

ZOETIS DIAGNOSTICS

vetscan Imagyst[®]
AI Urine Sediment

Hospital Resource Guide



LOOK DEEPER

zoetis

Welcome

to the Vetscan Imagyst® AI Urine Sediment Hospital Resource Guide.

This guide is designed to give you everything you need to get the most out of the Vetscan Imagyst AI Urine Sediment application. Throughout the chapters listed, you will find links to supplemental resources to help address questions.

We hope you find this guide useful. And as always, contact Diagnostic Technical Support for further assistance at:

(888) 963-8471 (option 5)

dxsupport@zoetis.com

Need guidance on a treatment plan?

Confirm results and a path forward for complex cases with remote specialist consultations at no additional cost for Zoetis Diagnostics customers.* Schedule at [ZoetisDx.com](https://zoetisdx.com).

* Requires the use of Vetscan® Fuse or Hub and at least one Zoetis Diagnostics analyzer or service.

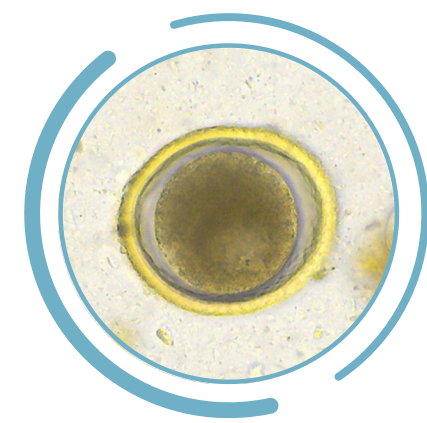
Contents



Vetscan Imagyst Overview

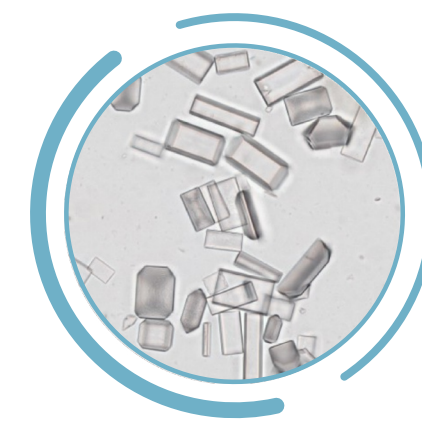
What Is Vetscan Imagyst?

The Vetscan Imagyst is an in-clinic analyzer powered by AI (artificial intelligence) that features multiple testing capabilities on a single platform. This multi-use diagnostic tool streamlines your point-of-care workflow with simple setup and comprehensive, repeatable diagnostic findings comparable to a clinical expert in just minutes.¹⁻⁵ With remote expert review available whenever clinically necessary, you can treat patients quickly and with confidence.*



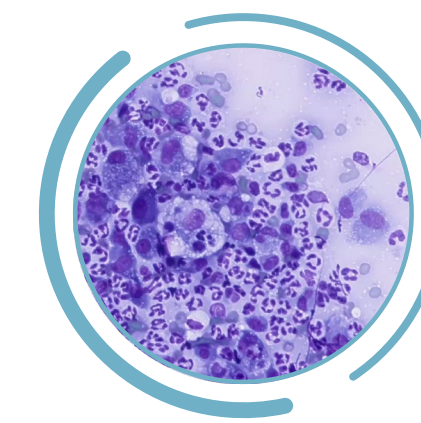
AI Fecal

- ✓ Detects common parasitic ova, cysts and oocysts
- ✓ Clean, efficient approach to fecal analysis



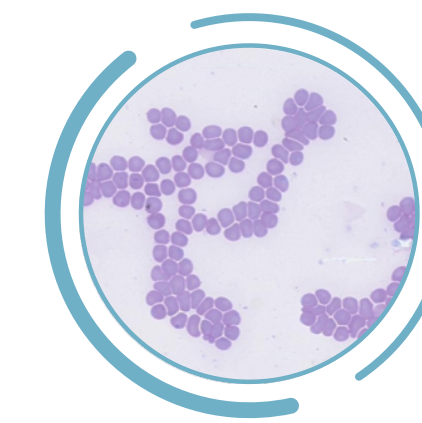
AI Urine Sediment

- ✓ Consistent, thorough urine sediment analysis with standardized sample processing
- ✓ Point-of-care testing reduces sample changes due to delayed testing



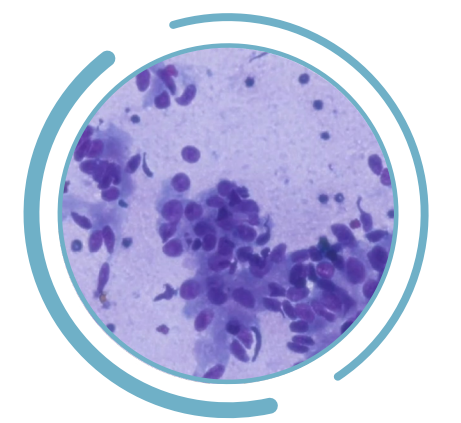
AI Dermatology

- ✓ Analyzes skin impression smears and skin and ear swabs to identify yeast, inflammatory cells and bacteria
- ✓ Differentiates between cocci and rod bacteria



AI Blood Smear

- ✓ Identifies hematologic abnormalities
- ✓ Supplements CBC results for a comprehensive hematology picture



Digital Cytology

- ✓ Digital 24/7/365 access to board-certified clinical pathologists
- ✓ Specialist insights in about two hours⁶

* Additional costs may apply.

1. Data on file, Study No. D870R-US-21-045, 2021, Zoetis Inc.

2. Nagamori Y, Sedlak RH, DeRosa A, et al. Evaluation of the VETSCAN IMAGYST: an in-clinic canine and feline fecal parasite detection system integrated with a deep learning algorithm. *Parasit Vectors*. 2020;13(1):346. doi:10.1186/s13071-020-04215-x.

3. Nagamori Y, Scimeca R, Hall-Sedlak R, et al. Multicenter evaluation of the Vetscan Imagyst system using Ocus 40 and EasyScan One scanners to detect gastrointestinal parasites in feces of dogs and cats. *Journal of Veterinary Diagnostic Investigation*. 2023;0(0). doi:10.1177/10406387231216185

4. Data on file, Study No. DHXMZ-US-23-218, Zoetis Inc.

5. Data on file, Study No. DHX6Z-US-23-222, 2023, Zoetis Inc.

6. Data on file, Study No. TI-10365, 2023, Zoetis Inc.



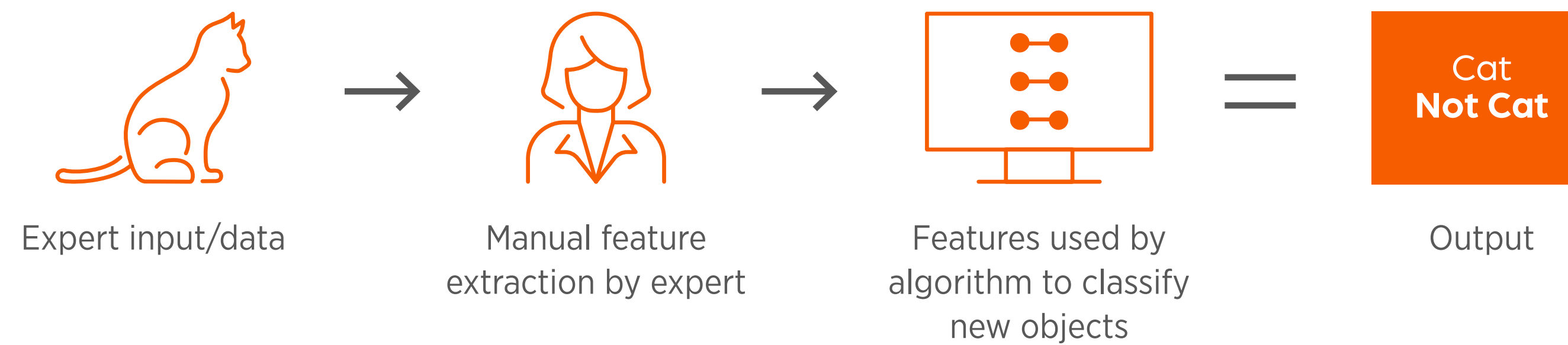
Vetscan Imagyst Overview

AI-Powered Image Recognition: How It Works

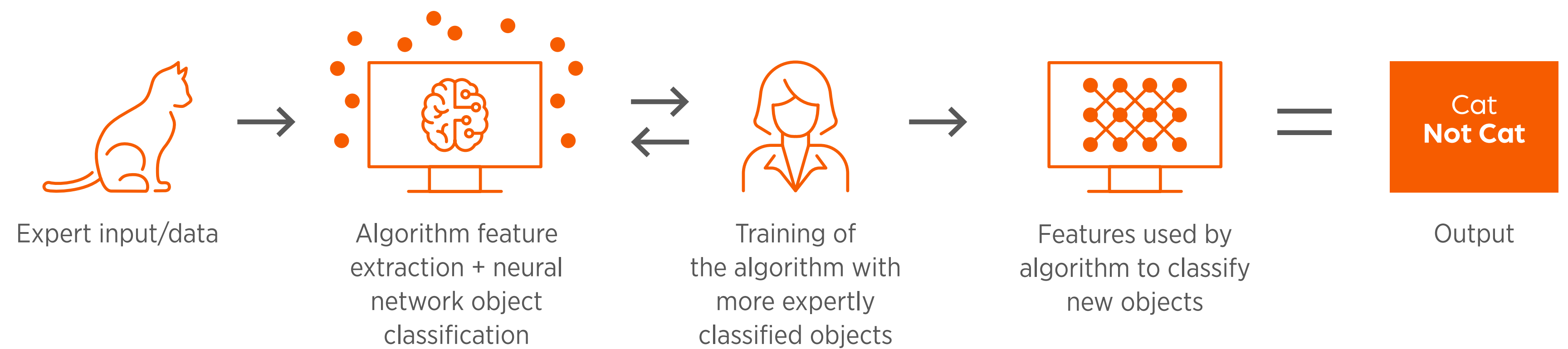
The Vetscan Imagyst leverages deep-learning AI to extract thousands of features that may otherwise be missed with superficial-learning AI algorithms, as seen in Figure 1.1.

Figure 1.1 Types of Image Analysis AI Algorithms

Superficial Learning



Deep Learning



The deep learning system utilized for the Vetscan Imagyst is a convolutional deep neural network, which uses many narrow filters to extract a large quantity of features from a selected sample image. Those features are then applied to the deep learning neural network to enhance accuracy and automate sample analysis to reduce hands-on staff time.

For additional information on AI-Powered Image Recognition, please refer to the Vetscan Imagyst AI Urine Sediment Analysis Whitepaper.



Vetscan Imagyst Overview

Why AI Urine Sediment?

Part of the innovative, multi-application Vetscan Imagyst platform from Zoetis, AI Urine Sediment analysis offers consistent, accurate results within minutes¹ for fast treatment decisions that help improve patient outcomes. With simple instrument setup, easy slide preparation, and accuracy¹ powered by AI, the Vetscan Imagyst AI Urine Sediment analysis overcomes challenges of traditional manual sediment evaluation to optimize point-of-care urinalysis.



Accurate,¹ in-clinic analysis for fast treatment decisions

- ✓ Analysis of fresh urine offers the most diagnostic value²
- ✓ Supported by expert clinical pathologist review* and consultation when needed
- ✓ Evaluates ~1000 fields of view for critical urine sediment elements



Simple operation ensures accuracy¹ and consistency

- ✓ Fast to set up and easy to use, reducing the time needed to get results
- ✓ Easy, in-clinic preparation of urine samples and slides
- ✓ Helps to standardize results regardless of who runs the sample



Innovative AI analysis offers a valuable customer experience

- ✓ Provides a wide range of high-value diagnostics within your clinic
- ✓ Reduces the need for follow-up calls and appointments
- ✓ Helpful information in easy-to-share visual reports

* Additional costs may apply.

1. Data on file, Study No. DHXMZ-US-23-218

2. Skeldon, N, et al, BSAVA Manual of Canine and Feline Clinical Pathology, 3rd Edition. Quedgeley, England: British small Animal Veterinary Association; 2016. p184.



Vetscan Imagyst Overview

The Zoetis Virtual Laboratory

Bringing Specialist Level Medicine to Your Clinic

The Zoetis Virtual Laboratory offers deeper insights through its unique portfolio of interconnected diagnostic products and services to bring specialist-level medicine to your clinic. Central to the Virtual Laboratory offering, Vetscan Imagyst connects innovative, in-clinic AI diagnostic testing with real human clinical pathology expertise, empowering confident treatment decisions and elevating patient care. Refer to Section 6 for a detailed look at the Virtual Laboratory platform.

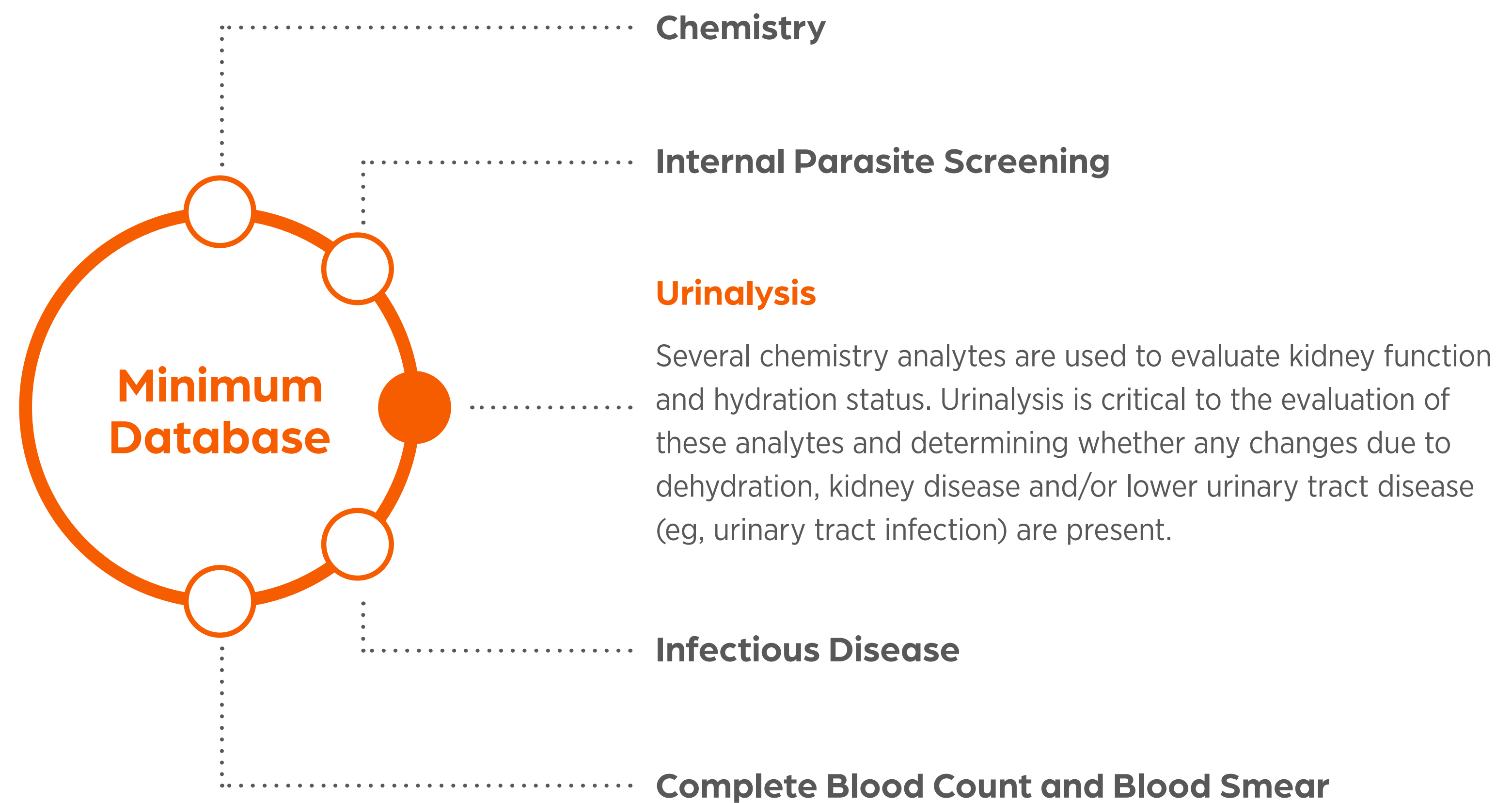


The Complete Urinalysis

Introduction to Urinalysis

Urinalysis is an essential component of the diagnostic evaluation of sick patients, and the results should be interpreted along with the results of a blood chemistry panel. Ideally, urine should be collected at the same time blood is collected for hematology and clinical chemistry, as part of the diagnostic minimum database.

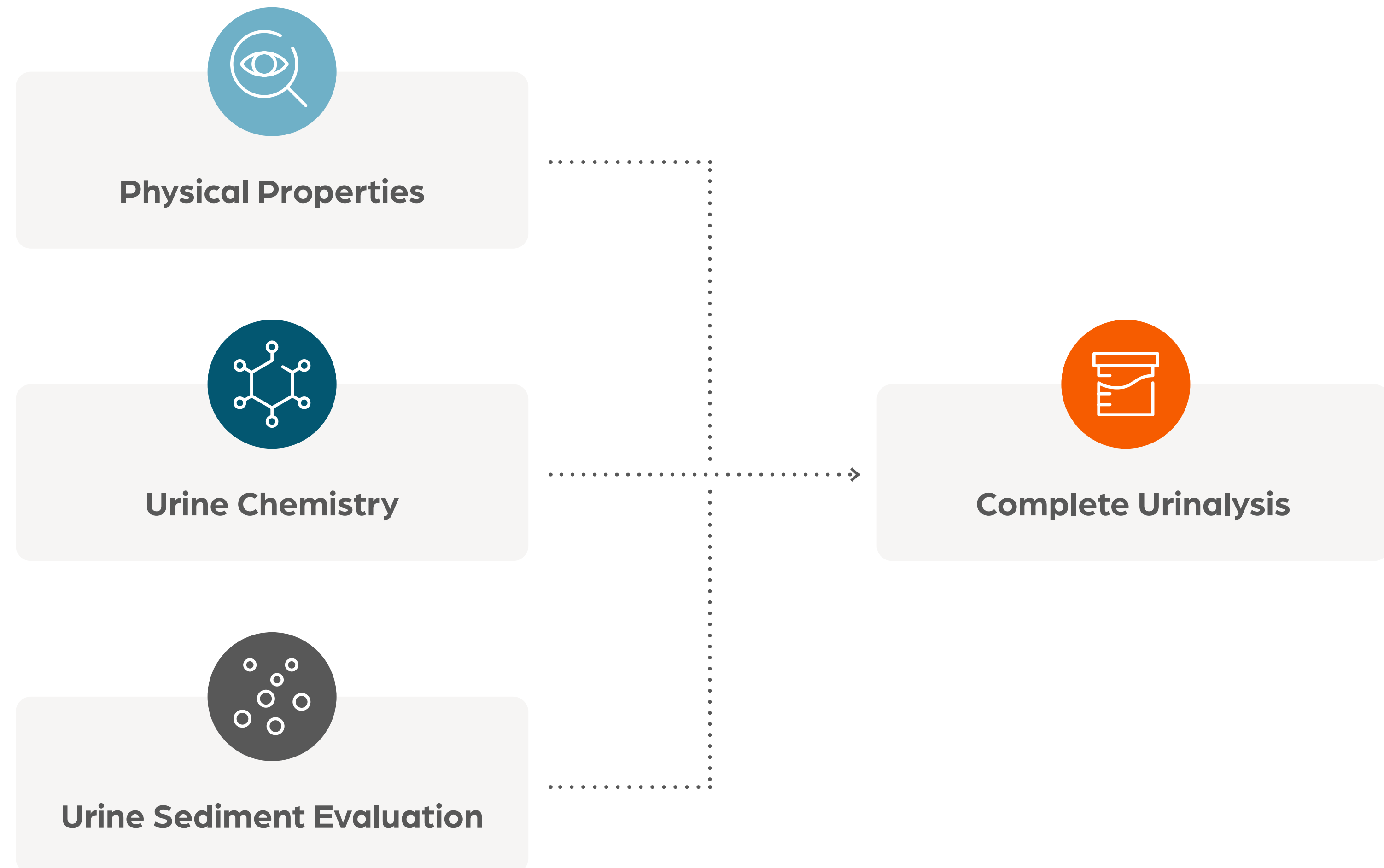
Figure 2.1 Diagnostic Minimum Database



The Complete Urinalysis

A complete urinalysis combines evaluation of physical and chemical properties with microscopic evaluation of urine sediment (Figure 2.2). Urine specific gravity (USG), urine color, odor and clarity comprise the physical properties. Urine Chemistry is read via multi-test dipstrips.^{1,2}

Figure 2.2 Three Broad Categories of Investigation Make up a Complete Urinalysis



1. Barsanti, Jeanne A. Small Animal Clinical Diagnosis by Laboratory Methods, 5th edition, Elsevier 2012: Chapter 7: Urinary Disorders. p131-143, 152.

2. Skeldon, N., and Ristić, J. (2016). BSAVA Manual of Canine and Feline Clinical Pathology (Vol. Third edition). Quedgeley, Gloucester: BSAVA. p183-205.



The Complete Urinalysis

When to Do a Urinalysis



The American Animal Hospital Association (AAHA) has published guidelines surrounding the need for regular diagnostic health screenings. Urinalysis is part of these recommendations. Table 2.1 highlights the recommended frequency of a minimum database, including urinalysis, based on life stage.^{1,2}

Table 2.1 AAHA Diagnostic Testing Recommendations for CBC/CHEM/UA Based on Life Stage

Test Type	Young Adult	Mature Adult	Senior
Complete Blood Count	Consider for Initial Baseline	Annually (Canine), every 1-2 Years (Feline)	Every 6–12 mos
Chemistry Panel	Consider for Initial Baseline	Annually (Canine), every 1-2 Years (Feline)	Every 6–12 mos
Complete Urinalysis	Consider for Initial Baseline	Annually (Canine), every 1-2 Years (Feline)	Every 6–12 mos

In addition to routine diagnostic health screenings, a urinalysis should be performed in, but not limited to, the clinical scenarios seen in Figure 2.3 below.³

Figure 2.3 Clinical Indications for a Complete Urinalysis

-  Clinical signs of lower urinary tract disease
-  Evaluation of animals with suspected infectious disease
-  Changes in character of urine
-  In animals with fever
-  Known, previous or suspected renal disease or urolithiasis
-  To evaluate renal function in dehydrated animals prior to institution of fluid therapy
-  Evaluation of animals with non-renal systemic disease, e.g. Hepatic Disease
-  As a screening tool for geriatric animals and pre-anesthesia

1. <https://www.aaha.org/aaha-guidelines/life-stage-canine-2019/diagnostic-testing-for-each-life-stage/> Accessed 07/19/23
 2. <https://www.aaha.org/aaha-guidelines/life-stage-feline-2021/diagnostic-testing-for-each-life-stage/> Accessed 07/19/23
 3. Chew, Dennis and DiBartola, Stephen. Interpretation of Canine and Feline Urinalysis. Nestle Purina, Wilmington, DE. 2004: p.1-31.






The Complete Urinalysis

Urine Sample Collection

Collection methods influence what is considered “normal” in urine sediment results. It is important to record the collection method so the clinician can properly interpret results and then steer subsequent diagnostic and treatment decisions. Table 2.2 summarizes the pros and cons of the three urine collection methods.

Table 2.2 Urine Collection Methods: Benefits and Risks¹

Collection Method	 Voided Sample	 Catheterization	 Cystocentesis
Benefits	<ul style="list-style-type: none"> - Generally low stress - Avoids trauma to urinary tract - Useful for initial routine evaluation of suspected urinary disorders and screening 	<ul style="list-style-type: none"> - May avoid contamination from distal urogenital tract 	<ul style="list-style-type: none"> - Avoid contamination - Best for culture - May be better tolerated and easier than catheterization especially cats
Risks	<ul style="list-style-type: none"> - Contamination from distal urinary tract with bacteria, cells, etc. 	<ul style="list-style-type: none"> - Stress due to restraint and catheterization - Skill required - Potential trauma to tissues - Potential infection due to poor technique 	<ul style="list-style-type: none"> - Potential tissue trauma - Stress due to restraint - Skill required

During sample collection, be mindful of the following:

- 1-3 mls of urine is typically required to perform a urinalysis. Collect a sufficient amount to complete the test
- Dilution may be necessary if the sample is hematuric, or red before centrifugation and clear after centrifugation. Refer to Section 4 for additional information on sample dilution

1. Chew, Dennis and DiBartola, Stephen. Interpretation of Canine and Feline Urinalysis. Nestle Purina, Wilmington, DE. 2004: p.1-31.

The Complete Urinalysis

Urine Sample Handling

Refer to the AI Urine Sediment Quick Start Guide (Figure 2.13) for an overview of the complete urine sediment analysis process with Vetscan Imagyst, from sample preparation to reviewing results.

Sample Storage and Preservation

After urine collection, place the sample in a clear, clean and sterile container. A clear container is necessary to enable evaluation of physical properties.¹ Do not reuse containers, even if washed.² Fresh, room temperature, well-mixed samples are ideal. It is recommended that processing and examination of urine are completed within 15-30 minutes of collection. Delays in the time of analysis can result in artifactual changes in the patient's urine, as seen in Figure 2.4.

Figure 2.4 Consequences of Urine Sample Processing Delays



If the analysis cannot be performed within 15-30 minutes of sample collection, the urine sample should be stored at refrigerated temperature to minimize changes in urine physical and chemical makeup, inhibit bacterial growth and maximize cell preservation. If possible, experts recommend performing the urinalysis within 4 hours of refrigeration.^{2,3}

After refrigeration, it is extremely important to bring the sample back to room temperature prior to analysis, since refrigeration can cause in vitro formation of crystals, which may inaccurately indicate the presence or extent of crystalluria in vivo.⁴ If crystalluria is a clinical concern, freshly collected urine should be examined immediately.⁵

Because urinalysis results may be affected by storage duration and temperature, the time the urine was collected, the time it arrived in the clinic/laboratory, the time it was processed, and method and length of storage should be recorded.

1. Sink CA and Feldman BF. Specimen Collection and Dipstick Analysis In: Laboratory Urinalysis and Hematology for the Small Animal Practitioner. Jackson, WY: Teton NewMedia. 2004.
2. Chew, Dennis and DiBartola, Stephen. Interpretation of Canine and Feline Urinalysis. Nestle Purina, Wilmington, DE. 2004: p.1-31.
3. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: p.162-217.
4. Albasan H, Lulich JP, Osborne CA, Lekcharoensuk C, Ulrich LK, Carpenter KA. Effects of storage time and temperature on pH, specific gravity, and crystal formation in urine samples from dogs and cats. J Am Vet Med Assoc. 2003 Jan 15;222(2):176-179.
5. Sturgess, CP, Hesford A, Owen H and Privett R. An investigation into the effects of storage on the diagnosis of crystalluria in cats. J Fel Med Surg 2001;3:81-85.

The Complete Urinalysis

Sample Centrifugation

Centrifugation is recommended to concentrate samples and potentially avoid missing the rarer elements in the sample. There are two centrifuge requirements for the Vetscan Imagyst AI Urine Sediment Analysis: 1.) variable speed compatibility and 2.) tube compatibility.

1. Variable Speed Compatibility:

450-500 RCF or ~1500-2300 RPM speed x 2 minutes for urine.¹

- To reduce the need for additional centrifuges, we recommend a single centrifuge that supports blood (1000 RCF or ~3000-3600 RPM) and Vetscan Imagyst AI urine and fecal (450-500 RCF or ~1500-2300 RPM).
- The centrifugation can be performed using either a swinging bucket or fixed angle centrifuge, as long as the tube fits. The speed of the centrifuge must be increased slowly, centrifuge smoothly, and be allowed to come to a complete stop following centrifugation.¹

2. Preparation Tube Compatibility:

Must be able to hold the XactUrine® Sample Tube (Figure 2.5).

- The tube must fit in the chamber so that the centrifuge lid can close completely for centrifugation. When removed from the buckets, the Vetscan Imagyst tubes must be able to be pulled out in the same upright position.

Figure 2.5 XactUrine Sample Tube Specifications



Calculating Centrifuge Radius and RPM to RCF

The centrifuge radius for the Vetscan Imagyst is the distance from the center of rotation to the outside tip of the XactUrine Sample Tube. If swing-arm style rotors are used, this must be measured with the rotor swung out, as it would be during centrifugation.

To calculate the Revolutions Per Minute (RPM) to Relative Centrifugal Field (RCF) conversion, use the following equation*:

$$\text{RCF} = 1.12 \times \text{Radius} \times (\text{RPM}/1000)^2$$

* RPM: The speed of rotation in a centrifuge is expressed as revolutions per minute. RCF: Relative centrifugal force is the force acting on samples during centrifugation. It is expressed as multiples of the earth's gravitational field (g).

1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023. pg 165.



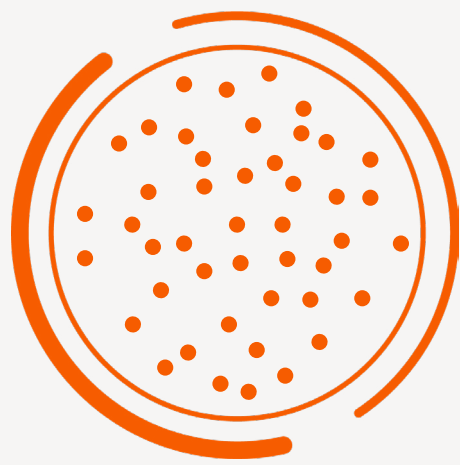


The Complete Urinalysis

Consistency in Urine Sediment Analysis

If a sample urine volume is used that is different from the volume used to determine reference intervals, as is sometimes seen in traditional manual sediment analysis, the suggested reference intervals may no longer be appropriate. As outlined in Table 2.3, the concentration of increasing volumes of urine may lead to increasing numbers of formed elements per HPF. In these cases, the deviation from the standardized quantity should be noted on the final report.

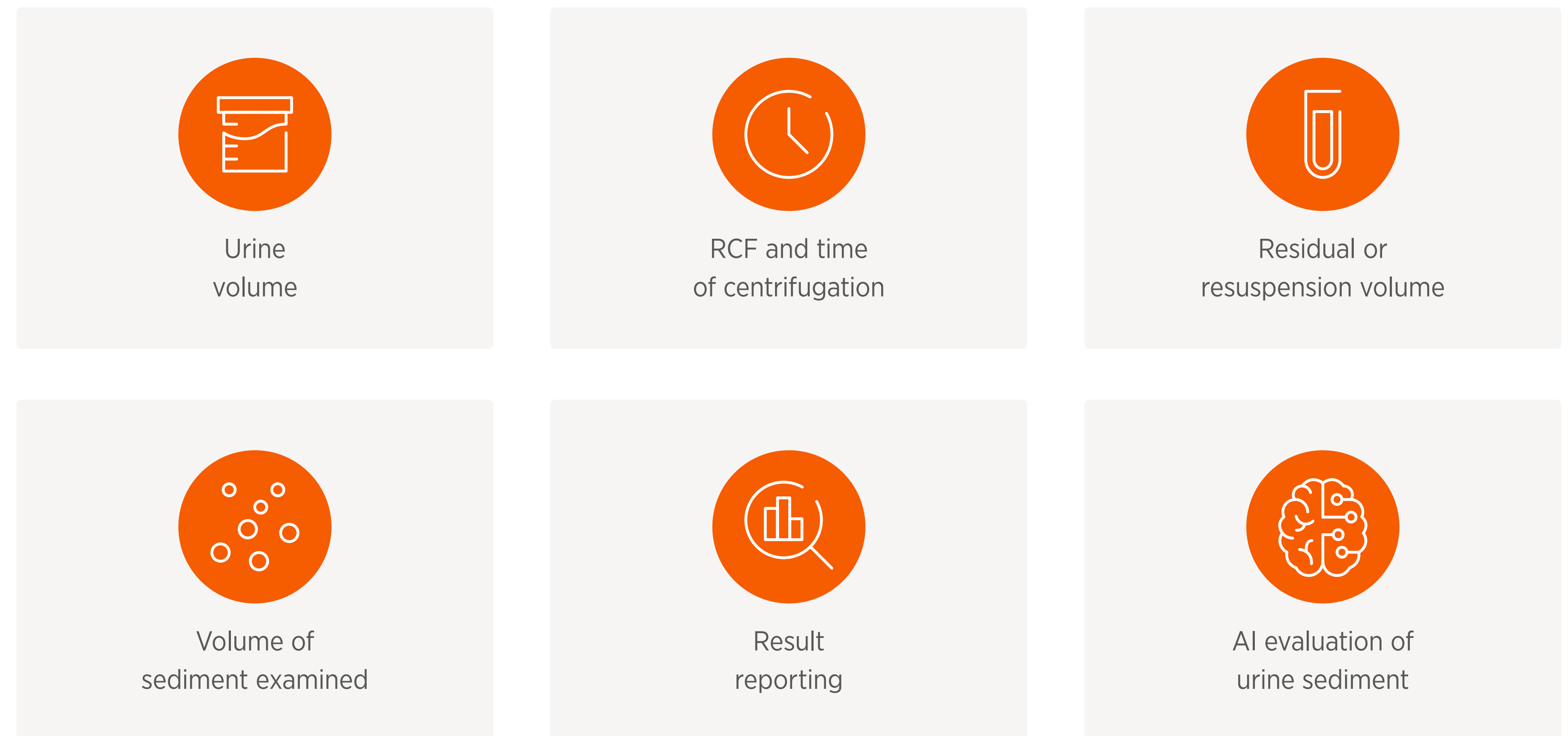
Table 2.3 Urine Sediment Formed Element Quantification

			
Starting Urine Volume	1.0 mL	2.0 mLs	3.0 mLs
Resuspension Volume	0.35 mL	0.35 mL	0.35 mL
WBC/HPF	15	30	45
Semi-Quantitative Bucket	6 – 20 WBC/HPF	21 – 50 WBC/HPF	21 – 50 WBC/HPF

The Complete Urinalysis

A high coefficient of variation can exist in manual urine sediment analysis due to a large number of pre-analytical and analytical factors in sample handling and microscopic evaluation.¹ With the Vetscan Imagyst AI Urine Sediment sample preparation method and AI algorithm, consistency of results can be achieved by any hospital team member. With the Vetscan Imagyst process, numerous sources of potential variability have been standardized, including the starting volume, residual volume, volume of sample placed on the slide, centrifugation time and RCF (Figure 2.6). Moreover, the AI algorithm provides consistent and accurate results² at all times of the day, eliminating the variation between microscopic readers.

Figure 2.6 Standardization of the Urinalysis by Vetscan Imagyst AI Urine Sediment



1. Kouri T, Gyory A, Rowan RM. ISLH Recommended Reference Procedure for the Enumeration of Particles in Urine. Laboratory Hematology 2003; 9:58-63.

2. Data on file, Study No. DHXMZ-US-23-218, Zoetis, Inc.

The Complete Urinalysis

Physical Properties of Urine

Physical properties evaluated in a urinalysis include color, clarity, odor and urine specific gravity (Figure 2.7). A clear collection container enables evaluation of color and clarity (Figure 2.8). Refractometry is the easiest and most reliable way to obtain a urine specific gravity.¹

Figure 2.7 Physical Properties Evaluated in a Urinalysis

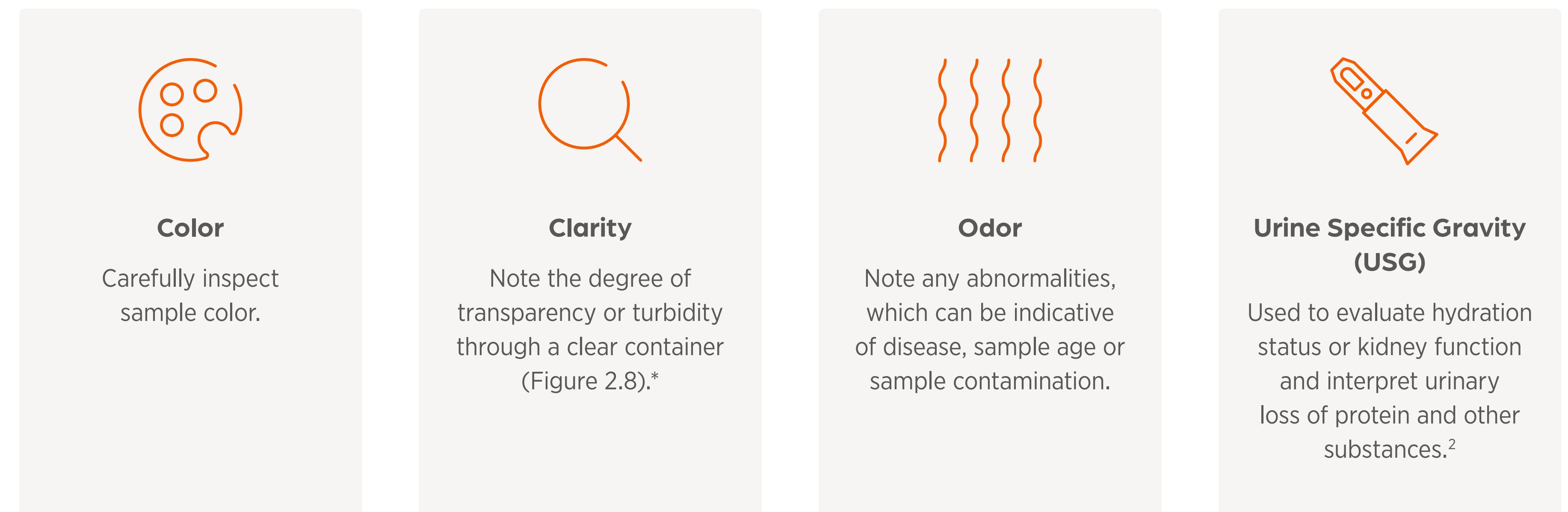
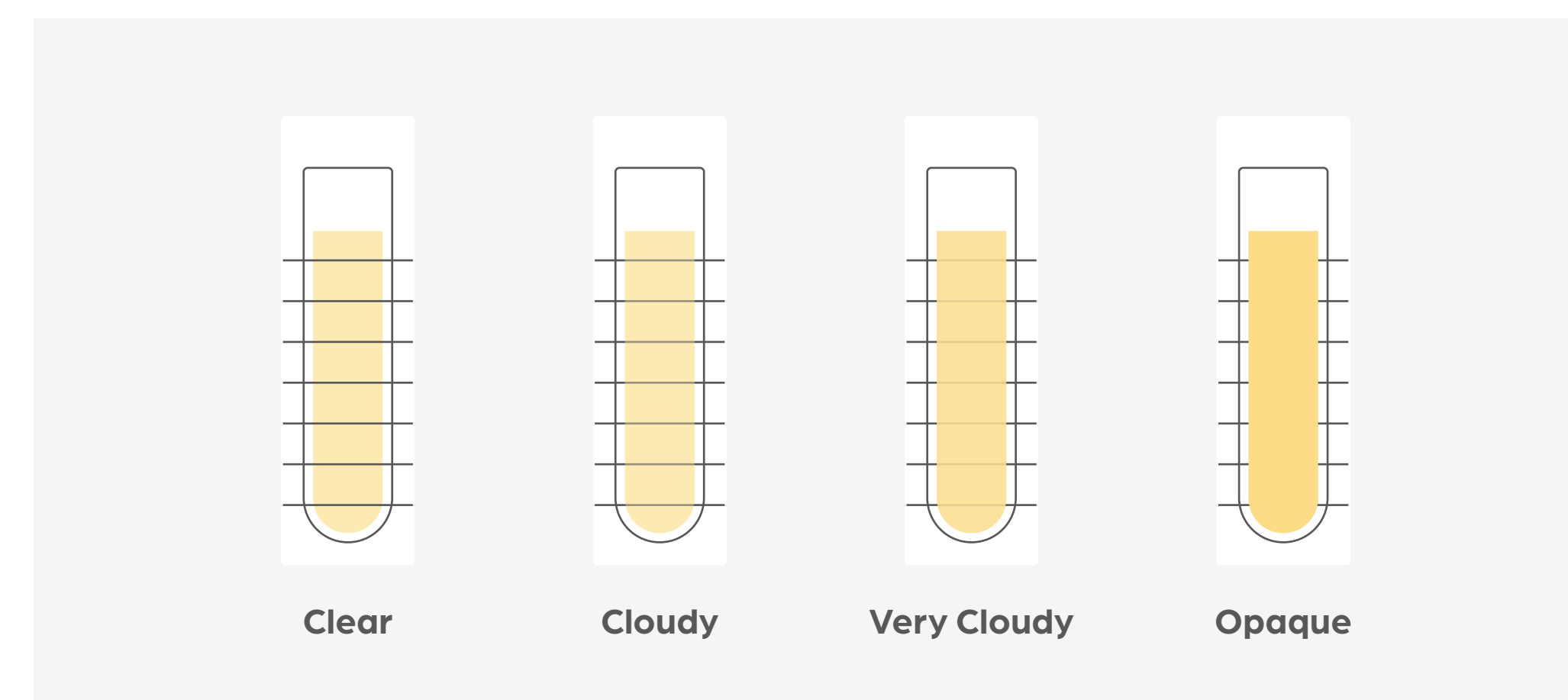


Figure 2.8 Degree of Clarity of a Urine Sample



* If turbid urine is collected, Urine Sediment Analysis is recommended. Note that urine can become cloudy over time.

1. Chew, Dennis and DiBartola, Stephen. Interpretation of Canine and Feline Urinalysis. Nestle Purina, Wilmington, DE. 2004: p.1-31.

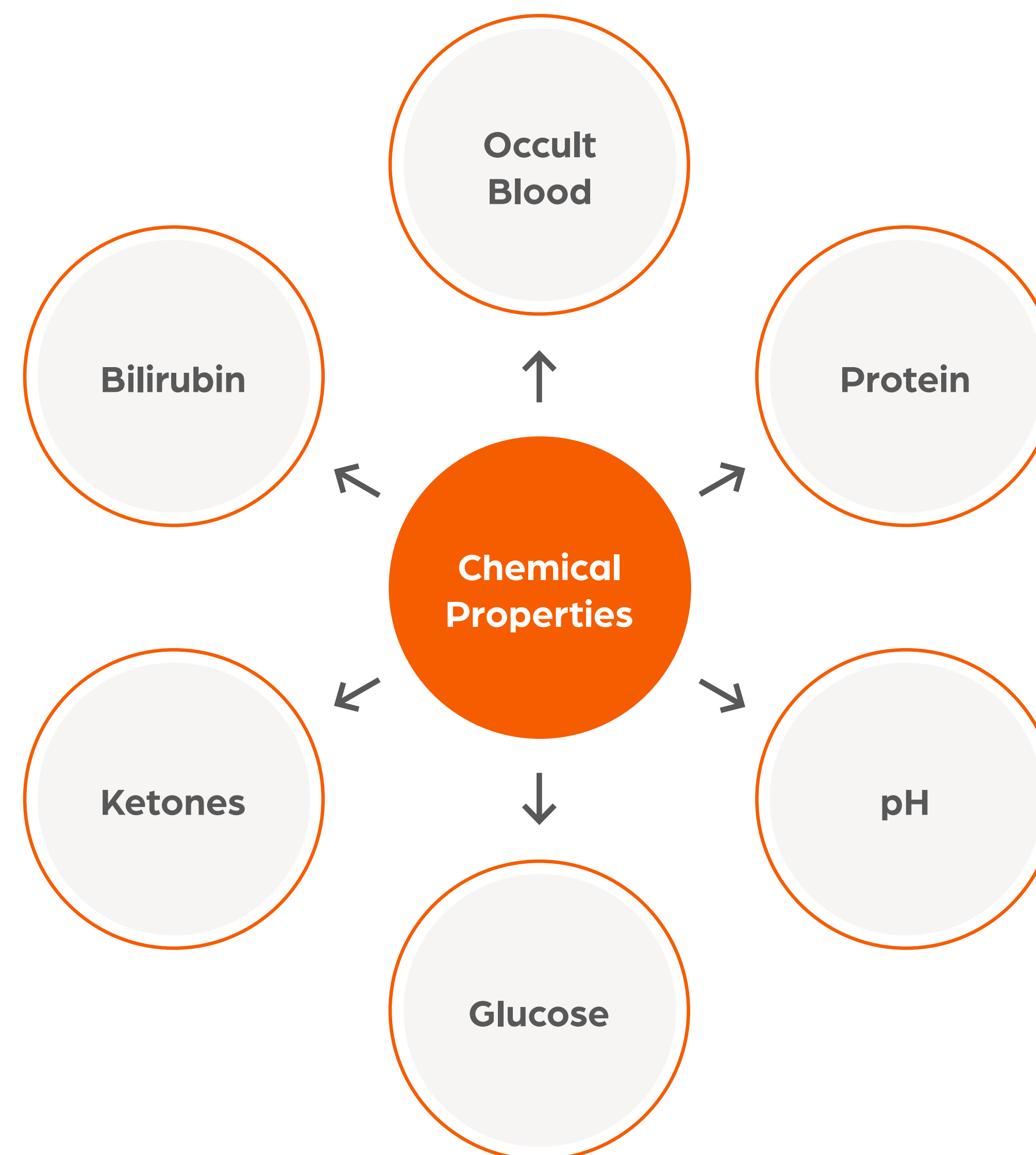
2. Sink CA and Weinstein NM. Routine Urinalysis: Physical Properties In: Practical Veterinary Urinalysis. Ames, IA: John Wiley & Sons Inc. 2012. pgs. 19-28.

The Complete Urinalysis

Chemical Properties of Urine

A variety of common chemical properties, outlined in Figure 2.9, can be reliably assessed in a canine or feline urine sample.¹

Figure 2.9 Common Urine Chemical Analytes Evaluated in a Urinalysis¹



1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023. pg 125.

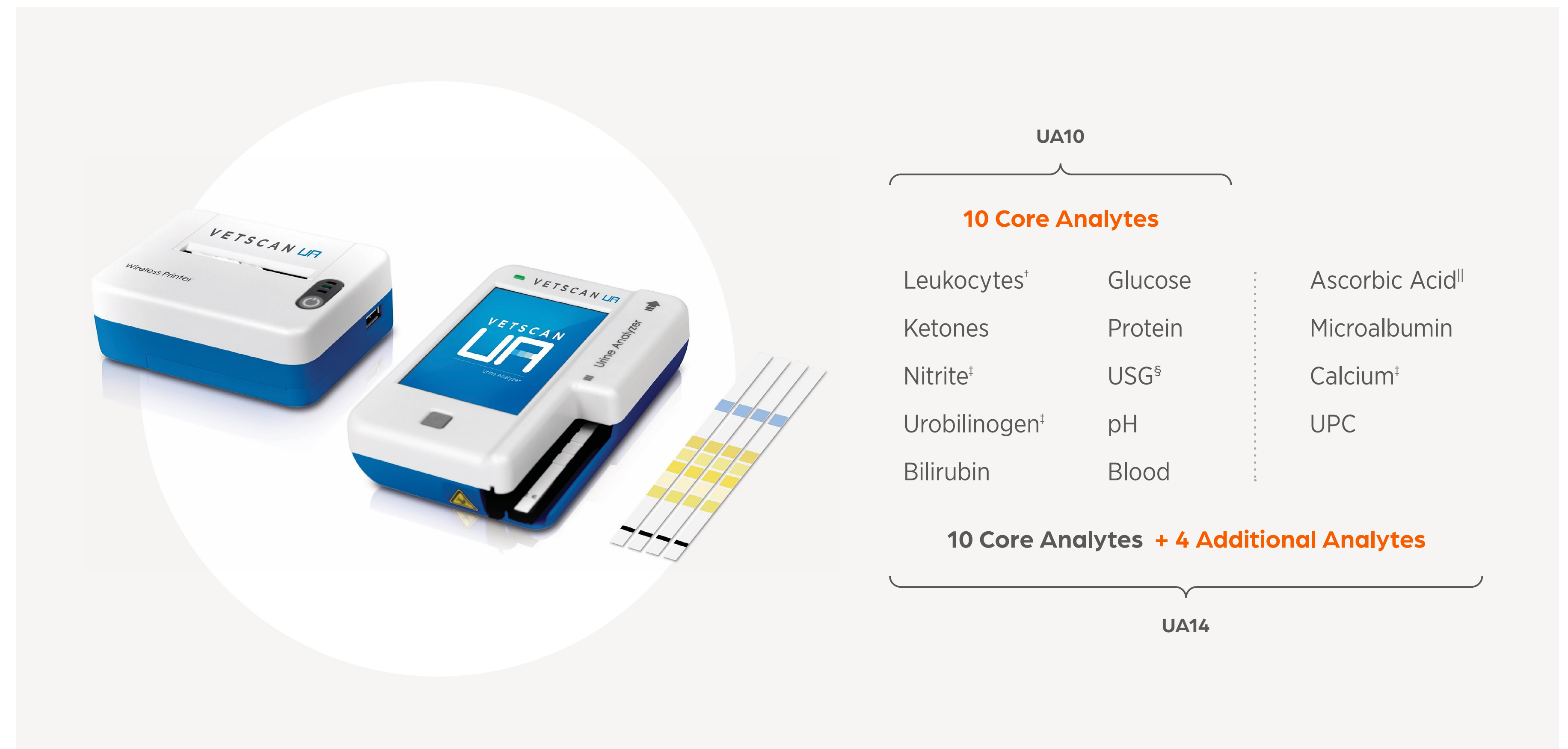


The Complete Urinalysis

Zoetis Vetscan UA® Urine Analyzer

The Vetscan UA is an easy-to-use urine chemistry analyzer that automates urine chemistry test strip reading, providing reliable veterinary urine chemistries that include results for urine protein:creatinine (UPC) ratio and microalbumin (MA).* It includes options for either 10 or 14 analytes (Figure 2.10) and, when combined with Vetscan Imagyst AI Urine Sediment, provides a complete solution that enables comprehensive point-of-care urinalysis.¹

Figure 2.10 The Vetscan UA



* UA14 strips only.

[†] Microscopic analysis recommended.

[‡] Clinical diagnostic significance undetermined in veterinary medicine.

[§] Refractometer analysis recommended.

^{||} Assay for quality control purposes only.

¹. Data on file, Vetscan UA Urine Analyzer User Manual. pg 8. 1550-7005 Rev B, Zoetis Inc.



The Complete Urinalysis

Microalbumin Screening

The MA test screens for the presence of urine albumin not detected by the standard urine protein strip pad, typically <20-30 mg/L. With repeated use, this test can detect increases in MA, which may indicate early kidney disease. Three MA elevations (>25mg/L) at two weeks apart suggests renal proteinuria, and persistent MA with normal sediment exam and no other disease is considered significant.¹ Clinical indications for MA screening are outlined in Figure 2.11 below.¹

Figure 2.11 Clinical Indications for MA Screening (Not Exhaustive)



Urine Protein:Creatinine Screening

The UPC test is necessary to confirm and/or stage proteinuria after ruling out pre- and post-renal causes. The value is standardized by using creatinine as part of the calculation.

- A UPC is indicated if the patient's urine is positive for protein in conjunction with an inactive sediment.
- Substage reference ranges include non-proteinuric, borderline proteinuric and proteinuric (Figure 2.12).

Figure 2.12 Sub-Staging Tool in the International Renal Interest Society (IRIS) Protocol for Chronic Kidney Disease²

UPC Value		Substage
Dogs	Cats	
<0.2	<0.2	Non-proteinuric
0.2 to 0.5	0.2 to 0.4	Borderline proteinuric
>0.5	>0.4	Proteinuric

1. Lees GE, Brown SA, Elliott J, Grauer GE, Vaden SL. Assessment and management of proteinuria in dogs and cats: 2004 ACVIM Forum Consensus Statement (small animal). J Vet Intern Med 2005;19:377-385

2. <http://www.iris-kidney.com/guidelines/staging.html>. Accessed 7/19/2023.

The Complete Urinalysis

AI Urine Sediment Quick Start Guide

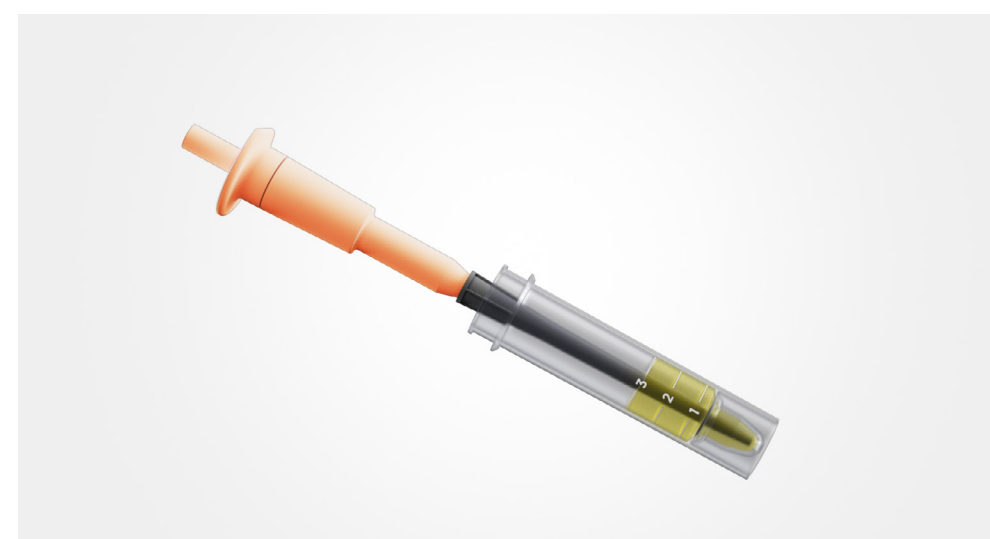
Vetscan Imagyst offers reliable urine sediment analysis in minutes at the point of care with Add-On Expert Review* available anytime, from anywhere. Review the Quick Start Guide below (Figure 2.13) for an overview of the complete urine sediment analysis process, or refer to Section 3 for detailed step-by-step instructions.

Figure 2.13 Vetscan Imagyst AI Urine Sediment Quick Start Guide



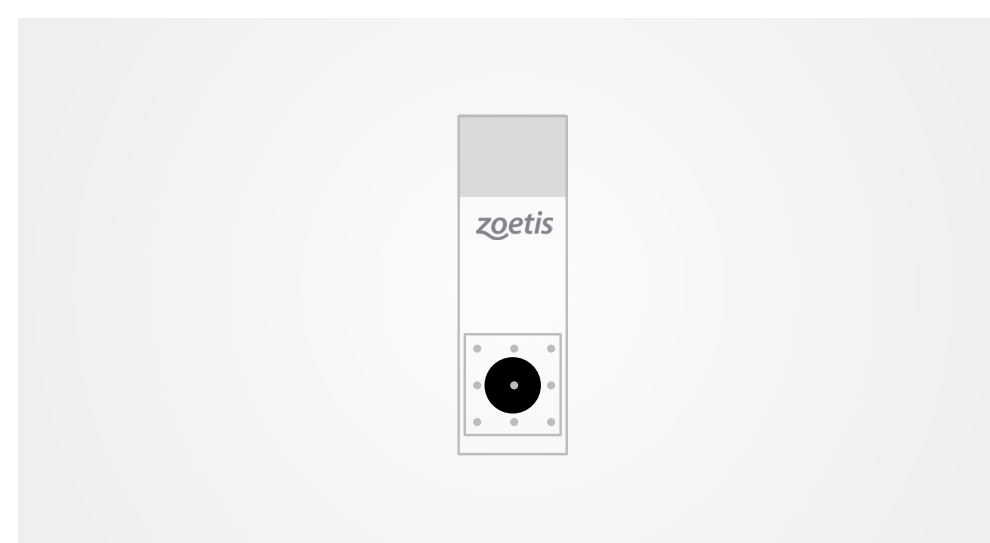
Centrifuge the Sample

1. Determine if dilution may be necessary[†]
2. Mix the sample well
3. Transfer 1, 2, or 3mLs to the centrifugation tube
4. Centrifuge with a corresponding tube for balance for 2 minutes at 450–500RCF
5. Allow to come to a complete stop



Prepare Sample

1. Attach the XactUrine[®] pipette tip to the micropipette
2. Place the pipette with tip attached in the tube
3. Tilt the tube to pour off the supernatant until no liquid is visualized above the stopper
4. Return the tube to vertical
5. Press the plunger 5 times, or until the pellet is resuspended



Prepare Slide

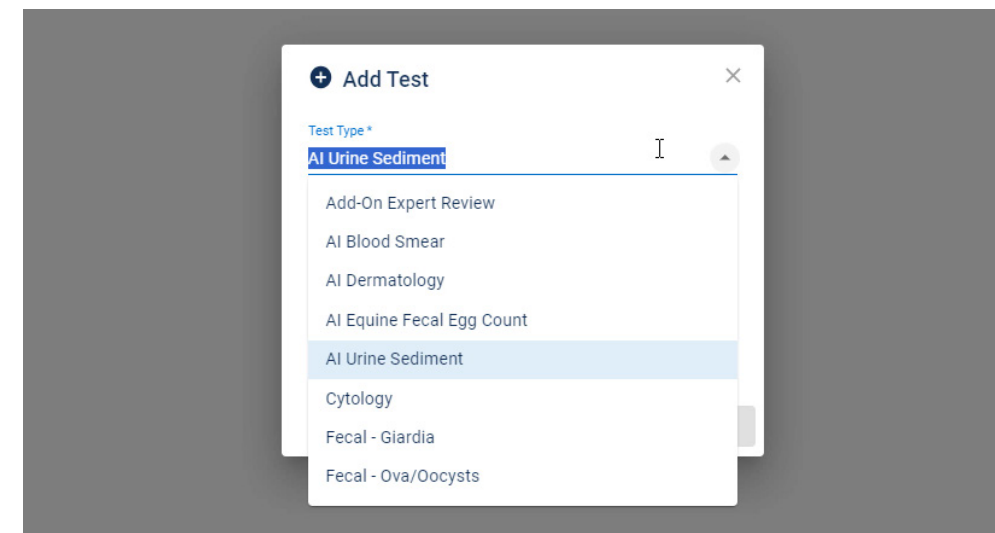
1. Place a pre-printed slide on the template
2. Orient the fiducial circle toward the bottom of template
3. Label the slide with patient information on the frosted edge
4. Once pellet is resuspended, place 20µl in the fiducial circle
5. Cover with a 22x22 mm coverslip

* Additional costs may apply.

[†] Refer to Dilution Guide.

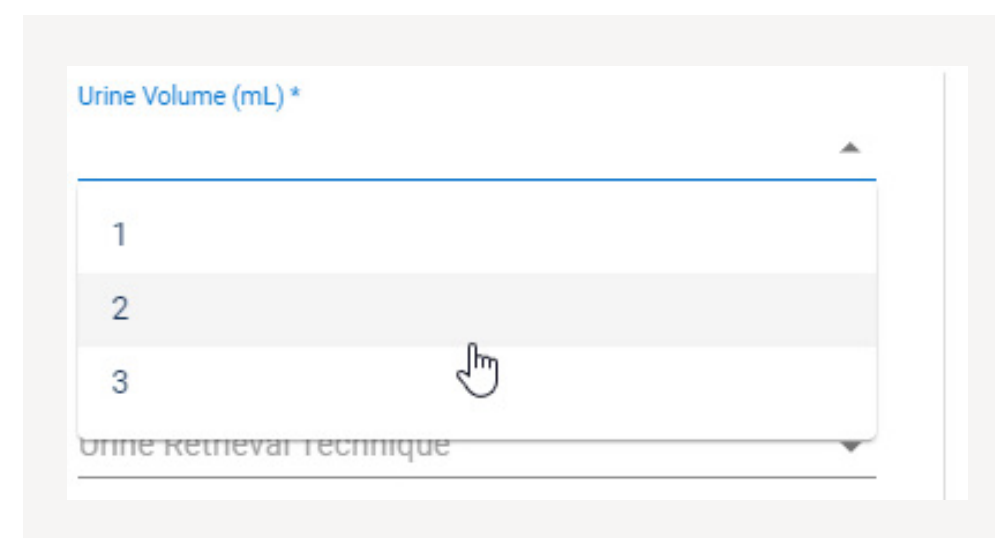
The Complete Urinalysis

Figure 2.13 Vetscan Imagyst AI Urine Sediment Quick Start Guide (Cont'd)



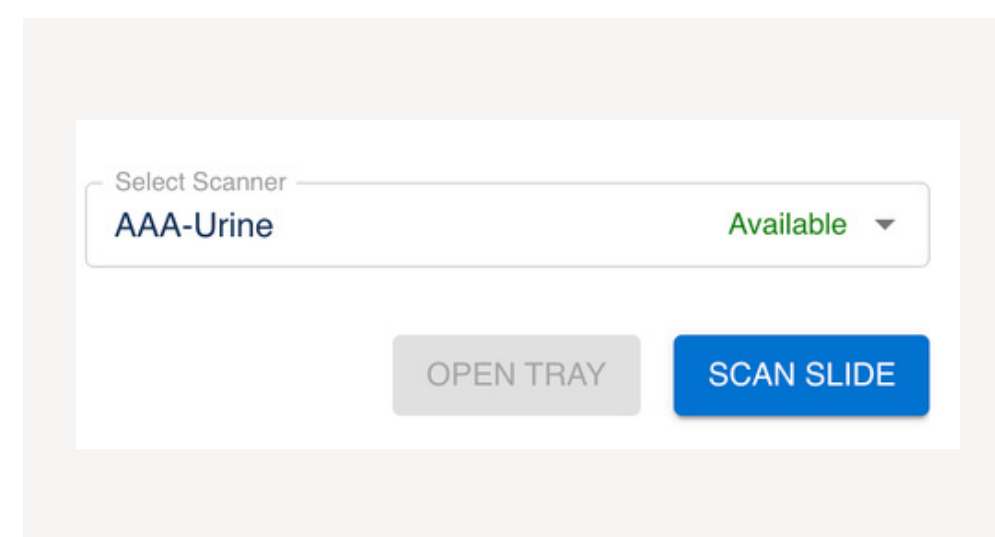
Add Test

1. Log in to Vetscan Imagyst
2. Choose the correct test and select SCAN. Sample information will come prepopulated from any Fuse- or Hub-connected software system
3. If no practice management integration is available, select Add Test (+)



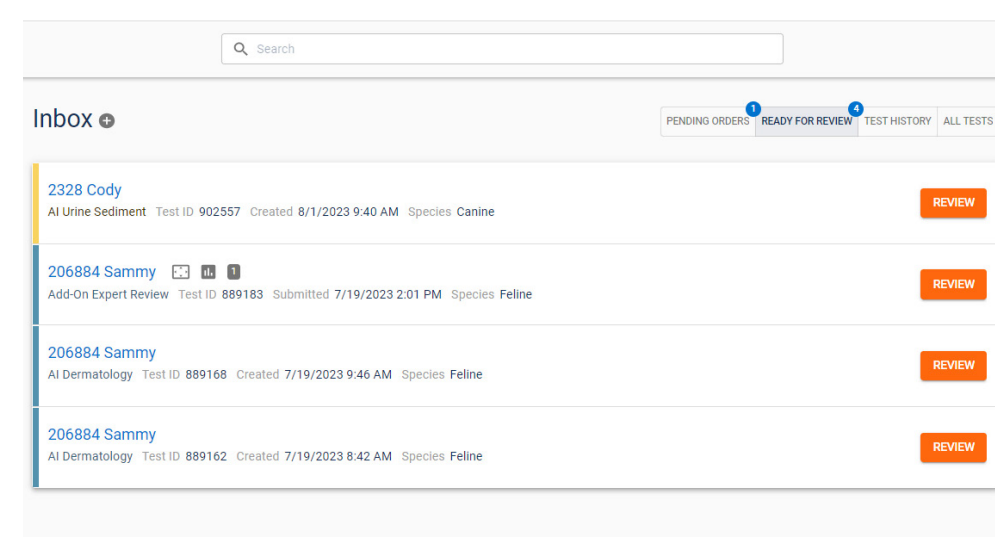
Complete Sample Information

1. Choose the volume used
2. Enter the dilution factor, if applicable
3. Enter any additional information, including sample color & clarity



Scan Slide

1. Unlock the slide holder
2. Place the slide in the tray with the label toward the right
3. Close the locking mechanism
4. Select SCAN SLIDE

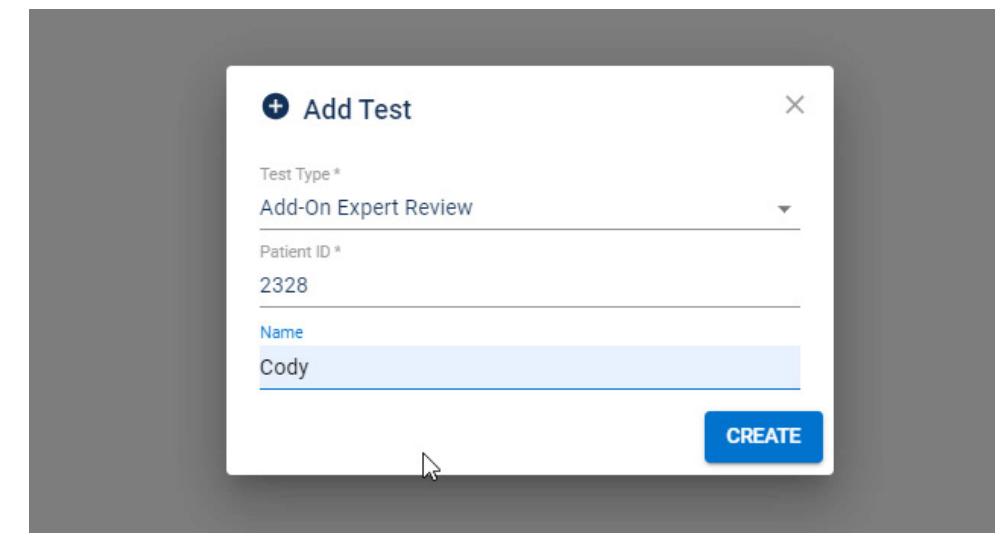


Review Results

1. Select REVIEW
2. Review any captured images
3. Manually select additional images for inclusion in the report, if needed
4. For a closer look, select VIEW SLIDE
5. FINALIZE the report to move it to TEST HISTORY
6. Select SHARE or download a printable PDF

The Complete Urinalysis

Figure 2.13 Vetscan Imagyst AI Urine Sediment Quick Start Guide (Cont'd)



Add-On Expert Review* (Optional)

1. Select Add Test (+)
2. Choose the sample
3. Attach history documents (.pdf) or photos (.jpeg)
4. Add a stained urine sediment smear or line prep slide
5. Select CLOSE, then SUBMIT ORDER
6. Find the desired tests and select REVIEW

Refer to Pages 25-26 for an in-depth overview of the Add-On Expert Review process.

Create Stained Slide

1. Mix the remaining urine sediment well
2. Use one drop to create smear or line-prep
3. Allow to air-dry
4. Stain the slide using a Romanowsky-type stain (e.g. Diff-Quik®)
5. Allow to air-dry
6. Add one drop of immersion oil
7. Place a 24x60mm coverslip used for the Digital Cytology application

* Additional costs may apply.

The Complete Urinalysis

The Do's and Don'ts of Sample Preparation

Figure 2.14 Urine Sample Dos and Don'ts

Do

- ✓ Mix sample well prior to placing an aliquot into urine centrifugation tube
- ✓ Ensure only one pre-printed slide is used and the fiducial circle is face up
- ✓ Ensure only one coverslip is placed on sample
- ✓ Ensure sample placed to the user's left on scanner stage with frosted edge to the user's right
- ✓ Follow maintenance guide for regular cleaning

Don't

- ✗ Do not utilize more than 20 μ L of sample-increased volume can spill over the sides of the slide onto scanner stage
- ✗ Do not allow air bubbles to group around the center fiducial. This can lead to the scanner having difficulty focusing on the sample
- ✗ Do not attempt to scan a urine sample with residual immersion oil on the lens from a prior scan

Using the Vetscan Imagyst for AI Urine Sediment

How to Run an AI Urine Sediment Analysis

You will need:



Laptop, tablet, or mobile device



Vetscan Imagyst analyzer



Vetscan Imagyst
Urine Sediment Sample Kit

Step 1

Complete the patient history

1. Open your PIMS and locate the record for the patient, noting the patient ID.
2. On your Vetscan Imagyst, select **Scan** for the correct sample.
 - Sample information will come pre-populated from any FUSE-connected software system.
 - If your system is not connected to FUSE or you do not have a system, order the test directly on the Vetscan Imagyst platform. Simply select the **Add Test** icon, enter the required information and select create.
 - Choose the volume used and, if applicable, the dilution factor.
 - If you have additional information, enter it at this step as well. The more information you include, the more will populate on your report and enable further diagnostic testing decisions.
 - Prepare the sample as described in the AI Urine Sediment Quick Start Guide on Page 19.



Using the Vetscan Imagyst for AI Urine Sediment

Step 2

Scan the prepared slide

1. Make sure your scanner is connected to the network and has been powered on. Then, select a scanner.
2. If the tray is open, place the slide on it. If it is closed, return to Vetscan Imagyst and click the **Open Tray** button, then place the slide on it.
3. With the tray locking mechanism open, place the slide with the label toward the right of the tray and make sure it is facing upward. Close the locking mechanism.
4. Return to Vetscan Imagyst and click the **Scan Slide** Button.
5. Click **Close**. Your test order has now been submitted.

If an error in scanning is occurring, verify that:

- The slide is facing the right direction and is aligned properly
- The slide is not upside down
- Only one cover slip has been used

Step 3

Check the test status

While Vetscan Imagyst is processing the results, the test will be listed on the **Pending Orders** tab of your inbox. When the AI results are available, the test will move from the **Pending Order** tab to the **Ready for Review** tab, and the result will be displayed.



Using the Vetscan Imagyst for AI Urine Sediment

Step 4

Review the test results

1. Find your specific test order and click the **Review** button to open the report.
 - Vetscan Imagyst will automatically select the four best images from each object class. You can also manually select additional pictures for inclusion in the PDF report.
2. To have a closer look at the slide, click **View Slide**.
 - If you think the results may not be accurate, flag them by selecting the option at the bottom of the screen. A flagged result alerts us to look at the image for future improvements.* You can also unflag the results once you have flagged them.
3. Finalize the report.
 - This moves it from the **Ready to Review** tab to the **Test History** tab of your inbox. It also transfers the report to Vetscan Fuse or Hub, where it can be seen with other diagnostic results. From the Vetscan Fuse or Hub, the report will be added directly to the patient record via your PIMS. This completes the test order.
4. Click the **Share** button to share the report within Vetscan Imagyst or download a printable PDF.

Step 5

Initiate an Add-On Expert Review (optional)[†]

Initiate the test within your Vetscan Fuse or Hub-connected system, then go to the Vetscan Imagyst Inbox and select **Start** for the correct sample.

If your system is not connected to Vetscan Fuse or Hub or you do not have a system, create the test within Vetscan Imagyst using the **Add Test** icon.

1. Enter the Patient ID and name. Select **Add-On Expert Review** and click **Create**.
2. The most recent results from that patient will be automatically selected. Verify the selection and click **Select Test**.

* If technical support is needed, contact (888) 963-8471 (option 5) or dxsupport@zoetis.com for assistance.

[†] Additional costs may apply.



Using the Vetscan Imagyst for AI Urine Sediment

Step 6

Add a stained slide

It is strongly recommended that you include an additional stained urine sediment slide for analysis. While a review of the wet mount may be preferred for questions surrounding crystals or casts, a stained, air-dried slide is essential for review of bacteria and cellular morphology. You can add one additional scan to supplement the initial AI scan.

For instructions on how to create and attach a stained slide, watch the Sample Prep Video or refer to Page 21 for written instructions.

Step 7

Add patient information and additional files

1. Enter information for the patient's breed, age and gender; the patient's species is already set. Include a succinct clinical history summary.
2. Click on the prepopulated sample card to add any additional information not entered in the original test, such as the USG.
3. Attach additional jpg or PDF files that the pathologist might find useful. We strongly recommend attaching all available reports for the patient, including the CBC, blood chemistry and urinalysis.

Step 8

Submit and review your order

1. After attaching the files, click **Close**, then click **Submit Order**.
 - Your test order has now been submitted and will show in the **Pending Order** tab while it is out for review.
2. Once the pathologist finishes their review, the report will be available in the **Ready for Review** section of your inbox.
3. After you review the report, click **Finalize** to move it to the **Test History** tab, and release it to the Vetscan Fuse or Hub and your PIMS. You will also have access to a shareable PDF.

Dilution Guide

What is Dilution?

Dilution is the action of making the urine sample more dilute in order to evaluate a less concentrated urine sediment sample (Figure 4.1). This process facilitates element identification as it ensures formed elements are adequately spaced with no overlap.

When and Why to Dilute?

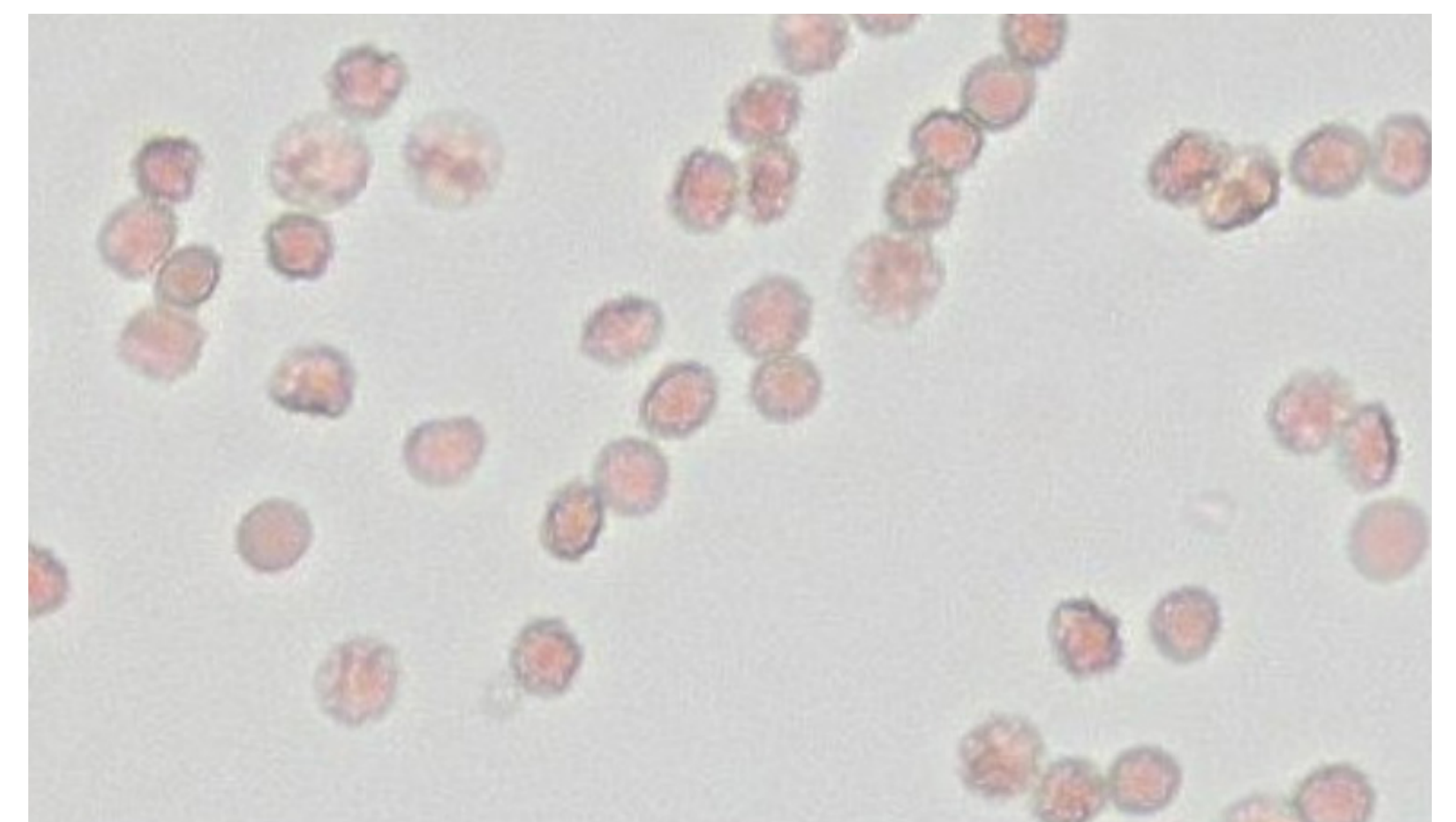
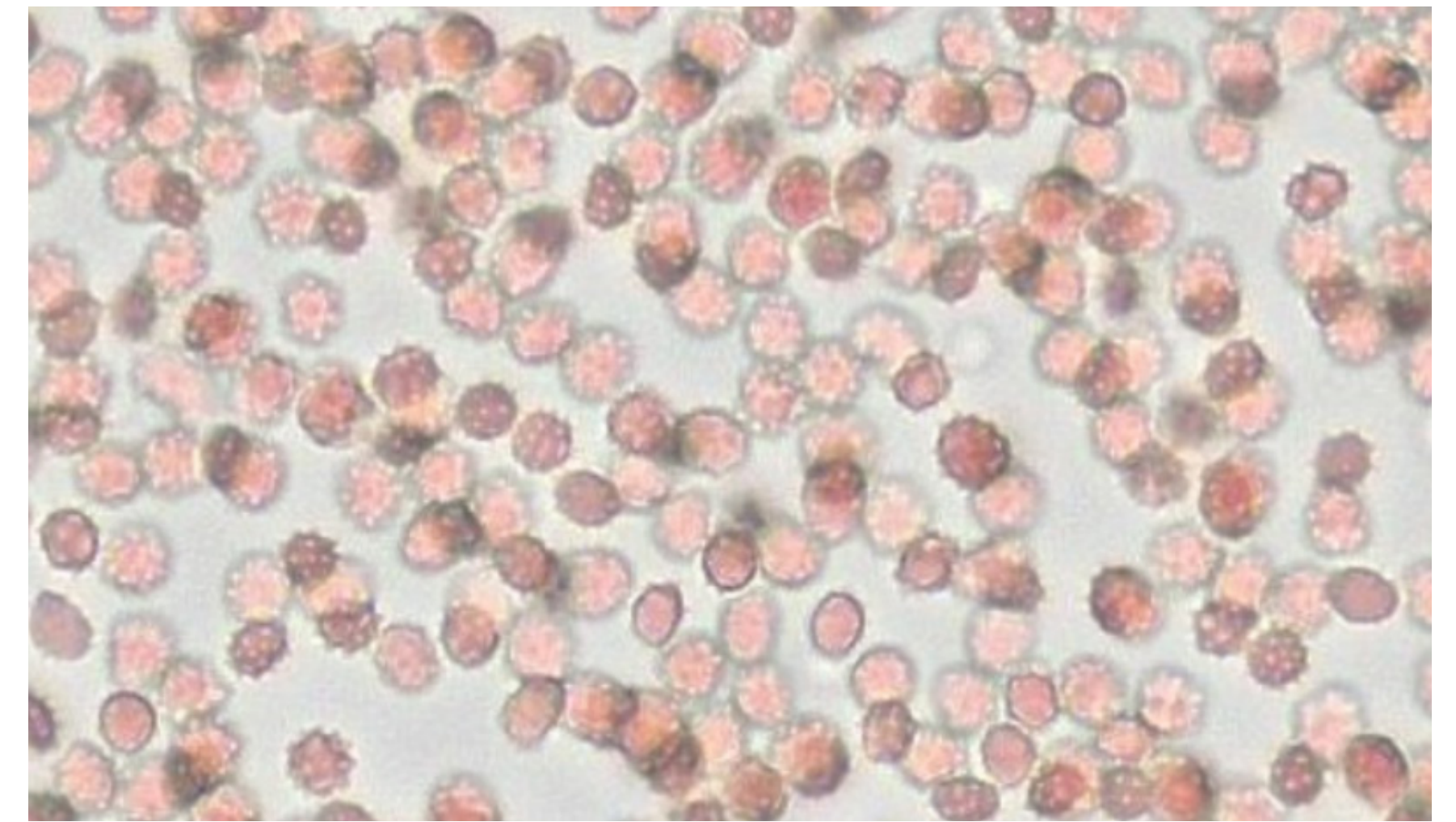
It is important to evaluate the color and clarity of the urine sample to determine if dilution is necessary (See Table 4.2).

Be sure you're using a clear specimen container to evaluate urine color and clarity.

Several factors can create abnormal urine color, such as metabolic or pathological conditions, muscle damage, or drug intake. Turbidity can occur due to crystals, cells, mucus, fat, bacteria, casts, and potentially spermatozoa in the urine.

A urine sediment evaluation is essential to determine which formed elements are contributing to the color and clarity of the urine sample.

Figure 4.1 Pre- and Post-Dilution (1:8) of a Hematuric Sample (40x)

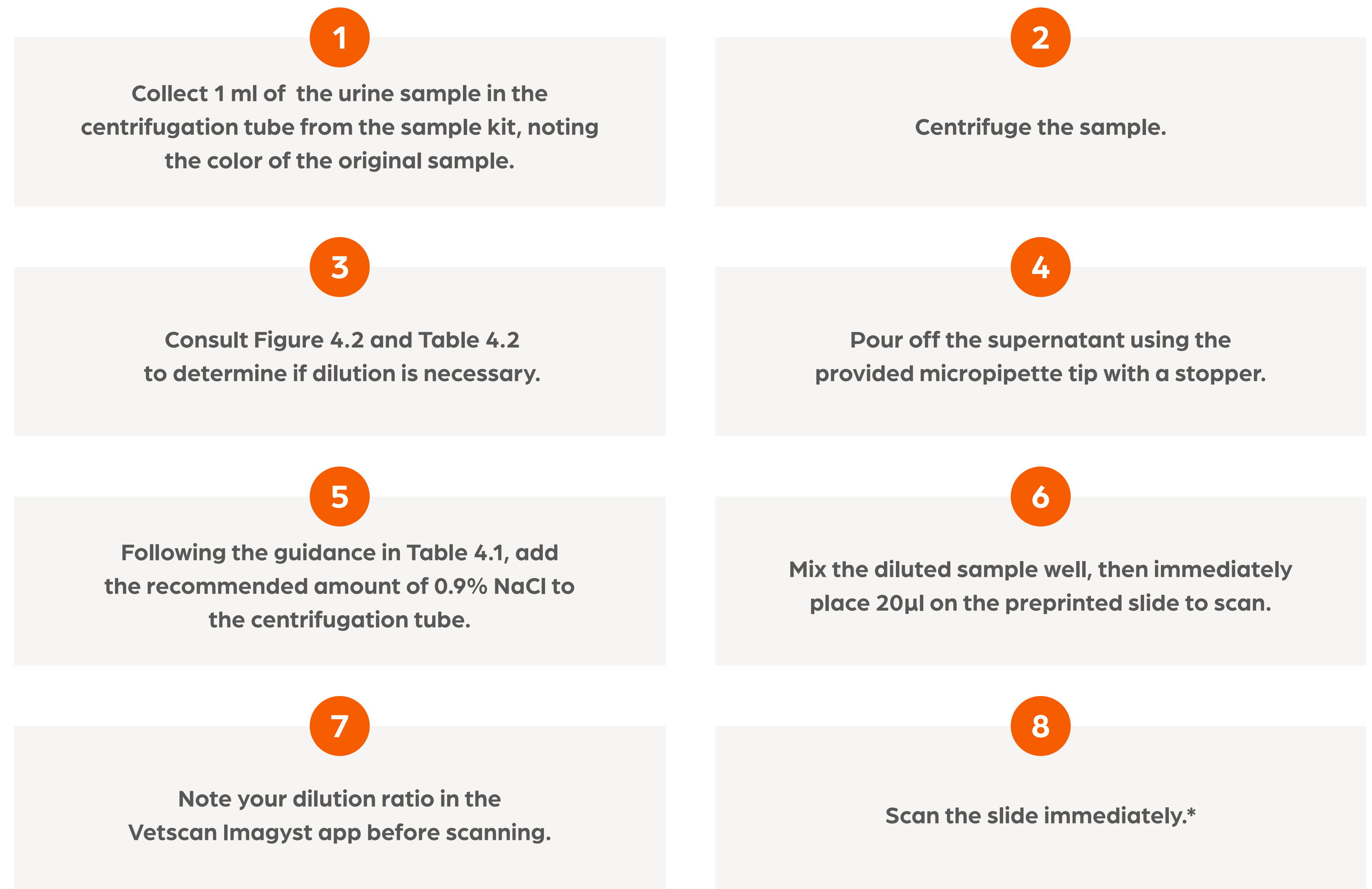


Dilution Guide

8 Steps to Dilution

If dilution of the sample is needed, Figure 4.3 provides a step-by-step guide to the process.

Figure 4.3 8 Steps to Dilution Using the Vetscan Imagyst



* Evaluating the sample immediately after dilution is vital as dilution can alter pH and osmolality, which can change cellular appearance or lead to non-pathologic crystal formation.



Dilution Guide

As Figure 4.3 on the previous page outlines, centrifuge the sample and then drain the supernatant. Choose an appropriate dilution ratio based on color (Figure 4.2). Then, add the appropriate amount of sterile saline to reach the new desired concentration (Table 4.1). Finally, gently re-suspend the pellet in the supernatant/saline mixture, place 20µl of the well-mixed sample on the slide, and scan immediately (Figure 4.4).

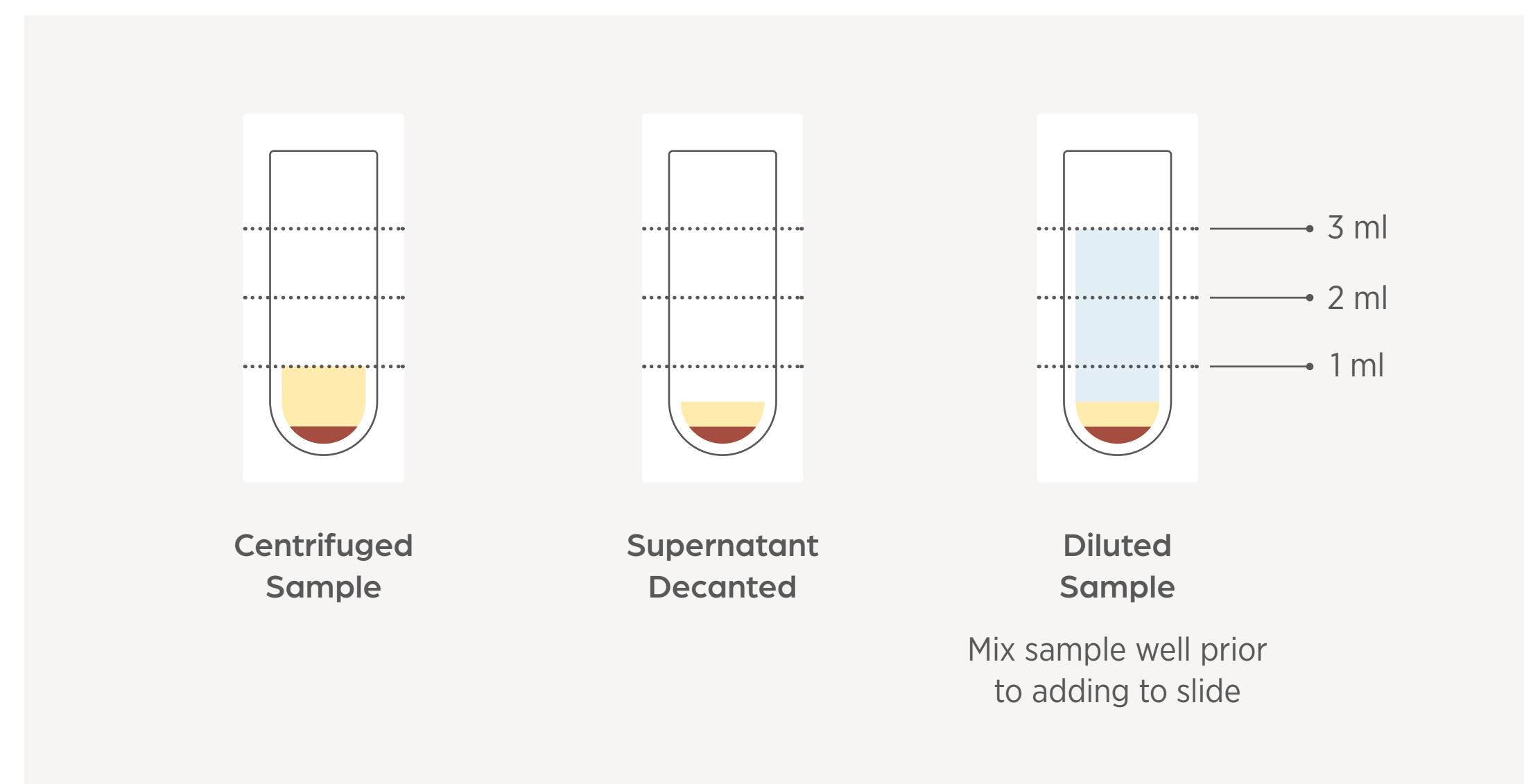
Table 4.1 Dilution Preparation

Add sterile saline (0.9% NaCl) to residual/concentrated urine to reach the desired dilution ratio.

Dilution Ratio (Approximate)	Residual Concentrated Urine Volume*	Sterile Saline Volume (0.9% NaCl)*	Corresponding fill line on sample preparation tube
1:2	0.35 ml	0.65 ml	1 ml
1:5	0.35 ml	1.65 ml	2 ml
1:8	0.35 ml	2.65 ml	3 ml

Figure 4.4 Dilution Process

Centrifuge, decant supernatant, and add the appropriate saline volume. Note that the correct amount of saline will fill the tube to the 1 ml, 2 ml, or 3 ml lines.



* Approximate volume.










Dilution Guide

The color of the supernatant after centrifugation is useful to determine the need for dilution. If at **step 3** of Figure 4.3 the supernatant is pink, red, or brown, the sample may be showing signs of hemoglobinuria or myoglobinuria (Table 4.2). If this is the case, process the sample without dilution.

Alternatively, if at **step 3** the supernatant clears, the sample is likely red or cloudy due to formed elements like RBCs and/or WBCs. In this instance, dilution is probably necessary.

Table 4.2 Interpretation of Pre- and Post-Centrifugation Urine Color

	Hematuria	Hemoglobinuria	Myoglobinuria
Color Pre-centrifugation	Red, Brown, Pink 	Red, Brown 	Red, Brown 
Color Post-centrifugation	Straw/Yellow 	Red, Brown 	Red, Brown 
RBC present in Urine Sediment?	Many	None to Few	None to Few
Plasma Color	Normal	Pink 	Normal
Other Evidence	Urinary Tract Disease, Traumatic Urine Collection	Anemia	Muscle Damage



Interpretation Guide and Suggested Reference Intervals

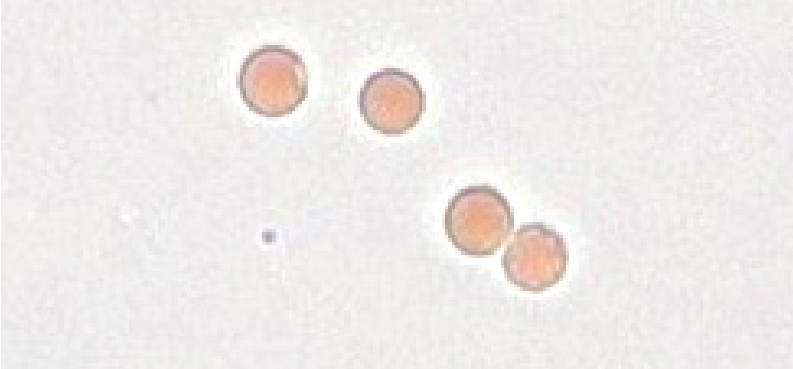
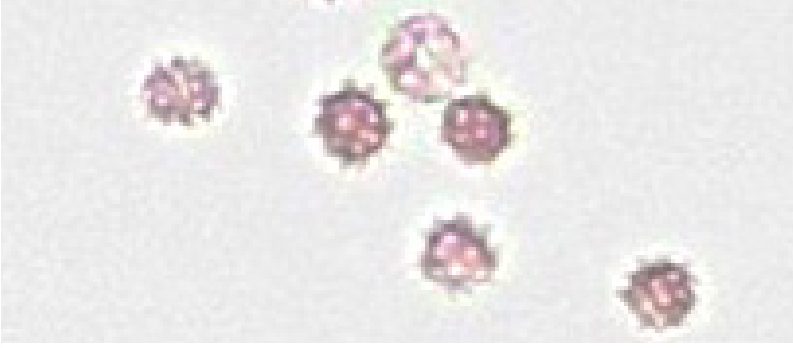
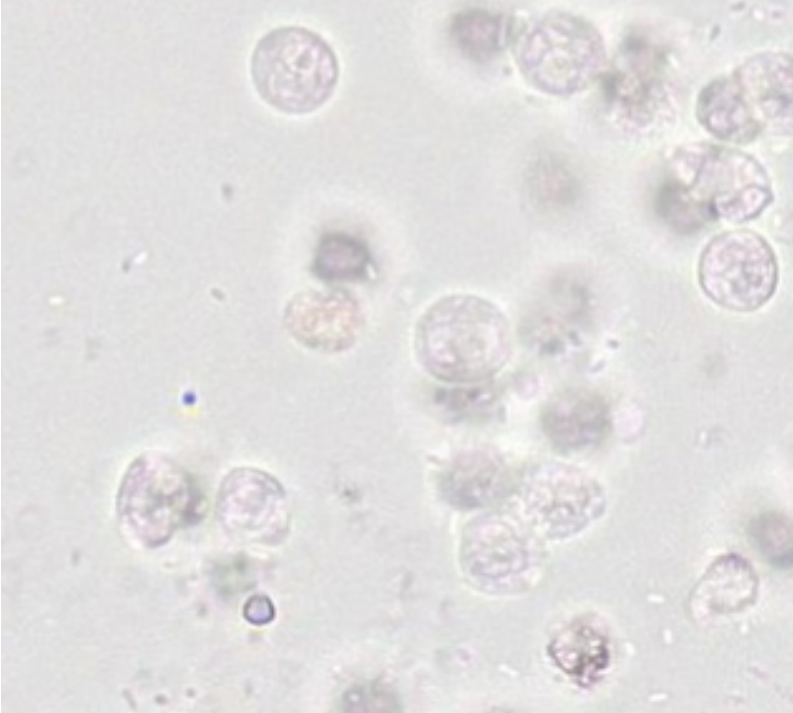
A complete urinalysis should be performed with every complete blood count (CBC) and blood chemistry profile. A urine sediment examination is a vital part of the complete urinalysis as it provides information unavailable in other tests, resulting in comprehensive diagnostic information. Although inexpensive, manual microscopic sediment examination can be time consuming, labor intensive and lacks standardization.

Vetscan Imagyst evaluates urine sediment elements to provide the veterinary practitioner with reliable diagnostic information to inform further diagnostic and treatment decisions. The AI technology identifies the presence of bacteria, crystals, cells and casts to aid in the diagnosis of urinary tract pathology.

What to Look For

The Vetscan Imagyst AI Urine Sediment algorithm detects and reports semi-quantitatively the elements outlined in Table 5.1. For additional example images, please see Figure 5.1.

Table 5.1 Urine Sediment Elements

Urine Sediment Elements*	
	<p>Red Blood Cells (RBCs)</p> <p>The most common causes of hematuria in veterinary medicine are bacterial infections, neoplasia and trauma (cystocentesis, urolithiasis, injury). The causes of hematuria can be grouped in categories such as renal parenchymal disease, renal vascular disease, lower urinary tract disorders (including trauma), and systemic coagulation disorders.¹ Crenated RBCs can be seen in highly concentrated urine samples, particularly those with delayed processing. The change in cell morphology is the result of cell dehydration.</p>
	
	<p>White Blood Cells (WBCs)</p> <p>The most common causes of pyuria in veterinary medicine include infection-upper or lower urinary tract, urolithiasis, neoplasia, inflammation or infection of the genital tract.¹</p>

* Multiple magnifications shown.

1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pp. 177-216.



Interpretation Guide and Suggested Reference Intervals

Table 5.1 Urine Sediment Elements (Cont'd)

Urine Sediment Elements*	
	<p>Squamous, Transitional (Urothelial) and Renal Tubular Epithelial Cells</p> <p>Increased numbers of squamous epithelial cells most commonly occur due to estrus, neoplasia and collection of urine via catheterization. Small numbers are also common with voided samples as a result of normal cell turnover in the urinary tract.</p> <p>While small numbers of transitional (urothelial) cells may also be observed in urine due to normal cell turnover, the presence of renal tubular cells always indicates pathology. Clumping of epithelial cells is also considered abnormal. If clumping, abnormal cell morphology or increased numbers of epithelial cells are observed, consider investigation of infection, neoplasia, urolithiasis, AKI, or sterile inflammation (feline idiopathic cystitis).¹ Submitting a stained urine sediment smear for Add-On Expert Review[†] is recommended.</p>
<p>Squamous</p>	
<p>Other Epithelial</p>	
	<p>Struvite and Calcium Oxalate Dihydrate Crystals</p> <p>Struvite and calcium oxalate dihydrate crystals may be found in normal dogs and cats, and do not guarantee uroliths are present. Based on symptoms, investigation may be warranted to rule out UTI or stone formation.¹</p>
<p>Struvite</p>	
<p>Calcium Oxalate Dihydrate</p>	



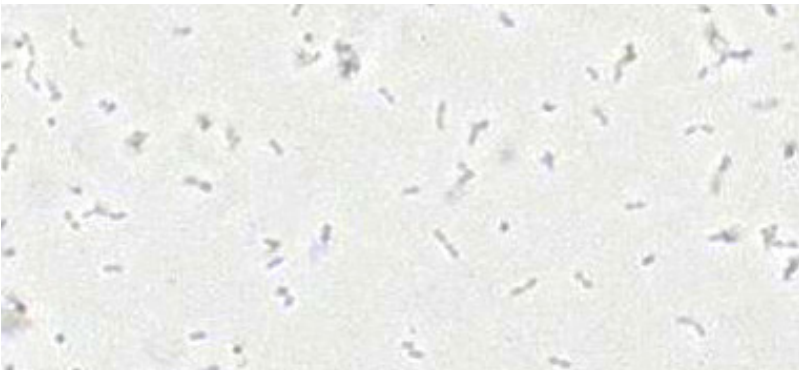
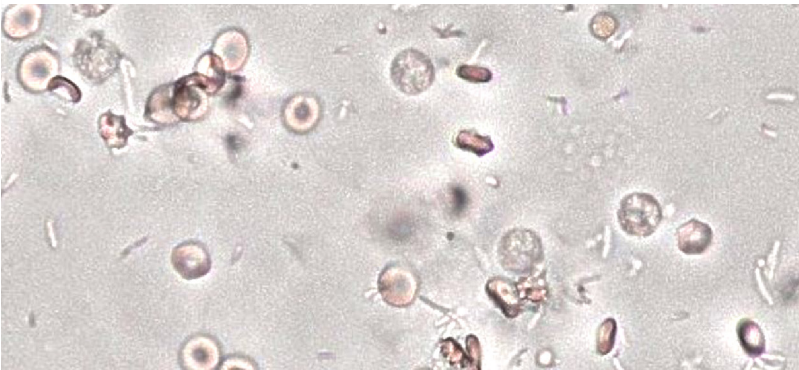
* Multiple magnifications shown.

† Additional costs may apply.

1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pp. 177-216.

Interpretation Guide and Suggested Reference Intervals

Table 5.1 Urine Sediment Elements (Cont'd)

Urine Sediment Elements*	
 <p>Hyaline</p>	<p>Hyaline and Non-hyaline Casts</p> <p>Increased numbers of non-hyaline casts usually indicate the presence of renal pathology. Consider Add-On Expert Review[†] for further evaluation. Increased numbers of hyaline casts may be seen with increased urinary protein due to pre-renal or renal causes of proteinuria.</p>
 <p>Non-hyaline</p>	
 <p>Cocci</p>	<p>Cocci and Rod Bacteria</p> <p>Interpret significance considering clinical signs, presence or absence of WBC and collection method. For more information, consider an Add-On Expert Review[†] with a stained sediment smear. To guide antimicrobial selection and/or confirm suspected bacterial infection, perform a culture and sensitivity.</p>
 <p>Rod</p>	

* Multiple magnifications shown.

† Additional costs may apply.

Interpretation Guide and Suggested Reference Intervals

Urine can commonly contain contaminants or objects that can be difficult to identify, regardless of the urine collection method (Table 5.2). These elements can be confusing for both a manual reviewer and an automated analyzer using image recognition technology.

Objects can occasionally be misclassified if the appearance is similar to a classified element, such as bacteria. It is best practice to review the images provided with every sample run. This is analogous to performing a blood smear review with every automated CBC to ensure accurate cell counts and examine for any abnormal cells and/or morphology.

Table 5.2 Common Urine Contaminants

Structure	Origin	Comments
Lipid droplets	Epithelium	Refractile, especially common in cats
Mucus	Urogenital tract	Usually seen in strands
Sperm	Male gonads	Common in intact males. Sperm heads may be confused with rod bacteria
Fungal Hyphae	Environment	Rare significance
Yeast	Environment	May look similar to bacteria
Pollen	Environment	May look similar to parasite eggs
Plant fibers	Environment	May be confused with casts
Muscle fibers	Cystocentesis accidental aspirate	May be confused with casts
Air bubbles	Sample pipetting error	Vary in size
Glass	Broken slide	May be confused with crystals
Stain Precipitate*	Stain	May be confused with bacteria

* Stain Precipitate does not apply to Vetscan Imagyst AI Urine Sediment.


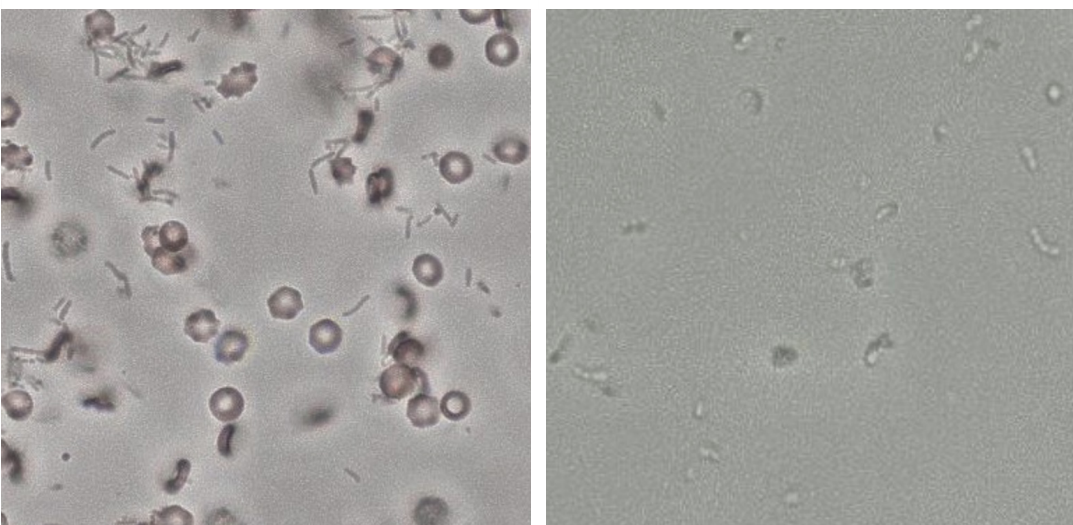
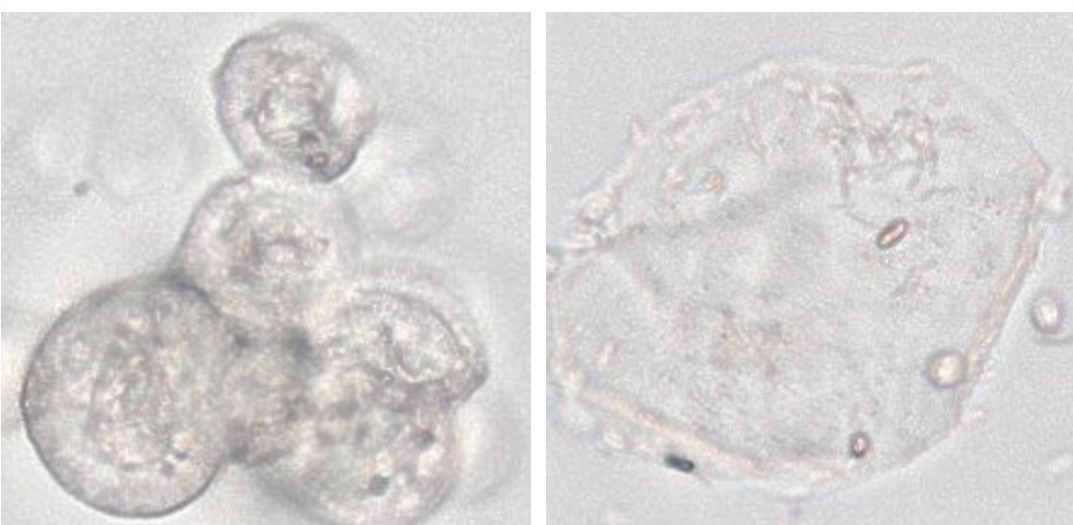
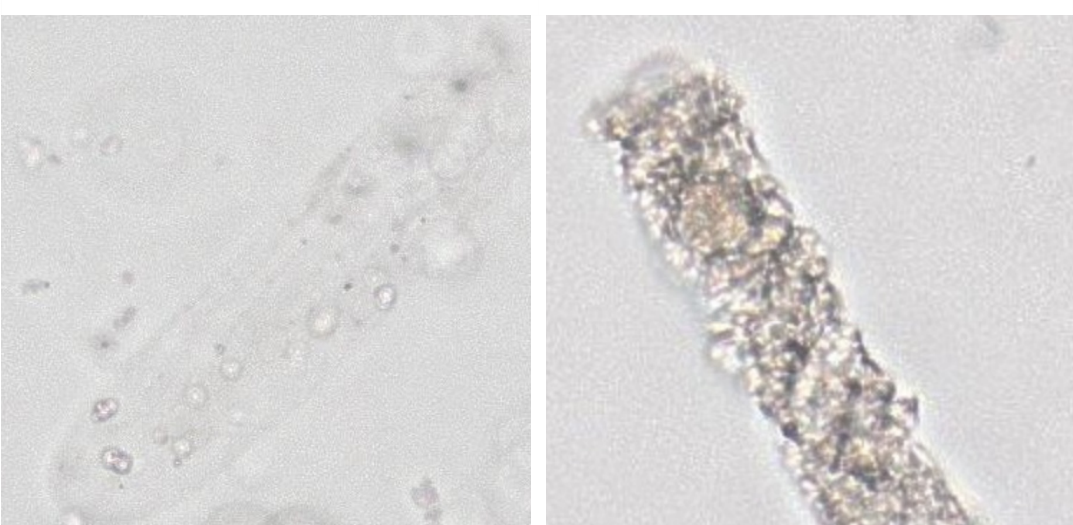


Interpretation Guide and Suggested Reference Intervals

Interpreting Results

All Vetscan Imagyst AI Urine Sediment results and images should be reviewed in conjunction with the patient clinical history and physical examination. Clinical profiles from the Vetscan Imagyst will populate with additional diagnostic direction depending on what is detected by the analyzer. Refer to Table 5.3 below for quick reference to specific clinical profiles and recommended action for each.

Table 5.3 Clinical Profile Reference Guide

Clinical Profile	Review Images*	Recommended Action
WBC Level High		Consider an Add-On Expert Review [†] with a stained slide for further morphologic evaluation of cells and potential identification of bacteria. If clinical signs support a urinary tract infection, culture and sensitivity are recommended to aid in appropriate antimicrobial selection.
Bacteria Level High		If clinical signs support a urinary tract infection, culture and sensitivity are recommended to aid in appropriate antimicrobial selection.
Epithelial Cells Level High		It is recommended to review all classified images. When cellular morphology is atypical an Add-On Expert Review [†] of a concentrated, stained sample is warranted.
Cast Level High		More than 0.5 casts/LPF are detected in this sample. Review of all images (along with the patient's clinical signs and chemistry results) is recommended. Add-On Expert Review [†] of casts is available.

* Multiple magnifications shown.

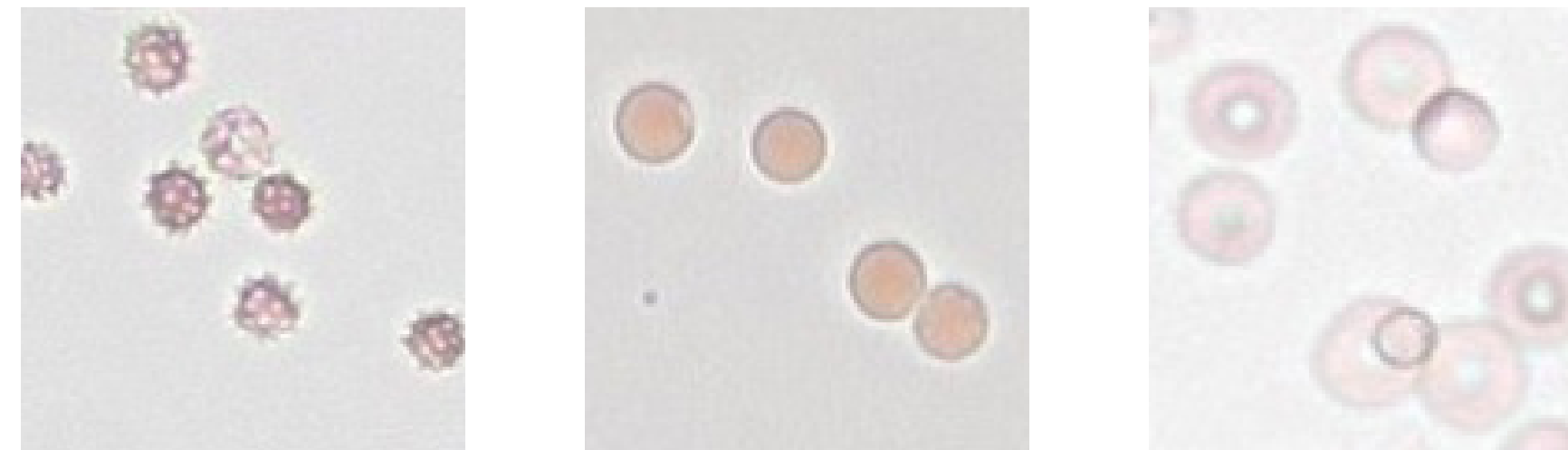
† Additional costs may apply.

Interpretation Guide and Suggested Reference Intervals

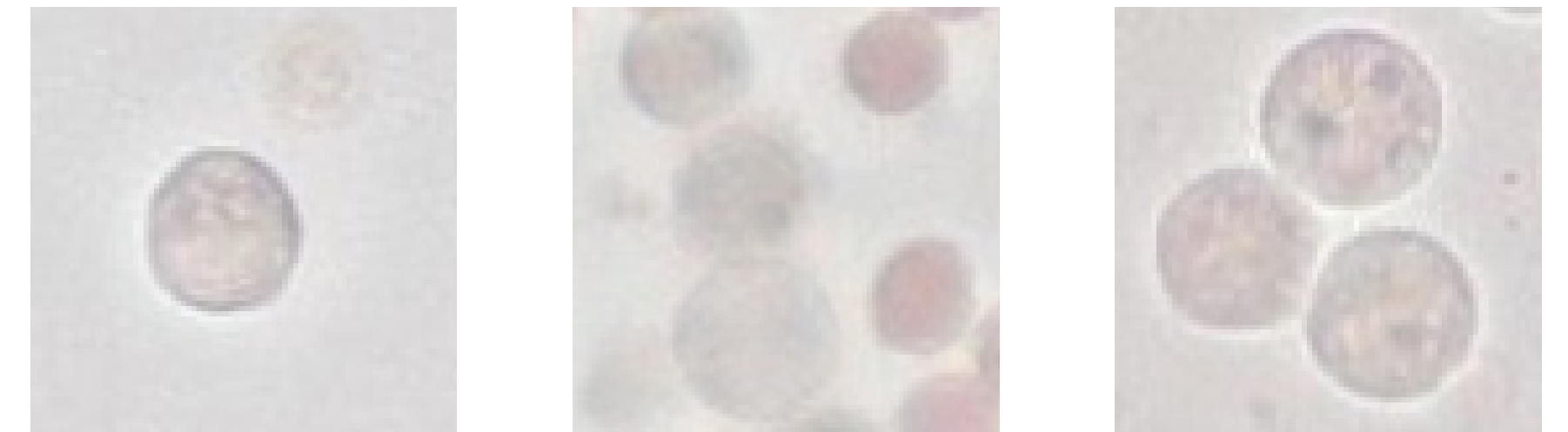
Refer to the Urine Sediment Atlas (Figure 5.1) below for help distinguishing common urine sediment findings.

Figure 5.1 Urine Sediment Atlas
 All images shown at 40x magnification.

Red Blood Cells



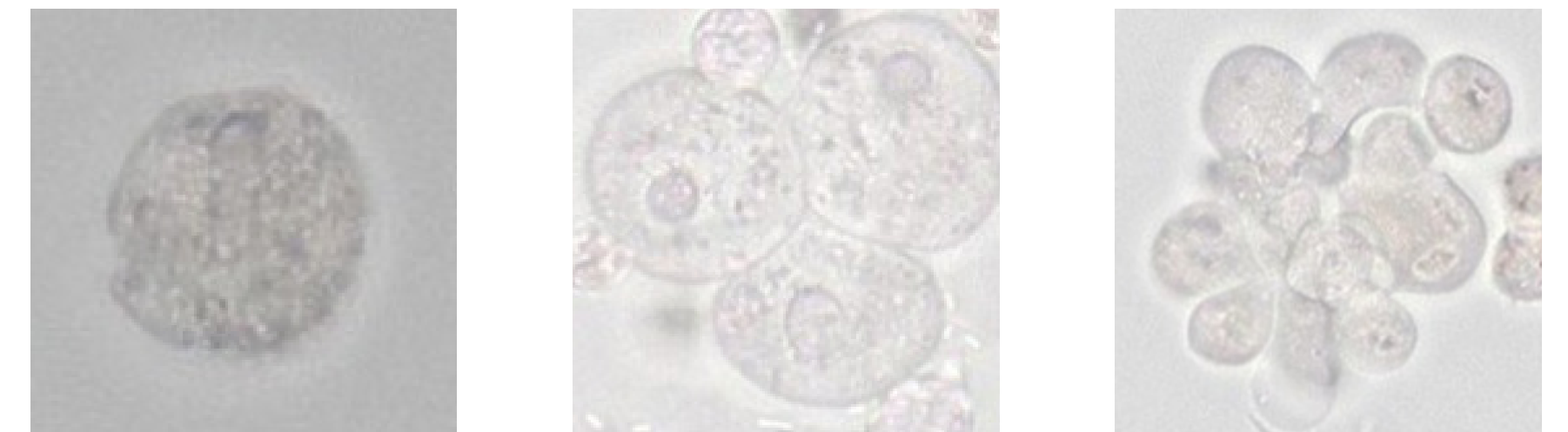
White Blood Cells



Squamous Epithelial Cells



Other Epithelial Cells



Struvite Crystals



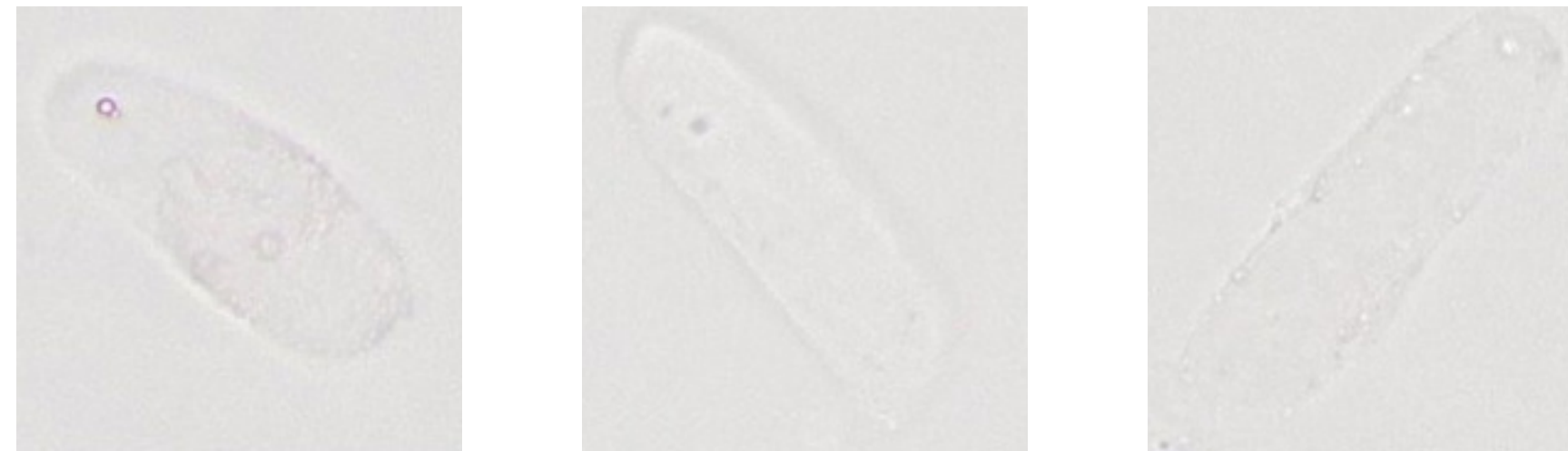
Calcium Oxalate Dihydrate Crystals



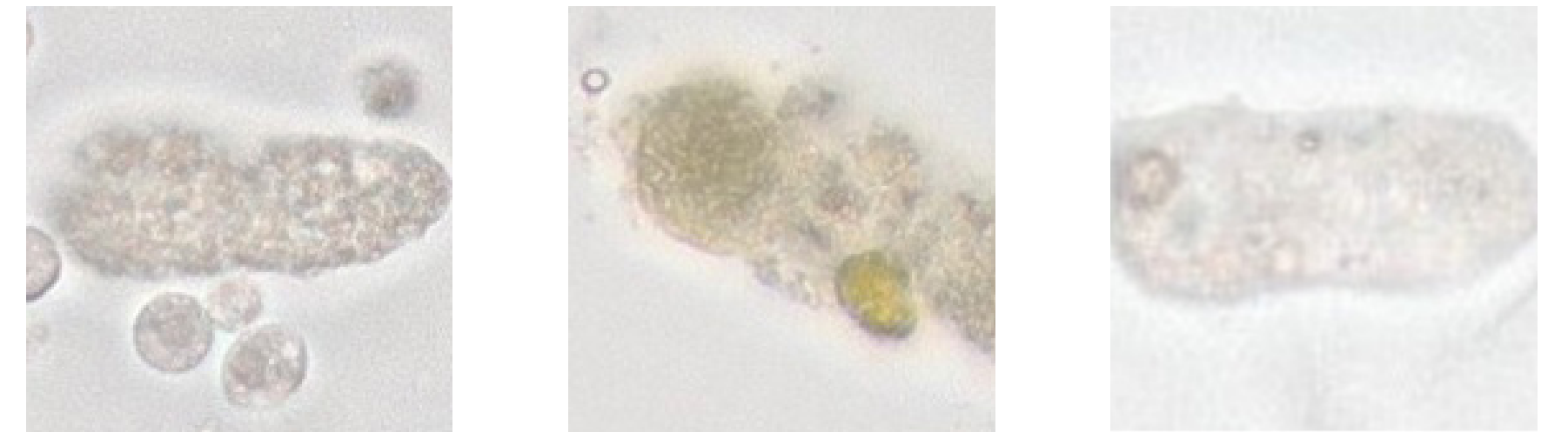
Interpretation Guide and Suggested Reference Intervals

Figure 5.1 Urine Sediment Atlas (Cont'd)
 All images shown at 40x magnification.

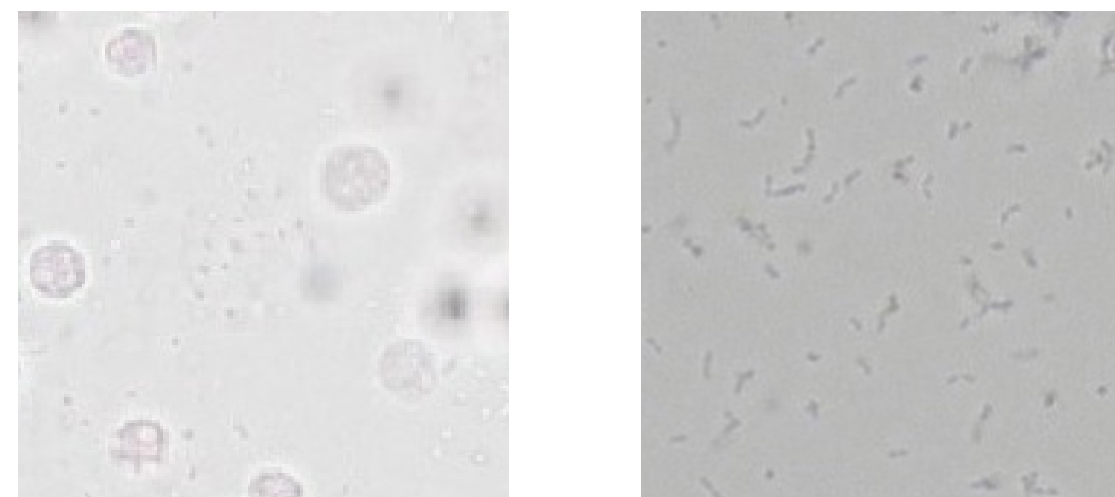
Hyaline Casts



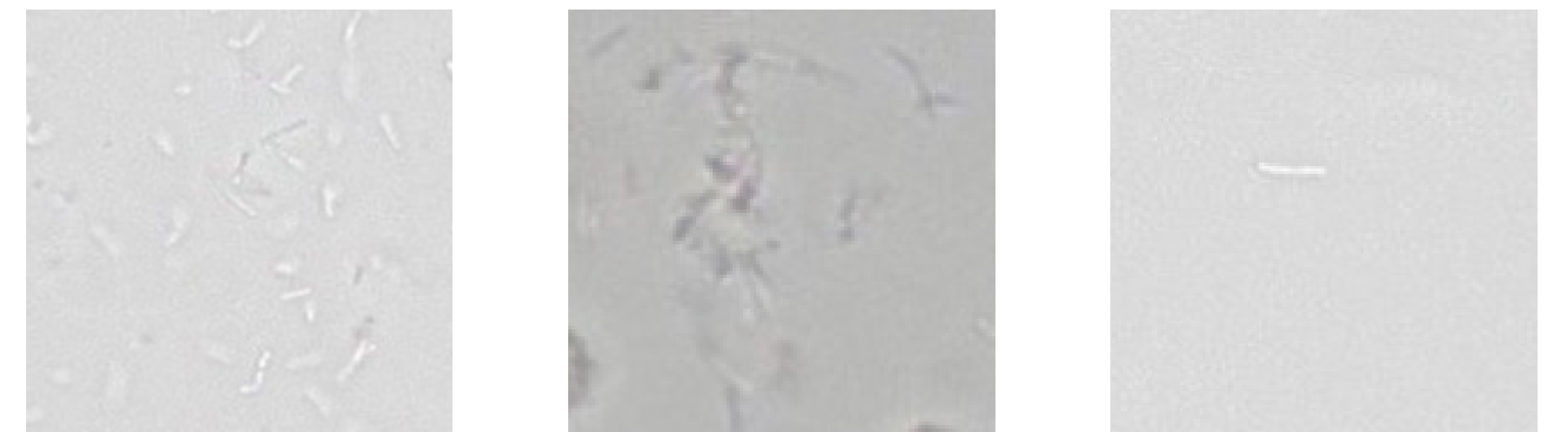
Non-hyaline Casts



Cocci Bacteria



Rod Bacteria



Miscellaneous



Airbubble

Alternaria

Amorphous Crystals

Pollen

Sperm

Starch or
Glove Powder

Interpretation Guide and Suggested Reference Intervals

Suggested Reference Intervals

The suggested reference intervals outlined in Table 5.4 refer to the number of urine sediment elements considered “normal” in a urine sample based on collection and handling methods. Interpret the results while accounting for patient clinical signs, collection method, urine chemistry analysis, specific gravity, and blood chemistry.

Table 5.4 Suggested Reference Intervals of Urine Sediment Elements

Urine Sediment Element Type	Variations	#Elements/40X(HPF)*
Red Blood Cells	Voided/Free Catch Collection	0-10
	Catheterization, Non-traumatic	0-5
	Catheterization, Traumatic	>50
	Cystocentesis, Routine	<10
	Cystocentesis, Traumatic	>50
White Blood Cells	Voided/Free Catch Collection	<10
	Catheterization	<7
	Cystocentesis	<3
Struvite Crystals	Fresh, Warm Urine	0
	Refrigerated/Stored	Few/Moderate
Calcium Oxalate Dihydrate Crystals	Fresh, Warm Urine	0
	Refrigerated/Stored	Few/Moderate
Bacteria	Voided/Catheterized	0-Few
	Cystocentesis	0
Epithelial Cells	Squamous	0-Few
	Other	0-Few [†]
Casts	Hyaline	0-2/LPF
	Non-Hyaline	0-1/LPF [‡]

Adapted from *Urinalysis in the Dog and Cat* (p167) by D. Chew and P.A. Schenck, 2023, Wiley Blackwell.

* All elements recorded per HPF except for casts which are reported per LPF(10X).

[†] Any renal tubular cell seen is abnormal. Occasional transitional (urothelial) cells with normal morphology may be observed.

[‡] Any number of waxy or cellular casts seen is abnormal. A granular cast may be observed in highly concentrated urine.

Interpretation Guide and Suggested Reference Intervals

Interpretation of Bacteria

Bacteria may be present in a urine sample due to a urinary tract infection (UTI) or urine sample contamination. The presence of bacteria (bacteriuria) in a sample does not always mean the patient has a UTI diagnosis.^{1,2} For this reason, it is imperative to evaluate the sample in the context of the collection method, patient history, other elements present on sediment evaluation (such as white blood cells), and urine culture results.¹

How to Test for Bacteria

It can be a challenge to differentiate bacteria from amorphous debris and other elements in the urine sediment, even for well-trained veterinary professionals. In one study, it was shown that medical technologists had a misclassification rate of 62% in identifying rods, cocci, or mixed infections when looking at wet, unstained urine sediments that were confirmed positive for bacteria by urine culture.³

After reviewing results, it may be necessary to confirm the presence and species of bacteria using an air-dried sediment smear and/or a urine culture and sensitivity test (Figure 5.2).¹

Figure 5.2 Intracellular Cocci Bacteria

Cytological evaluation of a dried, stained urine sediment smear reveals intracellular bacteria.

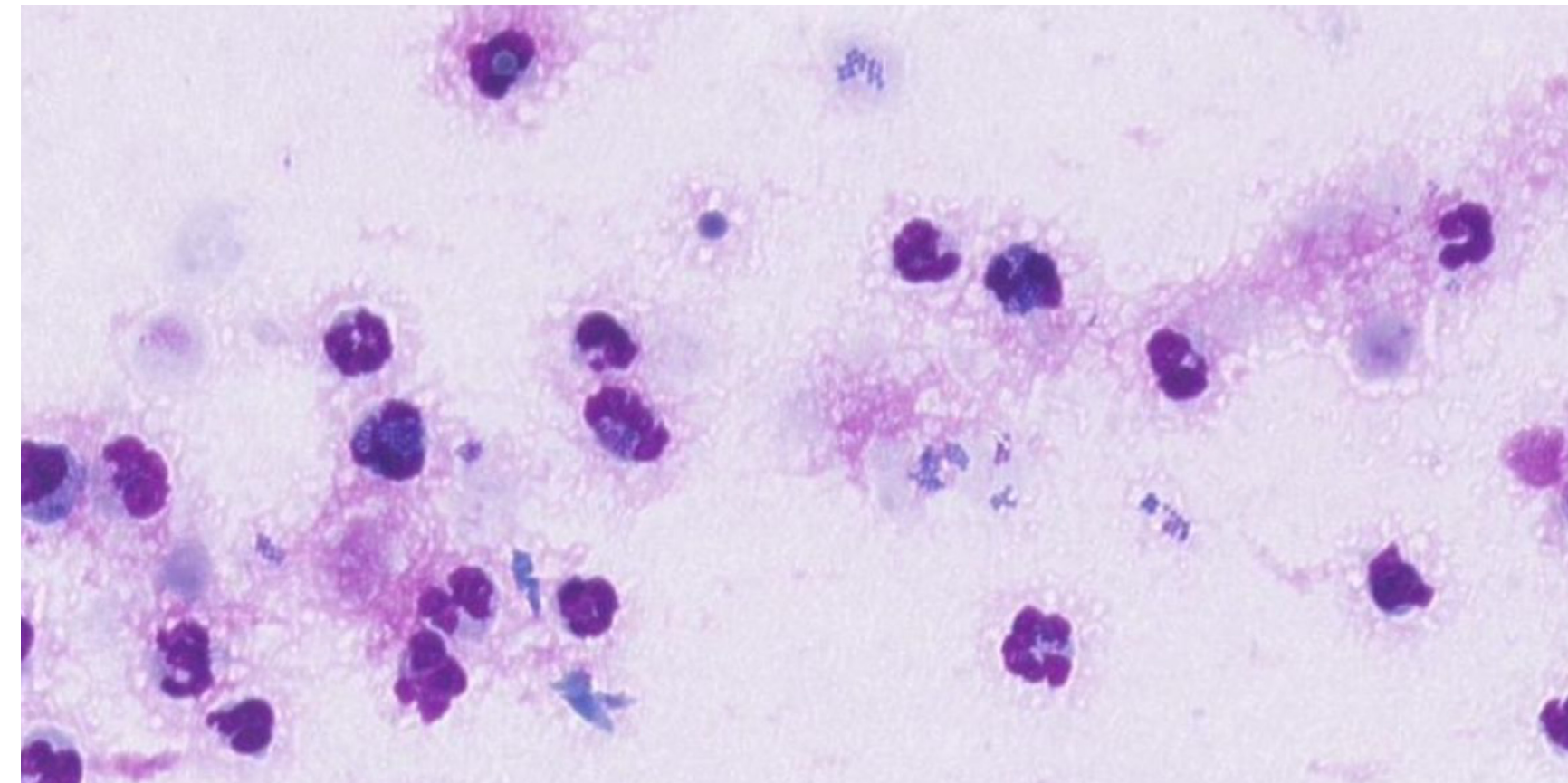


1. Skeldon, N. and Ristić, J. BSAVA Manual of Canine and Feline Clinical Pathology (3rd Edition). Quedgeley, Gloucester: BSAVA, 2016, p184-205.
2. Sink, C.A. and Weinstein, N.M. Practical Veterinary Urinalysis. Wiley-Blackwell, 2012, p134.
3. Swenson CL, Boisvert AM, Gibbons-Burgener SN, and Kruger JM. Evaluation of Modified Wright-staining of dried urinary sediment as a method for accurate detection of bacteriuria in cats. Vet Clin Pathol June 2011; 40(2) 256-64.

Interpretation Guide and Suggested Reference Intervals

Air-Dried Urine Sediment Smear

Figure 5.3 Cytological Evaluation of a Urine Sediment Smear
The presence of neutrophils, extracellular, and intracellular bacteria on cytological evaluation of a dried, stained urine sediment smear indicates an active UTI.



To prepare an air-dried stained sediment smear, add a drop of the remaining well-mixed sediment to the end of a slide. Use another clean slide to spread the liquid across the first slide and then allow the smear to dry. When the slide is dry, stain it like you would any other cytology sample. The smear can be evaluated microscopically for bacteria and other infectious agents, cellular morphology, and other elements (Figure 5.3).¹

Sometimes, a sediment smear will show an absence of bacteria, but it doesn't always rule out an active infection. In fact, a minimum of 100,000 cocci/ml and 10,000 rods/ml are necessary to detect bacteria on sediment evaluation.² Therefore, a sediment smear can be performed as a quick method to potentially rule in the presence of bacteria while waiting on a C&S. It should not be used to rule out bacteria at the expense of a C&S.

Urine Culture and Sensitivity Test

Table 5.5 Excerpt from a Zoetis Urine Culture & Sensitivity report

Urine C&S (Culture & Sensitivity)		Media Plated	Culture plated on 09/12/2023
Urine Collection Method: Cystocentesis		Culture Results	Growth Present
		Organism:	Escherichia coli
		Quantity	4+ Growth (> 100,000 cfu/ml)
Sensitivity	Escherichia coli	Sensitivity	Escherichia coli
Amikacin	S, <=2	Ciprofloxacin	S, <=0.06
Amoxicillin/Clavulanic Acid	S, <=2	Doxycycline	S, 1
Ampicillin	S, <=2	Enrofloxacin	S, <=0.12
Cefalexin	S, 8	Florfenicol	S
Cefovecin	S, <=0.5	Imipenem	S, <=0.25
Cefpodoxime	S, <=0.25	Marbofloxacin	S, <=0.5
Ceftazidime	S, <=0.12	Nitrofurantoin	S, <=16
Ceftiofur	S, <=1	Trimethoprim-sulfamethoxazole	S, <=20
Chloramphenicol	S, 4	Gentamicin	S, <=1

When a UTI is suspected, collection of urine by cystocentesis followed by complete urinalysis and quantitative aerobic bacterial culture are recommended.³

Ideally, urine samples are processed immediately to avoid false increases or decreases in bacterial counts. A urine culture and sensitivity test identifies the bacterial isolate(s) and provides information regarding appropriate selection of antimicrobials (Table 5.5).⁴

See Table 5.6 on the next page for guidance on recommended actions following the visualization of certain Urine Sediment Elements.



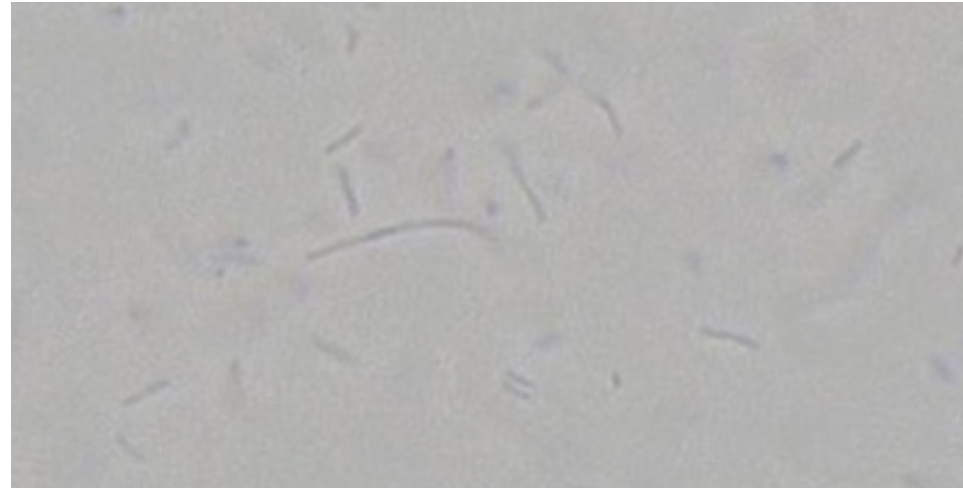
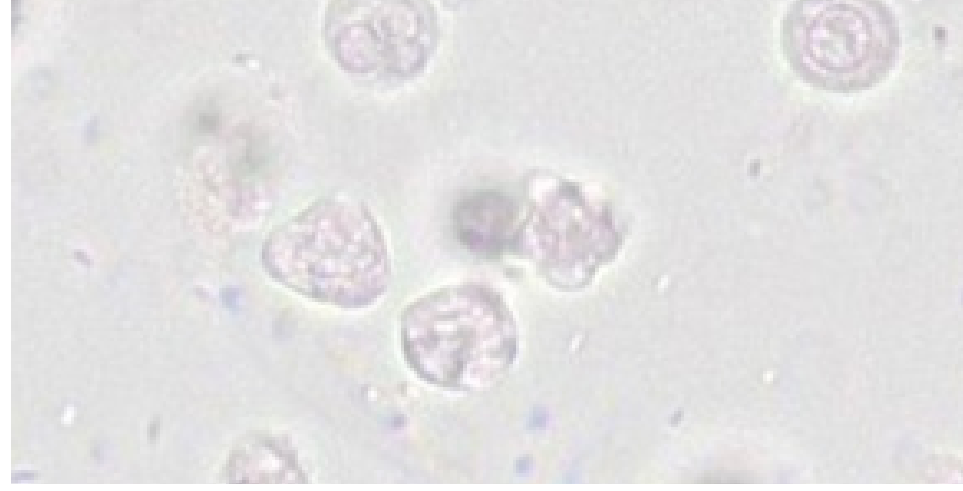
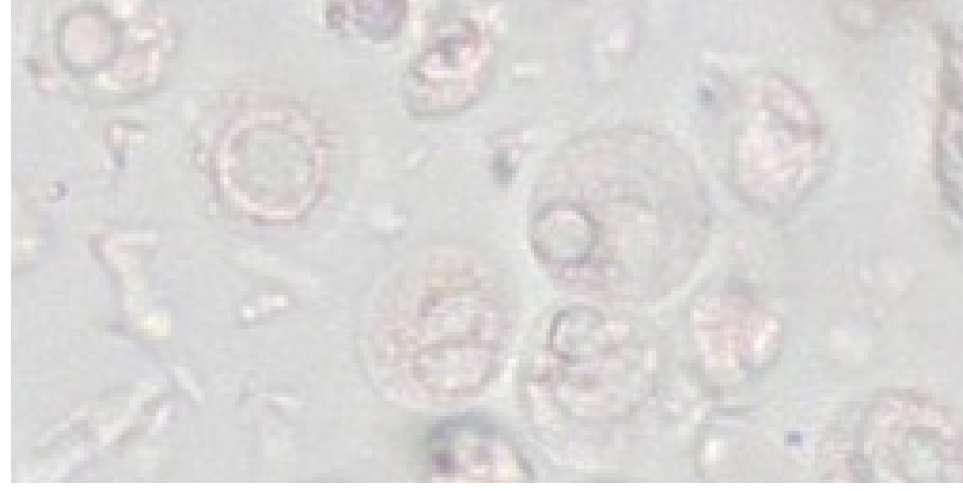
1. Sink, C.A. and Weinstein, N.M. Practical Veterinary Urinalysis. Wiley-Blackwell, 2012, p134.
 2. Skeldon, N. and Ristić, J. BSAVA Manual of Canine and Feline Clinical Pathology (3rd Edition). Quedgeley, Gloucester: BSAVA, 2016, p184-205.
 3. Wong C., Epstein S.E., and Westropp J.L. Antimicrobial susceptibility patterns in urinary tract infections in dogs (2010-2013). *J Vet Intern Med.* 2015;29:1045-1052.
 4. Willard, M. and Tvedten, H. Small Animal Clinical Diagnosis by Laboratory Methods (5th edition). Elsevier Saunders, 2012, p152.



Interpretation Guide and Suggested Reference Intervals

Example Slides

Table 5.6 Quick Guide for Interpretation of Possible UTI

Urine Sediment Elements Visualized	Clinical Signs of UTI Present	Recommended Action
None 	No	None
None 	Yes	Review WSI. Consider Add-On Expert Review* with a stained, air dried smear. Consider C&S.
Bacteria 	No	Analyze collection method for sources of contamination. If free-catch, consider cystocentesis and repeating test. If bacteria visualized after cystocentesis, consider C&S, follow ISCAID Guidelines for subclinical bacteriuria. ¹
WBC 	Yes	Consider sending a C&S. Consider Add-On Expert Review* to evaluate WBC morphology.
Bacteria, WBC 	Yes	Follow ISCAID Guidelines. ¹ Consider sending urine out for C&S test to identify bacteria and assist in determining appropriate antimicrobial selection.

* Additional costs may apply.

1. Weese, J.S. et al. International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats. *The Veterinary Journal*. 247(2019)8-25.



More on The Zoetis Virtual Laboratory

The Virtual Laboratory

The Zoetis Virtual Laboratory is an online platform of interconnected diagnostic products and services (Figure 6.1) that can help you deliver personalized, specialist-supported care within your clinic.

- ✓ Access to a global network of expert clinical pathologists and clinical specialists, for the support you need to make fast, confident diagnostic and treatment decisions.
- ✓ Diagnostic results from point-of-care analyzers and clinical specialists, integrated with your practice through the ZoetisDx platform.
- ✓ Cutting-edge AI across multiple indications on a single analyzer with the Vetscan Imagyst, for expert-level insights within minutes.¹⁻⁴

Figure 6.1 The Zoetis Diagnostics Portfolio



1. Data on file, Study No. D870R-US-21-045, 2021, Zoetis Inc.
 2. Nagamori Y, Sedlak RH, DeRosa A, et al. Evaluation of the VETSCAN IMAGYST: an in-clinic canine and feline fecal parasite detection system integrated with a deep learning algorithm. Parasit Vectors. 2020;13(1):346. doi:10.1186/s13071-020-04215-x.
 3. Data on file, Study No. DHX6Z-US-23-222, 2023, Zoetis Inc.
 4. Data on file, Study No. DHXMZ-US-23-218, Zoetis Inc.

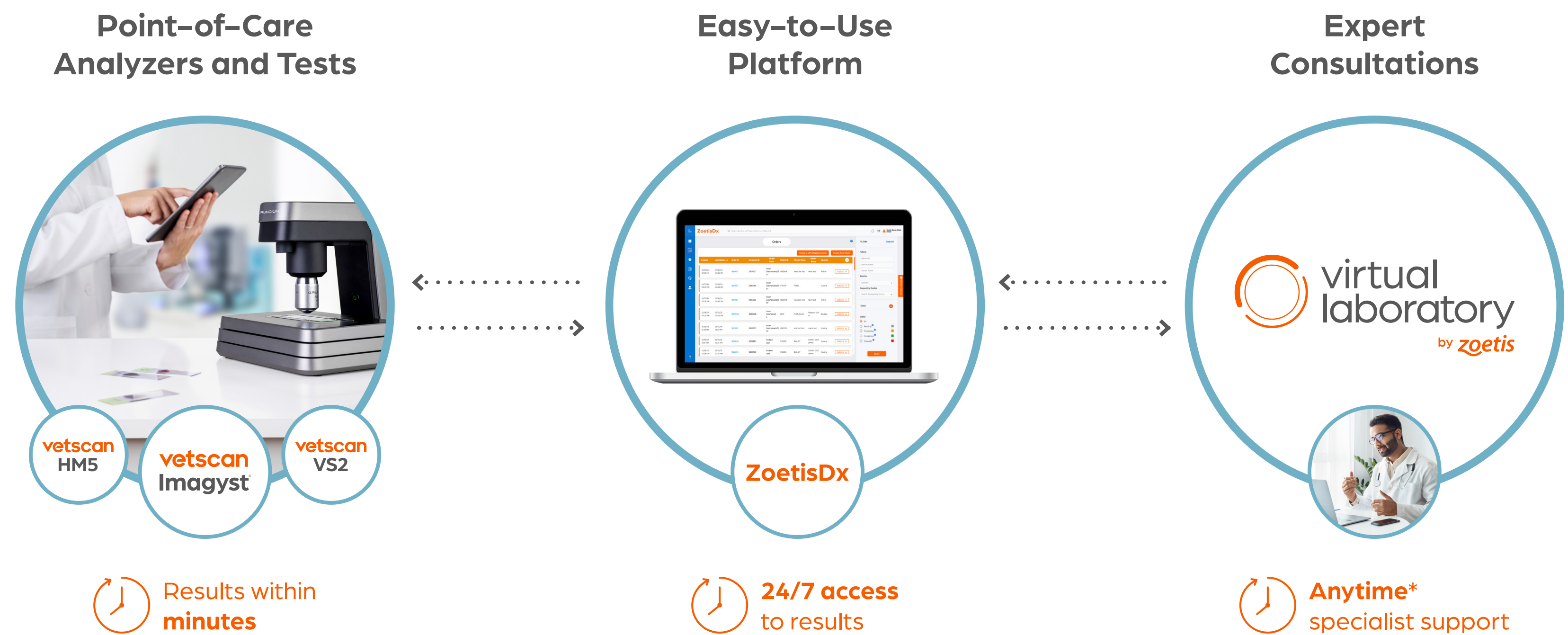


More on The Zoetis Virtual Laboratory

ZoetisDx

With a single log in, ZoetisDx.com allows you to review and share diagnostic results and request expert support, bringing together the Virtual Laboratory offerings on an easy-to-use online platform (Figure 6.2).

Figure 6.2 The Zoetis Virtual Laboratory Workflow



Vetscan Point-of-Care Analyzers and Tests

The Vetscan Point-of-Care portfolio includes a comprehensive array of diagnostic analyzers and rapid tests across chemistry, hematology, urinalysis and more, for fast, actionable insights and enhanced workflow efficiency.

* Dependent on consultant availability.

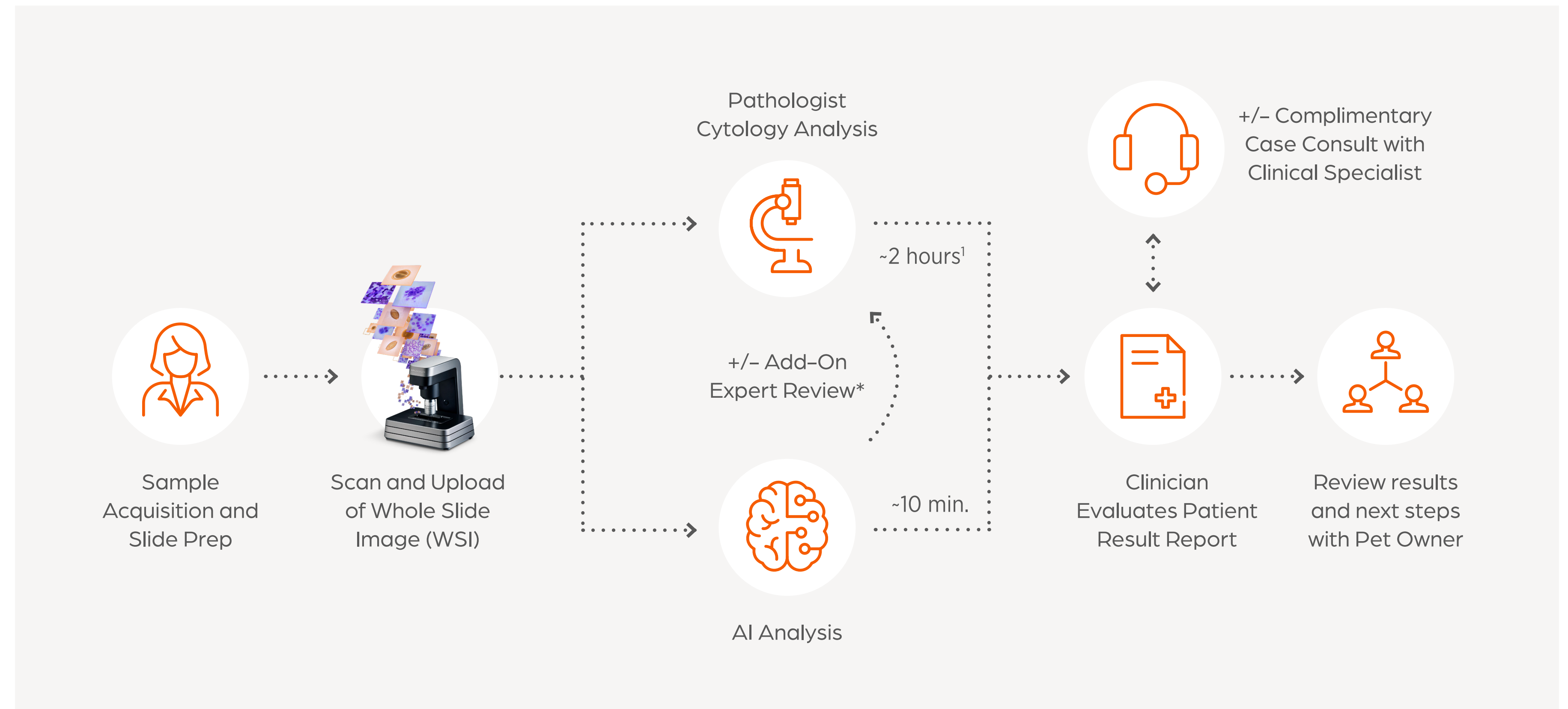


More on The Zoetis Virtual Laboratory

Vetscan Imagyst

Central to the Virtual Laboratory offering, Vetscan Imagyst connects innovative, in-clinic AI diagnostic testing with real human clinical pathology expertise (Figure 6.3), empowering confident treatment decisions and elevating patient care.

Figure 6.3 The Vetscan Imagyst Workflow



Connectivity Workflow

Within the Virtual Laboratory, the Vetscan Fuse and Hub enable seamless connectivity between your point-of-care testing analyzers and select practice information management software (PIMS) on a single, intuitive screen to improve in-clinic efficiency.

* Additional costs may apply.
 1. Data on file, Study No. TI-10365, Zoetis, Inc.



Vetscan Imagyst Maintenance Guide

Routine Cleaning

1. Power down the scanner by pressing the button.
2. Remove the power cable and the network cable from the scanner.
3. Slide the topmost plate to the front.
4. Wipe all surfaces with a soft, damp, lint-free cloth and distilled water. For in-depth cleaning, you can use a microscope cleaner (the Ocus® scanner has been tested with the Reagena™ microscope detergent) instead of distilled water.
5. Use cotton swab with distilled water for cleaning the edges.
6. Dry all surfaces with a soft, damp, lint-free cloth or Kimwipes™.
7. Slide the topmost plate back to its normal position.
8. Place a protective cloth on the glass beneath the objective.
9. You can first try to clean the objective in place, using a microfiber cloth. If necessary, try adding warm distilled water to the cloth or using a cotton swab.
 - **IMPORTANT:** Never pour or spray any liquids directly on the scanner
10. Connect the cables and switch the scanner on.
11. If scans had been blurry prior to cleaning, complete the scan again and validate the images to verify appropriate cleanliness:
 - The overview camera produces good quality images
 - Live view from microscope camera produces good quality images
 - Scanning of a known sample slide produces good quality images
12. If the quality is still poor, redo all steps and use Isopropyl Alcohol for the cleaning, and then follow the In-Depth Cleaning procedure for the objective.

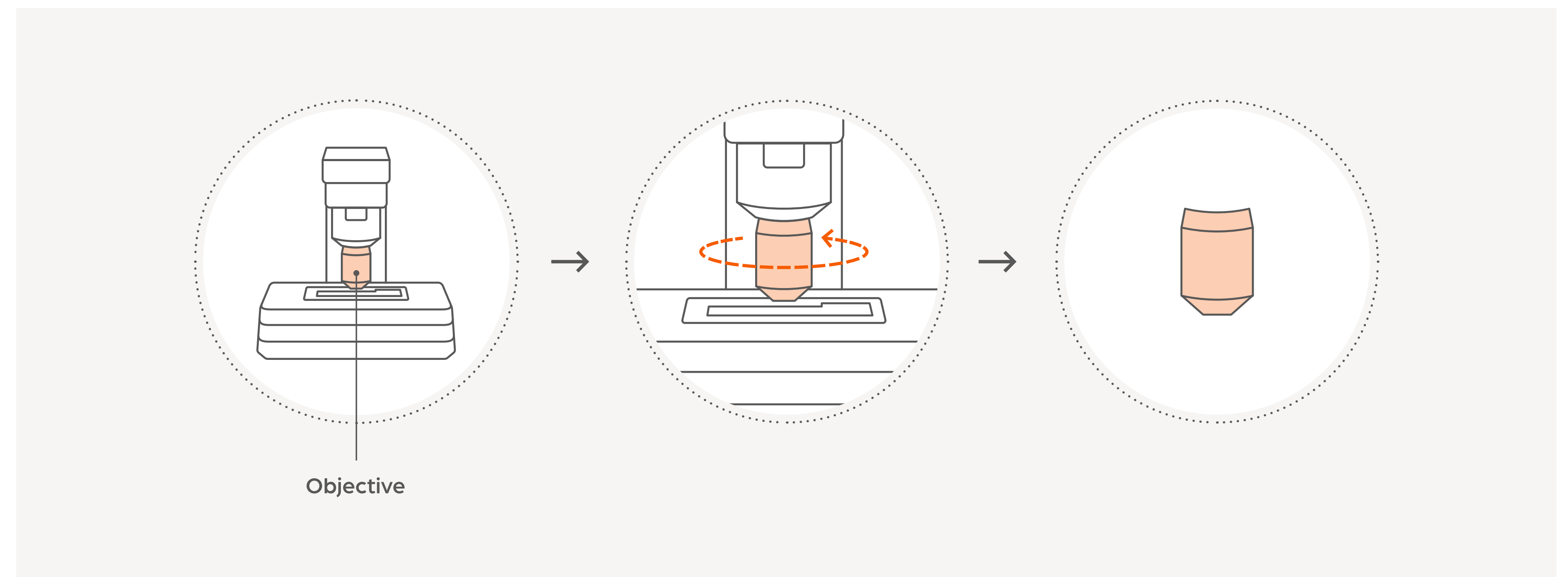
Vetscan Imagyst Maintenance Guide

In-Depth Cleaning: The Objective

Should the objective become dirty as a result of urine sample material or immersion oil, perform these steps to clean it:

1. Power down the scanner by pressing the button.
2. Remove the power cable and the network cable from the scanner.
3. Place a protective cloth on the glass beneath the objective.
4. You can first try to clean the objective in place, using a microfiber cloth. If necessary, try adding warm distilled water to the cloth or using a cotton swab.
 - **IMPORTANT:** Never pour or spray any liquids directly on the scanner
5. If the objective does not come clean, carefully unscrew it (Figure 7.1).

Figure 7.1 How to Unscrew the Objective





Vetscan Imagyst Maintenance Guide

6. Use the microfiber cloth and warm distilled water to clean the lens.
 - **IMPORTANT:** To clean immersion oil from the lens, use warm distilled water, isopropyl alcohol or microscopic cleaning fluid. Use isopropyl alcohol or wipes sparingly. For further help, contact Diagnostic Technical Support
 - **IMPORTANT:** Using acetone or xylene to clean the lens may damage it; however, if the lens is covered with glue/adhesive, cleaning the lens may require using stronger cleaners
7. Use a bulb syringe to remove any dust from the lens and scanner.
8. Replace the objective by gently screwing it back in place.
 - **IMPORTANT:** Do not forcefully screw the objective back onto the scanner
9. Remove the cloth covering the glass, replace the power and network cables and turn the scanner on.
10. Check the scanner by running a test scan.

For further guidance on analyzer maintenance, refer to the following videos:

- **How to Clean the Lens**
<https://www.youtube.com/watch?v=IOnEgSGD1Bw>
- **How to Remove and Clean the Lens**
https://www.youtube.com/watch?v=xDG_NG4Sk0U
- **How to Clean the Stage**
<https://www.youtube.com/watch?v=YkibYZ-59rY>

LOOK DEEPER

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