered formalin are acceptable. The liquid contents in the biopsy jars must be indicated and clearly labeled on the jars. Refer to this document.

go.idexx.com/submitbiopsy.



Choose the correct test code

Fees are determined by the number of sites, lesions/masses, or organs submitted. Use the appropriate test code based on number of sites. For help determining the correct number of sites, visit idexx.com/submitpathology.

Biopsy submission guidelines

Learn more about shipping and packaging requirements for biopsy specimens at go.idexx.com/submitbiopsy.

Quick tips:

- Use new jars, one jar per site, and label with the patient's first and last name, collection date, specimen ID, and veterinarian's name.
- 10:1 formalin to tissue ratio. Completely cover the mass. Microcassettes are available for small specimens.
- Ensure jars are labeled with "10% buffered formalin" or "saline" if using non-IDEXX issued jars.
- Submit using the standard shipping or courier service process.

Place specimen(s) in the appropriate-sized IDEXX provided formalin container(s).

- Do not reuse containers or use containers not approved for formalin.
- Use separate, individually labeled jars for each site in a multi-site submission.
- If the specimen is very small, place it in a microcassette before putting it in a formalin container (microcassettes are available through IDEXX Reference Laboratories).
- Make sure to use a compliant biopsy container that is large enough to completely cover the entire mass/lesion. Use a 10:1 formalin concentration to allow for adequate fixation.

Label each container with the patient's first and last name, collection date, specimen ID, and veterinarian's name.

Package submission(s) individually for each patient, along with their requisition form.

- To ensure all specimens for the same patient are processed together, package all jars with the requisition form into one bag.
- If there is not enough room to fit all jars into a single bag, use a larger resealable bag that will keep all sites submitted for the patient together, or wrap an elastic band around multiple bags for the same patient.
- Submit samples using your standard FedEx®, UPS®, or courier service process.

Large tissue specimen shipping instructions

- Samples that are too large to fit in IDEXX-provided formalin jars should be shipped fresh, wrapped in gauze wetted with saline (not soaked).
- Triple bag the specimen, using 1- to 5-gallon freezer bags or 10-gallon red biohazard bags. Place absorbents and ice packs inside the middle layer bag.




Note: Larger specimens require additional time for fixation; the normal turnaround time may not apply.

Pathology policies

Fresh tissue specimens from primates are not acceptable and will be shipped back to the submitting practice. Qualifying pathology specimens from primates cannot be processed at IDEXX Reference Laboratories and must be sent directly to the IDEXX BioAnalytics laboratory.

IDEXX Reference Laboratories does not accept tissue specimens or formalin jars for disposal-only requests. Please contact your local environmental health and safety agency for guidelines on safe disposal. A biohazard fee may be charged for specimens submitted in noncompliant jars that are not approved for formalin use, specimens containing needles/sharps, as well as any specimen types not approved for processing at IDEXX Reference Laboratories.

Pathology reports cannot be used for publication or social media dissemination without the pathologist's permission.

			
Type	Biopsy Jar—60 mL with 30 mL Formalin	Biopsy Jar—120 mL with 60 mL Formalin	Large Biopsy Sample Submission Kit
Description	60 mL jar for histology specimen; contains 30 mL of formalin.	120 mL jar for histology specimen; contains 60 mL of formalin.	Heat-sealed kit contains: <ul style="list-style-type: none"> • (1) 4-mil double-zipper bag (12" x 15.7") • (1) 2-mil double-zipper bag (12" x 15.7") • (1) 2-mil IDEXX Specimen Bag (14" x 18") • Kit instruction sheet.
Purpose	Collection and fixation of samples submitted for pathologic testing and review	Collection and fixation of samples submitted for pathologic testing and review	Submission of fresh tissue samples for pathologic testing and review
Comments	Make sure you use a compliant biopsy container that holds enough to completely cover the entire mass/lesion. Use a 10:1 formalin concentration to allow for adequate fixation. Lids of biopsy jars have a double-click sealing closure. Be sure the lids are secured appropriately. Do not place any labels on top of the label included on the jar.	Make sure you use a compliant biopsy container that holds enough to completely cover the entire mass/lesion. Use a 10:1 formalin concentration to allow for adequate fixation. Lids of biopsy jars have a double-click sealing closure. Be sure the lids are secured appropriately. Do not place any labels on top of the label included on the jar.	Samples that are too large to fit in IDEXX-provided formalin jars should be shipped fresh, wrapped in gauze, wetted with saline (not soaked).

Cytology submission guidelines

Prepare slides

- Make slides using either a squash technique or a blood smear technique. Stain one slide to ensure adequate cellularity and quality.
Note: The following handling conditions may result in nondiagnostic slides:
 - Material being expelled onto slides but not smeared
 - Excessive pressure being applied when smearing material
 - Material being too dense or thick
- Both prestained and unstained (preferred) slides are acceptable for cytology.
- Slides should be air-dried only. Do not fix slides, spray with hair spray, or apply a coverslip. Avoid contact with oil.
- Store slides at room temperature, and keep specimens away from formalin fumes.
- For fluid specimens, submit fluid in a lavender-top tube (LTT; EDTA), along with 1–4 slides prepared from the fluid.
 - Do not submit fluid in a serum separator tube, serum RTT with clot activator, or in a syringe for cytology.
 - Fluid in a WTT (plain plastic tube) may be included along with the LTT if a culture may be ordered based on cytology results.

Label specimens

- Using pencil, label the slide(s) and any tubes clearly with patient's first and last names and place into slide containers.
- Label slide holders and tubes with patient's first and last names, collection date, specimen ID, and veterinarian's name.
- If submitting for multiple sites, label both slides and slide boxes with site.

Slide submission

- Provide signalment, breed, relevant history, clinical signs, and specimen site location(s) to help our pathologists give you the most comprehensive interpretation. Include the following where applicable:
 - Gross lesion description, including size, shape, consistency, symmetry, and border definition (well-demarcated vs. invasive).
 - Radiographic findings (especially for bony lesions or oral masses) and/or ultrasonographic findings (especially for samples from internal organs).
 - References to prior laboratory results (prior cytology/biopsy, recent CBC etc.), including accession numbers.
 - Any specific questions you would like answered and working clinical diagnosis.
- For fine-needle aspirates (FNAs) or fluids, submit up to four slides per site. Submission of more than four slides per site may result in additional charges and a longer turnaround time.
- For lymph node(s), 3–10 slides can be submitted (1–4 slides per lymph node) using test code 609, Lymph Node Cytology. This will ensure the most appropriate processing of your specimen and allow for the appropriate larger number of slides associated with these cases.
- For fecal cytology, submit 1–4 prepared slides. Do not submit fecal swabs or fresh feces.
- For hair, fur, or skin cytology, submit 1–4 prepared, stained slides. Do not submit specimens in a tube. Submission of tape preps is not recommended.

To learn more about submitting samples for cytology or biopsy, visit [idexx.com/submitpathology](https://www.idexx.com/submitpathology).

RealPCR specimen collection guidelines

Polymerase chain reaction (PCR) testing offers a versatile testing modality for infectious diseases. However, accurate results depend on collecting the appropriate specimen type for the clinical manifestation. Provided below are detailed protocols for each specimen type.

All specimens should be stored and shipped refrigerated, unless otherwise indicated. Specimens should be collected prior to antibiotic, antifungal, or antiviral treatment directed against the organism of interest or collected at least 2 weeks after withdrawal of these medications. Specimens received within 72 hours of collection are preferred, but most specimens are stable for up to 10 days if stored refrigerated, unless otherwise indicated. Vaccination with an attenuated or modified live vaccine may result in positive PCR test results for up to a few weeks postvaccination.

Every RealPCR™ specimen submission is processed with up to 7 quality controls. If a specimen fails the preanalytical quality control (DNA and RNA), a repeat extraction is attempted. If quality control criteria are still not met for a particular diagnostic specimen, the submitting veterinarian will be contacted and encouraged to submit a fresh specimen at no additional charge.

Source	Tube/storage	Protocol
Whole blood	EDTA whole blood (LTT)	2 mL (0.1 mL minimum)
Feces	Sterile container (preferred) or empty, clean container	5 g (1 g minimum) fresh feces
Urine	Sterile container	2 mL (0.1 mL minimum) urine
Fluid (CSF, pleural effusion, respiratory wash specimens, uveal fluid, ascites, abscess aspirates, etc.)	LTT (preferred), RTT, or WTT (plain plastic tube)	0.5 mL (0.1 mL minimum) fluid
Swabs	RTT or a WTT (plain plastic tube)	Submit dry, plastic-stemmed swabs, without transport media. Respiratory specimens may include a deep pharyngeal swab (with visible organic material on swab; please rub firmly), and a conjunctival swab (wipe eye clean; swab inside of eyelid), which can be submitted together in the same tube, or a nasal swab (equine respiratory panels or systemic mycoses). When acquiring a pharyngeal swab, precautions should be taken to prevent patient from biting and/or ingesting part of swab. Collect specimens prior to fluorescein staining.
Tissue aspirates	Submitting tissue aspirates on a swab improves stability of the specimen. 1–3 air-dried, unstained slides (keep refrigerated) are also acceptable specimens but may result in lower sensitivity.	<ol style="list-style-type: none"> 1. Aspirate tissue into the hub of the needle using standard techniques. 2. Remove the syringe from the needle and fill syringe with air. 3. Reattach the syringe to the needle and squirt out aspirate onto the end of a dry, plastic-stemmed swab. 4. Submit the swab in an RTT or a WTT (plain plastic tube); keep refrigerated.
Tissue biopsies	PCR testing can be performed on previously submitted histopathology specimens (formalin-fixed, paraffin-embedded tissue). Fresh, refrigerated tissue specimens submitted within 24 hours of collection are also acceptable. Freezing is not recommended unless the specimen can be maintained frozen until arrival at the PCR laboratory.	



Serum is not a good specimen for PCR because the DNA-containing cells have been removed from the sample.

Time-sensitive results for your time-sensitive cases.

Sometimes “soon” just isn’t soon enough. Your most critical cases deserve quick answers—and with IDEXX **PCR Direct**, you can count on getting test results the next day for specimens submitted Monday–Friday.*

Our latest real-time PCR technology minimizes testing turnaround time while still delivering the highly sensitive, thorough results you’ve come to expect. And with those answers in hand, you can treat your patients with precision to resolve issues and infections as quickly as possible.

It’s just five simple steps to use PCR Direct:

1. Order the necessary supplies from IDEXX Online Orders:
 - UPS® return label (product: 98-0011-26-00)
 - UPS® shipping envelope (product: 98-0011025-01)
 - IDEXX-Direct® shipping box (product: 05-07973-04)
 - IDEXX specimen bag (product: 05-02496-00)
2. Pack the specimen(s) and test requisition form for RealPCR™ testing into the IDEXX specimen bag, and then place them in their own IDEXX-Direct shipping box. Place the box in the UPS shipping envelope and apply the UPS return label.
3. Call UPS at 1-800-742-5877 (1-800-PICK-UPS) to schedule a pick-up, or bring to your closest drop-off location. Provide them with the IDEXX UPS account number: 5846WR.
4. UPS delivers the box directly to the IDEXX RealPCR Laboratory.
5. The RealPCR tests are performed, and results are shared via vetconnectplus.com by the next day. (To set up your VetConnect® PLUS account, call **1-888-433-9987, option 5.**)

Key Benefits:

Reliable next-day results for specimens submitted Monday–Friday*

- + No additional cost.
- + Easy specimen shipping with UPS.
- + Ideal for critical cases, including suspected zoonotic infections.
- + Rules out or identifies multiple issues with a single specimen.

*Specimens submitted on weekends will have results delivered on Tuesday.

RealPCR™ FAQs

What is PCR?

Polymerase chain reaction (PCR) is a molecular technique that exponentially amplifies a specific region of DNA. The large number of copies of DNA produced permits detection of infectious agents in specimens.

What is an RealPCR™ test? How is it different from conventional PCR?

RealPCR tests are run by real-time PCR. Real-time PCR is faster and more sensitive and utilizes a closed-tube system that virtually eliminates contamination and false positives—a problem with conventional PCR. Real-time PCR also allows for testing for multiple pathogens on a single specimen and enables not only detection of pathogens but also quantification of the amount of genetic material in a specimen.

What additional steps are taken to prevent contamination and ensure accurate results?

IDEXX's molecular diagnostic laboratories are dedicated units separate from other testing areas. They offer maximum security through separation, air pressure differences and a QA/QC management system to control the PCR process, specimen integrity and facility safety.

When is PCR testing indicated?

PCR testing should typically be reserved as a diagnostic tool for sick animals to confirm or rule out the presence of infectious agents. PCR can detect the actual presence of the pathogen before antibody response occurs, making it extremely valuable for early detection.

What does a positive PCR result mean?

A positive PCR result indicates that the nucleic acid (DNA or RNA) of that organism was detected in the specimen submitted, indicating infection with the organism. A positive result should always be interpreted in light of the clinical signs of illness to determine clinical significance and whether treatment is indicated.

What does a negative PCR result mean?

A negative PCR result indicates that the nucleic acid (DNA or RNA) of that organism was not detected in the specimen submitted, which suggests that the animal's disease is not caused by the organism. However, a negative PCR result may be caused by the numbers of organisms being below the limit of detection of the PCR assay, decreased numbers of organisms following treatment or present in a chronic carrier state, or the occurrence of a new strain not detected by the PCR assay.

Does PCR differentiate between vaccination and infection?

For inactivated vaccines, PCR does differentiate between vaccination and infection. In general, PCR does not pick up the DNA component of inactivated vaccines administered systemically. For modified live vaccines, PCR may detect viral DNA/RNA for a few weeks after vaccination while the vaccine virus is replicating. Quantification of viral DNA/RNA in the specimen by real-time PCR may be used for some pathogens (e.g., distemper virus) to distinguish between vaccination and wild-type infection.

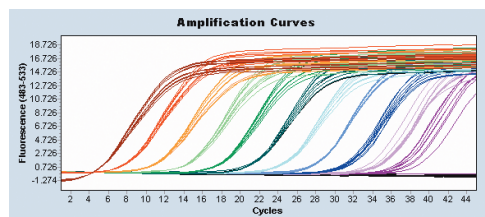
What are Quant RealPCR™ tests?

Quant RealPCR tests utilize the quantitative results that real-time PCR provides to give additional information to help interpret positive PCR results for certain pathogens. For example, the Canine Distemper Virus (CDV) Quant RealPCR™ Test can be used to determine if a positive PCR result is likely a result of recent vaccination or from wild-type infection. The *Clostridium perfringens* enterotoxin (CPE and CPA) Gene Quant RealPCR™ tests can be used to help decide whether the enterotoxins are likely contributing to diarrhea. The Feline Herpesvirus Type 1 (FHV-1) Quant RealPCR™ Test provides information about whether a positive herpesvirus result reflects active or latent infection. The *Leishmania* spp. Quant RealPCR™ Test on whole blood helps solve the dilemma of whether or not to treat by differentiating between *Leishmania*-infected but clinically healthy dogs with a low parasite burden and those dogs with active leishmaniosis and a high parasite burden. Quantitative testing for *Leishmania* on bone marrow is recommended to monitor treatment success. Additional Quant RealPCR tests are under development.

Should other diagnostic tests be performed in conjunction with PCR testing?

As with other diagnostic testing, PCR should not be used in isolation. The clinical signs of the patient and additional diagnostic testing should be considered when appropriate. In fact, several of our PCR panels include serology, for example, Tick RealPCR™ Panel with Lab 4Dx® Plus and Anemia RealPCR™ Panel with FeLV/FIV by ELISA. Other panels include reflex cultures if PCR results are positive.

More about PCR testing



Real-Time PCR

The real-time detection mode is made possible by using fluorescent tags built into the real-time PCR tests. Based on the real-time detection, quantitative information is readily available for downstream use. This feature has been used to develop quantitative PCR tests, which provide additional clinical information.



Automation

PCR is a process composed of two steps: DNA or RNA extraction followed by the real-time PCR reaction. High levels of automation during the nucleic acid extraction allows us to achieve high consistency and yields, minimizes errors and speeds up the process. Because of the highly automated first step in our process, diagnostic specimens are ready for PCR in less than 2 hours.



Highly affordable and fast real-time PCR testing

Our state-of-the-art real-time PCR equipment allows testing of large numbers of specimens within a very short time. Turnaround time of a PCR specimen (nucleic acid extraction and testing) once received at the PCR laboratory is less than 5 hours.

Images courtesy of Roche Molecular Systems, Inc.

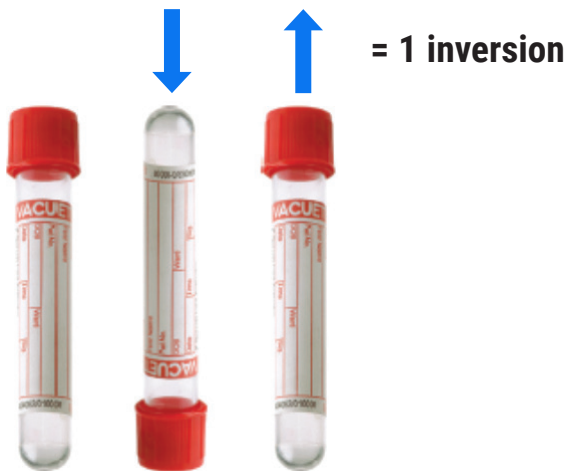
Specimen tube quick guide

Cap color	Tube type	Sample type	Number of inversions	Clot or not	Spin time	Spin speed
 Blue	Sodium citrate	Plasma	4	N/A	10 minutes	1,500 g
 Red	Clot activator	Serum	5-10	15-30 minutes	10-15 minutes	2,500 g
 Gold	Clot activator with gel	Serum	5-10	15-30 minutes	10-15 minutes	2,500 g
 Green	Lithium heparin	Plasma	5-10	N/A	15 minutes	1,500 g
 Lavender	K2 EDTA	Whole blood/ plasma	8-10	N/A	N/A	N/A
 White	No additive	Urine, transfer for separated serum or plasma	5-10	N/A	N/A	N/A

Recommended order of draw for multiple specimens

One complete inversion

- Turn the filled tube upside down and return it to an upright position.
- Repeat required number of times for each tube type.



Coagulation draw volume guide

Ensure the correct blood-to-additive ratio is met by checking the draw volume against the nominal fill mark on the tube or by holding the tube up to this guide.





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