ZOETIS DIAGNOSTICS

vetscan Imagyst®

AI Urine Sediment v2.0

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 Vetscan Imagyst AI Urine Sediment. Throughout the chapters listed, you will find links to supplemental resources to help address questions.

This guide is separated by topic into chapters which can be accessed easily by clicking the chapter title or scrolling through the guide to the desired page.

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.

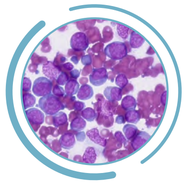
*Requires the use of Vetscan® Fuse or Hub and at least one Zoetis Diagnostics analyzer or service.

Contents

Vetscan Imagyst Overview

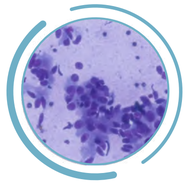
What Is Vetscan Imagyst?

The Vetscan Imagyst is an in-clinic analyzer powered by artificial intelligence (AI) 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.[1-11] With remote expert review* available whenever clinically warranted, you can make diagnostic and treatment decisions quickly and with confidence.



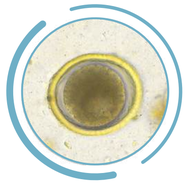
AI Masses

- Identifies cells in common lymph node and skin/subcutaneous masses suggestive of pathology
- Rapid point-of-care identification in minutes can help reduce wait times and the anxiety waiting causes



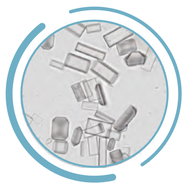
Digital Cytology

- Digital access to board-certified clinical pathologists
- Specialist insights within hours or next day[12]



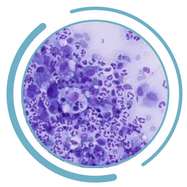
AI Fecal

- Detects specific parasite ova, cysts and oocysts for dogs and cats[13,14]
- Clean, efficient approach to fecal analysis
- Equine-specific AI identifies and classifies fecal parasite ova in minutes[15]



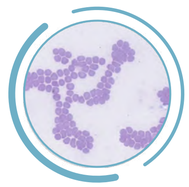
AI Urine Sediment

- Evaluates ~1000 fields of view for critical urine sediment elements
- Point-of-care testing reduces sample changes due to delayed testing[16,17]



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

*Option to send digital slide image to our network of pathologists as needed. Additional costs may apply.

References: 1. Data on file, Study No. DHXMZ-US-25-285, 2025, Zoetis Inc. **2.** Data on file, Study No. DHXMZ-US-25-286, 2025, Zoetis Inc. **3.** Data on file, Study No. DHX6Z-US-23-205, 2024, Zoetis Inc. **4.** Data on file, Study No. DHX6Z-US-23-206, 2024, Zoetis Inc. **5.** Data on file, Study No. DHX6Z-US-23-209, 2024, Zoetis Inc. **6.** Data on file, Study No. DHX6Z-US-24-257, 2024, Zoetis Inc. **7.** Data on file. Study No. DHX6Z-US-24-242, 2024, Zoetis Inc. **8.** Data on file, Study No. DHX6Z-US-24-275, 2024, Zoetis Inc. **9.** Data on file, Study No. DHX6Z-US-24-276, 2024, Zoetis Inc. **10.** Data on file, Study No. DHX6Z-US-23-222, 2023, Zoetis Inc. **11.** Data on file, Study No. DHX6Z-US-22-131, 2022, Zoetis Inc. **12.** Data on file, Study No. TI-11711 2024, Zoetis Inc. **13.** Data on file, Study No. DHX6Z-US-24-257, 2024, Zoetis Inc. **14.** Data on file, Study No. DHX6Z-US-24-242, 2024, Zoetis Inc. **15.** Data on file, Study No. Study DHX6Z-US-22-131, 2022, Zoetis Inc. **16.** Chew, Dennis and DiBartola, Stephen. Interpretation of Canine and Feline Urinalysis. Nestle Purina, Wilmington, DE. 2004: pg 1-31. **17.** Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pg 162-217.

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.

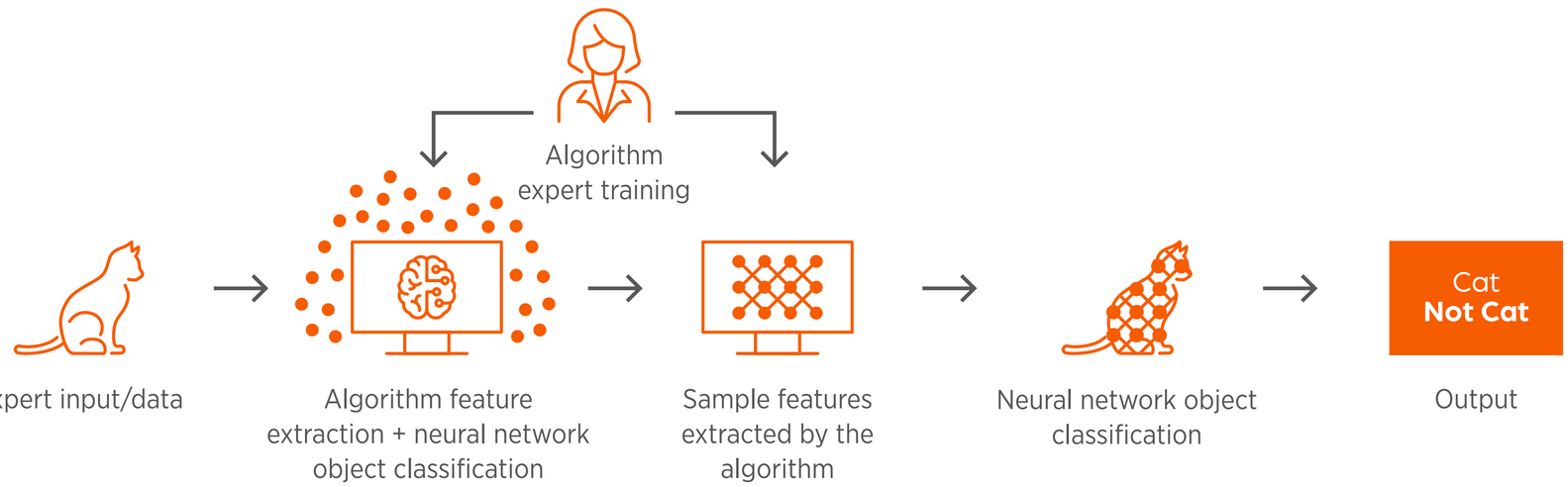
Figure 1.1 *Superficial vs. Deep Machine Learning*

Superficial Learning (Machine Learning)

Manually trained by an expert using differentiating features that can be seen with the naked eye.

Convolutional Neural Network (Deep Learning)*

Trained by showing thousands of individual expert-classified images to the algorithm. The algorithm then extracts features that cannot be detected with the naked eye.



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.

*Vetscan Imagyst

Vetscan Imagyst Overview

Why AI Urine Sediment?

Part of the innovative, multi-application Vetscan Imagyst platform from Zoetis, AI Urine Sediment offers consistent, accurate results within minutes[1] for fast treatment decisions that help improve patient outcomes. With simple instrument setup, easy slide preparation, and accuracy[1] powered by AI, Vetscan Imagyst AI Urine Sediment overcomes challenges of traditional manual sediment evaluation to optimize point-of-care urinalysis.

Accurate,[1–3] in-clinic analysis for fast treatment decisions

- Fresh urine offers the most diagnostic value[4]
- Supported by expert clinical pathologist review* and clinical consultation with internal medicine, oncology or other veterinary specialists when needed
- Evaluates the equivalent of ~1000 HPFs (high power fields of view)

Simple operation ensures accuracy[1–3] and consistency

- Fast to set up and easy to use, reducing the time needed to get results
- Familiar, simple preparation method of urine samples and slides of urine sediment
- Standardization of preparation method and analysis provides consistent results regardless of who runs or reads 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.

References: 1. Data on file, Study No. DHXMZ-US-23-218. **2.** Data on file, Study No. DHX6Z-US-24-275. **3.** Data on file, Study No. DHX6Z-US-24-276. **4.** Skeldon, N, et al, BSAVA Manual of Canine and Feline Clinical Pathology, 3rd Edition. Quedgeley, England: British Small Animal Veterinary Association; 2016. pg 184

Vetscan Imagyst Overview

The Zoetis Virtual Laboratory

Bringing Specialist Level Medicine to Your Clinic

The Zoetis Virtual Laboratory is an integrated support network of board-certified specialists paired with expert-level[1-12] AI, enhancing every element of your diagnostic practice to help you make diagnostic and treatment decisions with confidence.

References: 1. Data on file, Study No. DHXMZ-US-25-285, 2025, Zoetis Inc. **2.** Data on file, Study No. DHXMZ-US-25-286, 2025, Zoetis Inc. **3.** Data on file, Study No. DHX6Z-US-23-205, 2024, Zoetis Inc. **4.** Data on file, Study No. DHX6Z-US-23-206, 2024, Zoetis Inc. **5.** Data on file, Study No. DHX6Z-US-23-209, 2024, Zoetis Inc. **6.** Data on file, Study No. DHX6Z-US-24-257, 2024, Zoetis Inc. **7.** Data on file. Study No. DHX6Z-US-24-242, 2024, Zoetis Inc. **8.** Data on file, Study No. DHX6Z-US-24-275, 2024, Zoetis Inc. **9.** Data on file, Study No. DHX6Z-US-24-276, 2024, Zoetis Inc. **10.** Data on file, Study No. DHX6Z-US-23-222, 2023, Zoetis Inc. **11.** Data on file, Study No. DHX6Z-US-22-131, 2022, Zoetis Inc. **12.** Data on file. Study No. DHXMZ-US-24-235, 2024, Zoetis Inc.

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.

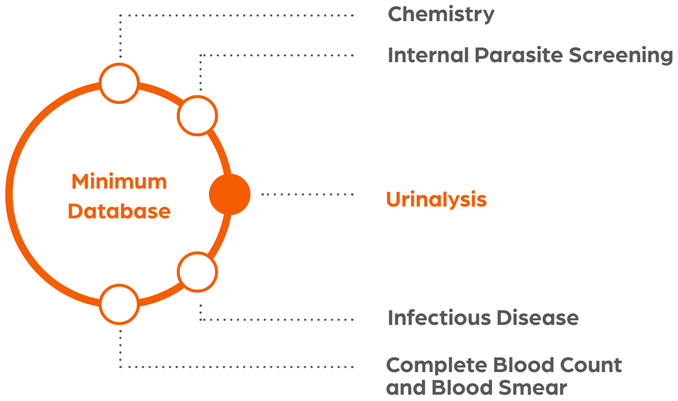


Figure 2.1 *Diagnostic Minimum Database*

Urinalysis

Several chemistry analytes are used to evaluate kidney function and hydration status. Urinalysis is critical to the evaluation of these analytes and determining whether any changes due to dehydration, kidney disease and/or lower urinary tract disease (eg, urinary tract infection) are present.

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 2.2:[1-3]

References: 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: pg 1-31.

The Complete Urinalysis

Figure 2.2 *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, eg, hepatic disease
- As a screening tool for geriatric animals and pre-anesthesia

What is a Complete Urinalysis?

A complete urinalysis combines evaluation of physical and chemical properties with microscopic evaluation of urine sediment (Figure 2.3). Urine specific gravity (USG), urine color, odor and clarity comprise the physical properties. Urine Chemistry is read via multi-test dipstrips.[1,2]

Figure 2.3 *Three Broad Categories of Investigation Make Up a Complete Urinalysis*

Physical Properties + **Urine Chemistry** + **Urine Sediment Evaluation** = **Complete Urinalysis**

References: 1. Barsanti, Jeanne A. Small Animal Clinical Diagnosis by Laboratory Methods, 5th edition, Elsevier 2012: Chapter 7: Urinary Disorders. pg 131-143, 152. **2.** Skeldon, N., and Ristić, J. (2016). BSAVA Manual of Canine and Feline Clinical Pathology (Vol. Third edition). Quedgeley, Gloucester: BSAVA. pg 183-205.

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 Risks*[1]

Collection Method	Voided Sample	Catheterization	Cystocentesis
Benefits	– Generally low stress – Avoids trauma to urinary tract – Useful for initial routine evaluation of suspected urinary disorders and screening	– May avoid contamination from distal urogenital tract	– Avoid contamination – Best for culture – May be better tolerated and easier than catheterization, especially cats
Risks	– Contamination from distal urinary tract with bacteria, cells, etc.	– Stress due to restraint and catheterization – Skill required – Potential trauma to tissues – Potential infection due to poor technique	– Potential tissue trauma – Stress due to restraint – Skill required

During sample collection, be mindful of the following:

– 1-3 mL 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

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

The Complete Urinalysis

Urine Sample Handling

Refer to the AI Urine Sediment Quick Start Guide (Figure 3.1) 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*

Tips for Best Results

1. 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]
2. 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]
3. 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.

References: 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: pg 1-31. **3.** Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pg 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). Prep method was validated using a swing arm centrifuge at these times and speeds.
   - 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*

Height 7.2 cm
Outer Diameter 1.8 cm
Inner Diameter 1.4 cm

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*:

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

*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).

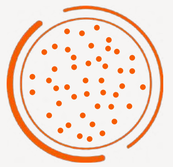
Reference: 1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023. pg 165.

The Complete Urinalysis

Consistency in Urine Sediment Analysis

Getting reliable results from a urine sediment exam all starts with how the sample is prepared. A VIN survey, referenced in Gibbs et al. (2023), revealed that many veterinary professionals use different starting volumes of urine—and some weren't even sure how much they used. This matters because if you spin down 3 mL of urine instead of 1 mL from the same well-mixed sample, you'll end up with about three times more sediment, like white blood cells. That means the number of cells seen under the microscope (per high-power field, or HPF) can be much higher, which could shift the results into a different category and affect treatment decisions (see Table 2.3).

Table 2.3 *How Starting Volume Affects Sediment Results*

			
Starting Urine Volume	**1.0 mL**	**2.0 mL**	**3.0 mL**
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

Another common source of variation is how much liquid (supernatant) is left after centrifugation. Often, this is estimated by eye or poured off without measuring, which leads to inconsistent resuspension volumes. If more liquid is left behind, the sediment gets diluted, and fewer cells are seen per HPF. Even small differences in this step can change the results (see Table 2.4).

Table 2.4 *How Resuspension Volume Affects Sediment Results*

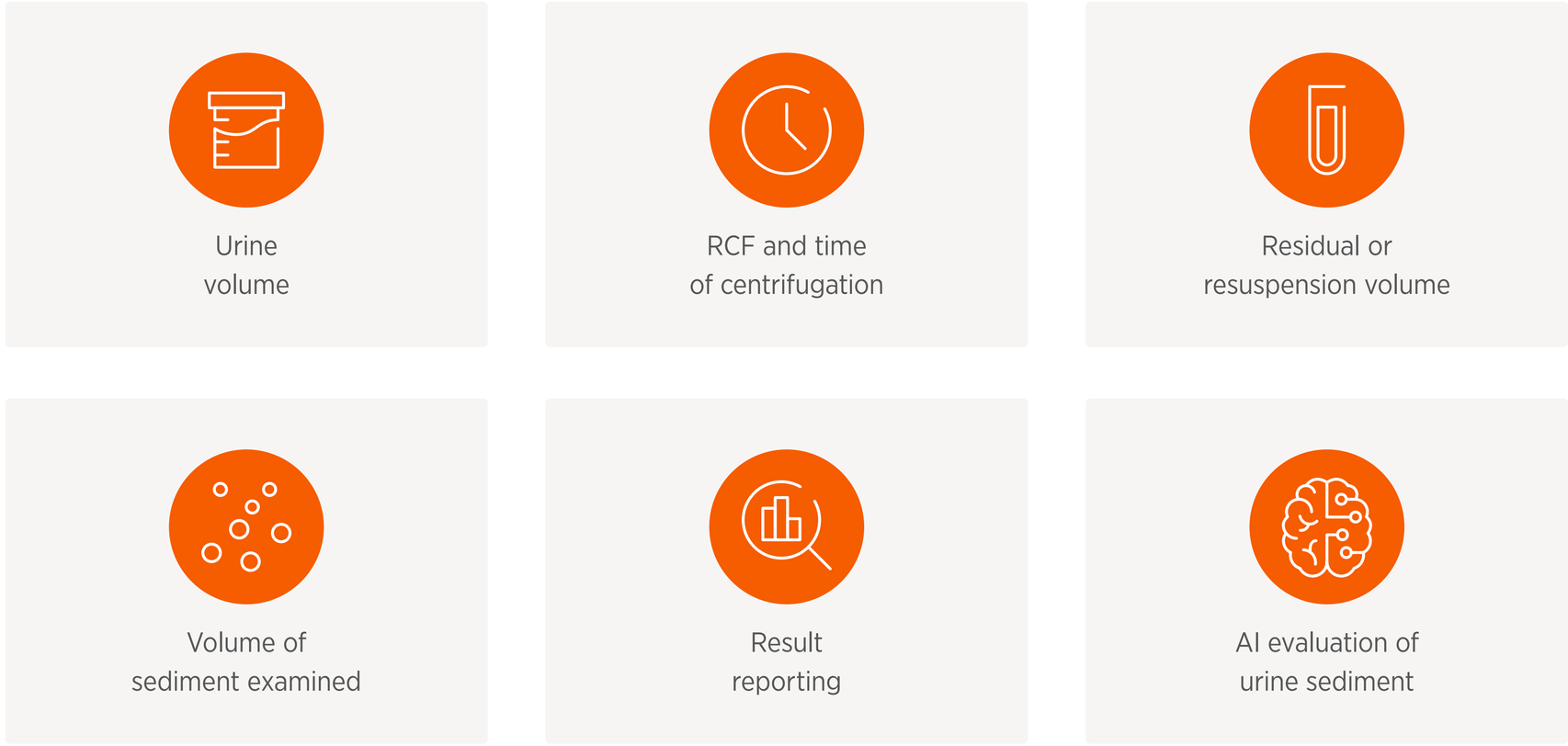
			
Starting Urine Volume	1.0 mL	2.0 mL	3.0 mL
Resuspension Volume	**0.2 mL**	**0.4 mL**	**0.6 mL**
WBC/HPF	45	30	15
Semi-Quantitative Bucket	21-20 WBC/HPF	21-50 WBC/HPF	6-20 WBC/HPF

To reduce these issues, the Vetscan Imagyst AI Urine Sediment method standardizes every step of the process: the starting volume, the amount of liquid left after spinning (residual volume), and the volume of sediment placed on the slide (20 microliters). This helps ensure accurate and consistent results—no matter who performs the test.

The Complete Urinalysis

Manual urine sediment analysis can vary a lot due to differences in how samples are handled and how the microscope is used.[1] The Vetscan Imagyst system helps solve these issues by combining a standardized prep method with an AI algorithm that delivers consistent, accurate results—any time of day, and by any team member. The process controls key variables like starting volume, residual volume, sample volume on the slide, centrifugation time, and relative centrifugal force (RCF), as shown in Figure 2.6. Plus, the AI eliminates variation between different readers, helping ensure confidence in every result.[2]

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



References: 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*

Color

Carefully inspect sample color.

Clarity

Note the degree of transparency or turbidity through a clear container (Figure 2.8).*

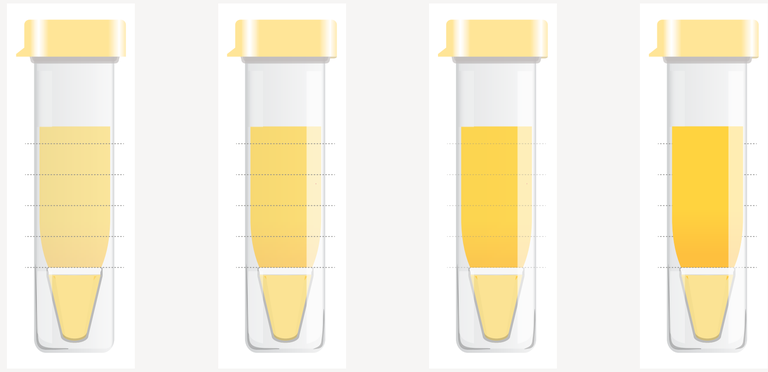
Odor

Note any abnormalities, which can be indicative of disease, sample age, or sample contamination.

Urine Specific Gravity (USG)

Used to evaluate hydration status or kidney function and interpret urinary loss of protein and other substances.[2]

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.

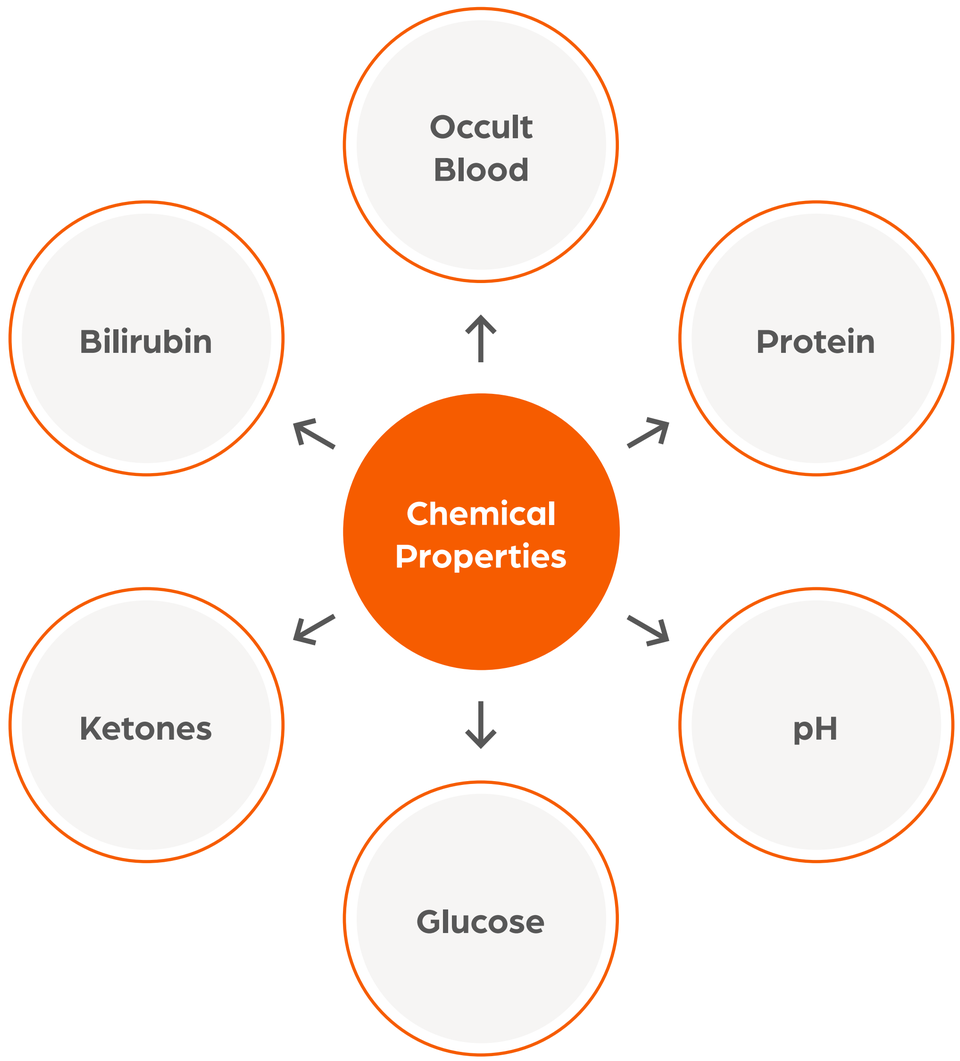
References: 1. Chew, Dennis and DiBartola, Stephen. Interpretation of Canine and Feline Urinalysis. Nestle Purina, Wilmington, DE. 2004: pg 1-31. **2**. Sink CA and Weinstein NM. Routine Urinalysis: Physical Properties In: Practical Veterinary Urinalysis. Ames, IA: John Wiley & Sons Inc. 2012. pg 19-28.

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 using urine test strips.[1]

Figure 2.9 *Common Urine Chemical Analytes Evaluated in a Urinalysis*[1]



Reference: 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]

Common chemical properties that can be reliably assessed using chemistry test strips in canine or feline urine sample, include occult blood, protein, pH, glucose, ketones, and bilirubin.[2] As illustrated in Figure 2.9 a variety of common chemical properties can be reliably assessed in canine or feline urine samples using urine test strips.

Figure 2.10 *The Vetscan UA*

UA10

10 Core Analytes

Leukocytes†	Glucose	Ascorbic Acid‖
Ketones	Protein	Microalbumin
Nitrite‡	USG§	Calcium‡
Urobilinogen‡	pH	UPC
Bilirubin	Blood	

10 Core Analytes + 4 Additional Analytes

UA14

*UA14 strips only.
†Microscopic analysis recommended.
‡Clinical diagnostic significance undetermined in veterinary medicine.
§Refractometer analysis recommended.
‖Assay for quality control purposes only.

References: 1. Data on file, Vetscan UA Urine Analyzer User Manual. pg 8. 1550-7005 Rev B, Zoetis Inc. **2.** Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023. pg 125.

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] The MA test screen uses different technology than a reference lab, but is much more cost efficient.

Figure 2.11 *Clinical Indications for MA Screening (Not Exhaustive)*

- As a screening tool for geriatric patients
  Dogs ≥ 6 years old | Cats ≥ 8 years old
- Patients at risk of early renal disease
- Confirmed or suspected high blood pressure
- Chronic illness that may be complicated by kidney damage or disease

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 Disease*[2]

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

References: 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

Tips for Success with Sample Preparation

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
- Dilute samples that have visible hematuria
- Make sure to use the Vetscan Imagyst AI Urine Sediment consumables — printed slide and plain coverslip

Don't

- Do not use more than 20 µL 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. Bubbles interfere with the scanner and can result in blurry scans and inaccurate reads
- Do not attempt to scan a urine sample with residual immersion oil on the lens from a prior scan
- Do not shake the sample, as this will create bubbles — mix it gently to resuspend the pellet by flicking the bottom of the tube or mixing with the pipette

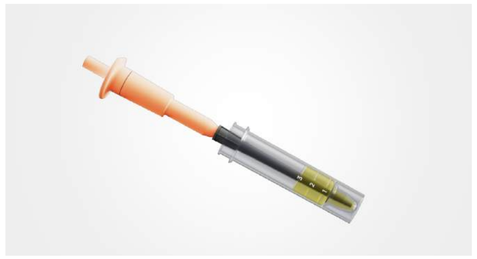
AI Urine Sediment Quick Start Guide

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 3.1) for an overview of the complete urine sediment analysis process, or refer to Section 3 for detailed step-by-step instructions.

Figure 3.1 *Vetscan Imagyst AI Urine Sediment Quick Start Guide*

Centrifuge the Sample

1. Determine if dilution may be necessary†
2. Mix the sample well by gently inverting the sample collection tube
3. Centrifuge with a corresponding tube for balance for 2 minutes at 450-500 RCF
4. Allow to come to a complete stop



Prepare the Sediment 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 and remove pipette from urine
5. Press plunger to expel air, then place pipette tip in urine and press plunger at least 5 times or until the pellet is completely resuspended
6. Assure pellet is completely resuspended. Carefully flick the bottom of the test tube if needed to completely resuspend

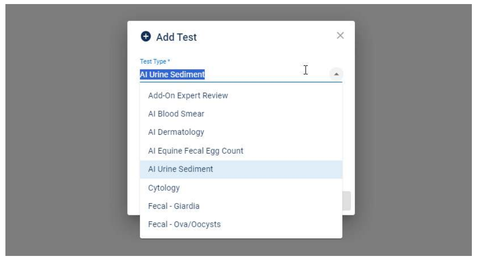
Prepare the Wet–Mount Slide

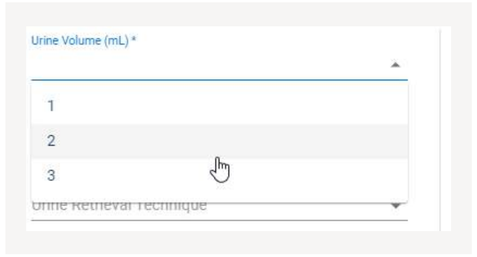
1. Place a pre-printed slide on the template
2. Orient the fiducial circle toward the bottom of template
3. Label the slide with patient information on the frosted edge
4. Once pellet is resuspended, place 20 µl in the fiducial circle
5. Cover with a 22x22 mm coverslip

*Additional costs may apply.
†Refer to Dilution Guide.

AI Urine Sediment Quick Start Guide

Figure 3.1 *Vetscan Imagyst AI Urine Sediment Quick Start Guide (Cont'd)*



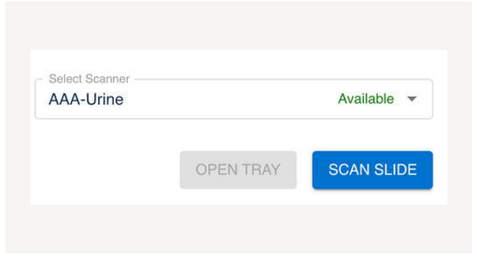


Add Test

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 (+)

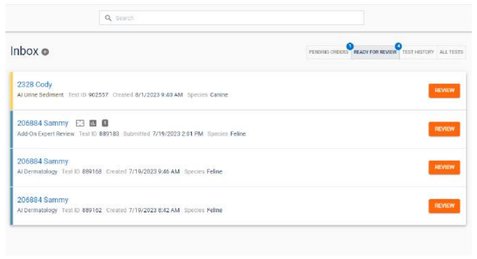
Complete Sample Information

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

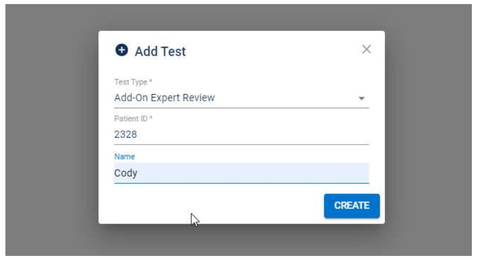


Review Results

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 and to transfer the report to your FUSE, HUB, PIMS or Zoetis Dx software
6. Select SHARE or download a printable PDF

AI Urine Sediment Quick Start Guide

Figure 3.1 *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

To Create Stained Slide for Add–On Expert Review

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 (eg, 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.

Using the Vetscan Imagyst for AI Urine Sediment

How to Run an AI Urine Sediment Analysis

You will need:

Laptop, Tablet, or Mobile Device

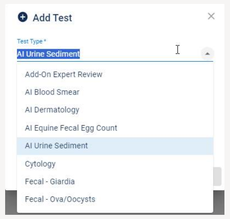
Vetscan Imagyst Analyzer

Vetscan Imagyst Urine Sediment Sample Kit

Imagyst Starter Kit

Step 1

Complete the Patient History



1. Open your PIMS and locate the patient record. Note the **Patient ID**.
2. On the VetScan Imagyst platform, select **Scan** for the correct sample.
   - If your system is **FUSE-connected**, sample information will auto-populate.
   - If not connected, select **Add Test**, enter the required details, and click **Create**.

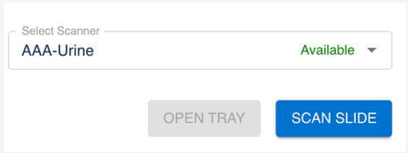
3. Choose the **sample volume** and **dilution factor** (if applicable).

4. Add any relevant clinical information to enhance the diagnostic report.
5. Prepare the sample according to the **AI Urine Sediment Quick Start Guide**.
   - Centrifuge the Sample
   - Prepare the Sediment Sample
   - Prepare the Wet-Mount Slide

Using the Vetscan Imagyst for AI Urine Sediment

Step 2

Scan the Prepared Slide



1. Ensure the scanner is **powered on** and **connected to the network**.
2. If the tray is closed, click **Open Tray** on the platform.
3. Place the slide on the tray with the **label facing right and side up**, then close the locking mechanism.
4. Click **Scan Slide**, then **Close** to submit the test order.

If an error in scanning is occurring, verify that:

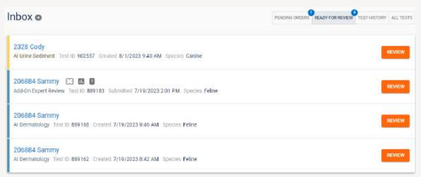
– The slide is facing the right direction and is aligned properly

– The slide is not upside down

– Only one cover slip has been used

Step 3

Check the Test Status



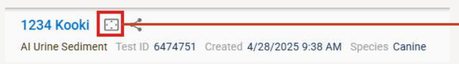
1. While processing, the test appears under the **Pending Orders** tab.
2. Once results are ready, it moves to the **Ready for Review** tab.

Using the Vetscan Imagyst for AI Urine Sediment

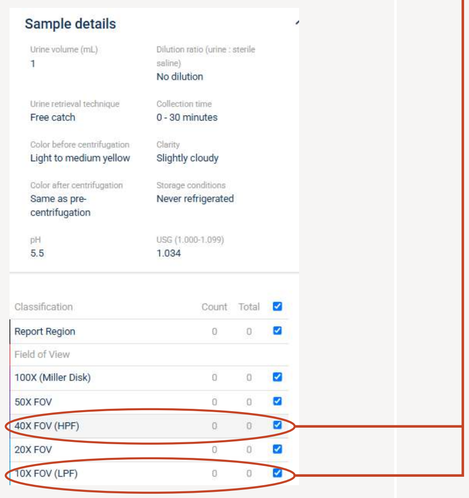
Step 4

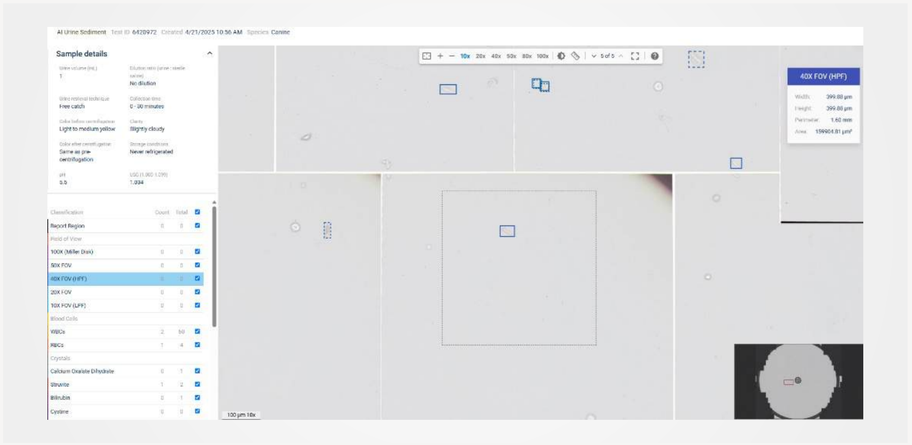
Review the Test Results

1. Click **Review** to open the report.
   - Click this button to review a test.
   - The system auto-selects the **four best images** per object class.
   - You can manually add more images to the PDF report.



2. Click **View Slide** to examine the full digital slide (WSI).
   - Click this icon to view the WSI.
   - Toggle between **five z-layers** to simulate traditional microscopy.
   - Use the **10x or 40x field of view tools** to evaluate elements; these are located on the side bar.
   - On PC: Press **ALT + Click** on the WSI to place a box.
   - On Mac: Press **OPTION + Click** on the WSI to place a box.





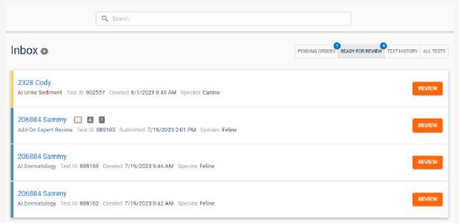
   - Once placed the area inside of a box is equivalent to what is seen under a traditional microscope using a 40x or 10x objective respectively.

3. **Add any notes or images to the report, as all steps in this section must be completed before finalizing the report.**

Using the Vetscan Imagyst for AI Urine Sediment

Step 5

Finalize the Report



1. Click **Finalize** to complete the report.
   - The report moves from "**Ready to Review**" tab to "**Test History**" tab.
   - At the same time the report syncs with **Vetscan Fuse/Hub** where it appears alongside other diagnostic results.
   - From there, it's added directly to the patient's record in your **PIMS and Zoetis Dx**—completing the test process.
2. Click **Share** to distribute the report or download a PDF.

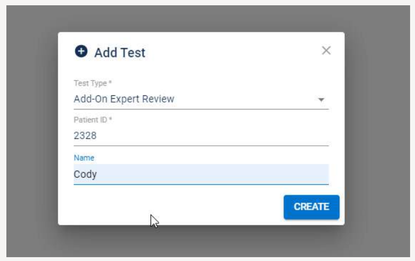
Optional

Add-On Expert Review

If further evaluation is needed—especially for bacteria, cellular morphology, or ambiguous findings—you can request an **Add-On Expert Review**.

Step A

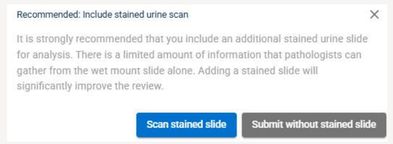
Initiate the Expert Review

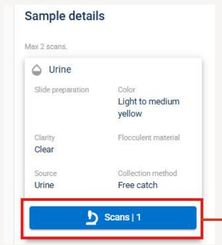


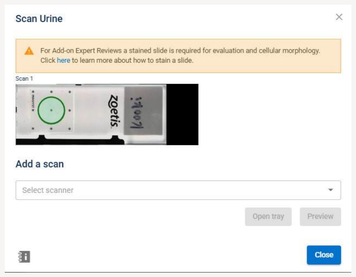
1. In a FUSE- or Hub-connected system, start the review from the **Inbox**.
2. If not connected, use **Add Test** to create the review manually.
3. Enter the **Patient ID**, select **Add-On Expert Review**, and click **Create**.
4. Confirm the most recent test and click **Select Test**.

Using the Vetscan Imagyst for AI Urine Sediment

Step B
Add a Stained Slide

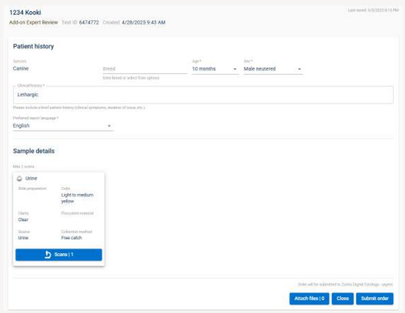






1. Prepare and include a **stained, air-dried urine sediment slide**.
   - Wet mounts are ideal for crystals and casts.
   - Stained slides are essential for evaluating bacteria and cell morphology.
2. You may upload **one additional scan** to supplement the AI scan. Select this button to add your stained slide.
3. Refer to the **Sample Prep Video** on page 21, “Create a Stained Slide” for instructions.

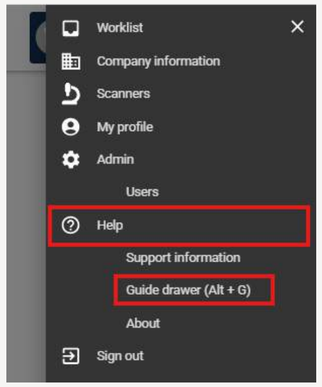
Step C
Add Patient Info and Files



1. Enter the patient’s **breed, age, and gender**.
2. Add any missing details (eg, **USG**) by clicking the sample card.
3. Attach relevant files (eg, CBC, chemistry, urinalysis) in **JPEG** or **PDF** format.

Using the Vetscan Imagyst for AI Urine Sediment

Step D
Submit and Review



1. Click **Close**, then **Submit Order**.
2. The test will appear in **Pending Orders** while under review.
3. Once reviewed, it moves to **Ready for Review**. Click Finalize to complete the process.
4. The report is now available in **Test History**, synced with **VetScan Fuse/Hub**, and added to the patient's PIMS record.
5. A **shareable PDF** is also available.
6. You can also find detailed instructions for running an AI Urine Sediment Analysis directly on the Vetscan Imagyst web platform. Simply open the Help section and click on the Guide drawer or press Alt + G for quick access.

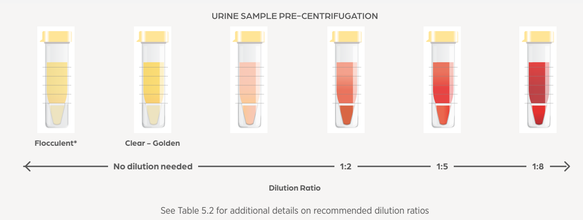
Dilution Guide

Quick Start Guide – Seven Step Dilution

For a more detailed explanation, please refer to the following section titled “When, Why and How to Dilute a Urine Sample”.

Step 1

Place 1 mL of urine sample in the centrifugation tube. Note pre-centrifugation color. Use this image to determine what dilution ratio is needed after centrifugation (Step 3).



See Table 5.2 for additional details on recommended dilution ratios

Step 2

Centrifuge with a corresponding tube for balance at 450-500RCF for 2 minutes.

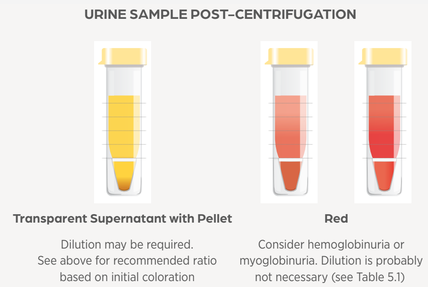
Step 3

Check the color of the supernatant.
If the supernatant is clear:

Go back to Step 1 to see if you need to dilute the sample and find the correct dilution ratio based on pre-centrifugation urine color.

If the supernatant is red:

Do not dilute the sample.



Step 4

Pour off the supernatant using the provided micropipette tip with a stopper.

Dilution Guide

Quick Start Guide – Seven Step Dilution (*Cont'd*)

Step 5

Refer to Table 5.2 to find the correct volume of 0.9% NaCl (saline) to add to the centrifuge tube. Add the recommended amount of saline to the tube. Thoroughly mix the pellet with the saline to fully resuspend it. Immediately place 20 µL of the resuspended sample onto the preprinted slide for scanning.

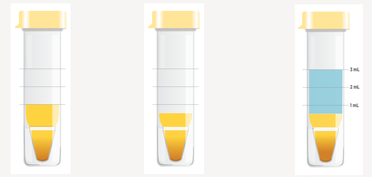
Table 5.2 *Dilution Preparation*
Add sterile saline (0.9% NaCl) to residual/concentrated urine to reach the desired dilution ratio.

Dilution Ratio (Approximate)	Approximate Residual Concentrate 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

Step 6

Note your dilution ratio in the Vetscan Imagyst app before scanning.

Figure 5.3 *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.

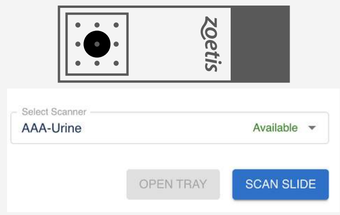


Centrifuged Sample | Supernatant Decanted | Diluted Sample

Mix sample well prior to adding to slide

Step 7

Scan the slide immediately.*



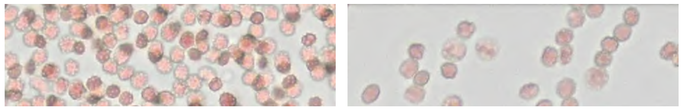
*Evaluating the sample immediately after dilution is vital as dilution can alter pH and osmolality, which can change cellular appearance or lead to non-pathologic crystal formation.

Dilution Guide

Understanding Dilution in Urine Sediment Analysis

Dilution is the process of reducing the concentration of a urine sample by adding a sterile solution—typically saline. This is done to improve the clarity of the urine sediment under microscopic evaluation. By spacing out the formed elements (such as cells, crystals, and casts), dilution helps prevent overlap, making it easier to identify and interpret these components accurately. This effect of dilution on a sample is illustrated in Figure 5.1.

Figure 5.1 *Pre–and Post–Dilution (1:8) of a Hematuric Sample (40x)*



When, Why and How to Dilute a Urine Sample?

The most common reason for dilution is **gross hematuria**—visible blood in the urine. In such cases, the sample may be too concentrated with red blood cells (RBCs), making it difficult to distinguish individual elements.

Another scenario is a **flocculent sample** (containing visible clumps or particles). These samples may require scanning first to determine the cause of the flocculation before deciding on dilution.

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

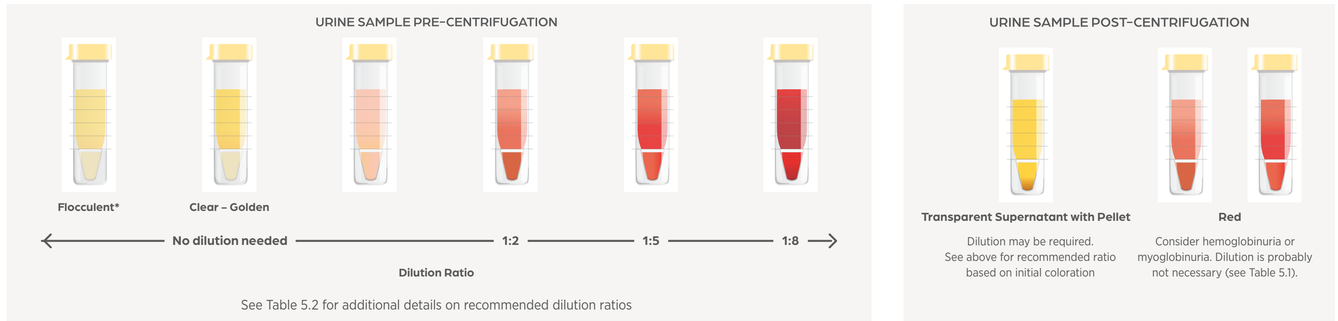
Step 1

Before centrifuging the urine sample – Observe the color of the urine sample

Before deciding to dilute, assess the color and clarity of the urine sample prior to centrifugation (refer to Figure 5.2):

1. **Abnormal color** may result from metabolic or pathological conditions, muscle damage, or medications.
2. **Turbidity** (cloudiness) can be caused by the presence of cells, crystals, mucus, fat, bacteria, casts, or spermatozoa.

Figure 5.2 *Suggested Dilution Ratios Based on the Color of the Urine Sample*



*Approximate volume.

Dilution Guide

Step 2

After centrifuging the urine sample – Observe the supernatant (the liquid above the sediment):

1. If it remains **pink, red, or brown**, it likely contains free hemoglobin or myoglobin, not just RBCs. In this case, **do not dilute**—proceed with scanning.
2. If the supernatant is **clear**, the color and turbidity are likely due to formed elements like RBCs or WBCs. In this case, **dilution is recommended**.

Refer to Table 5.1 for a summary of interpreting pre- and post-centrifugation urine color.

Table 5.1 *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

Step 3

If warranted, dilute the sample:

1. **Check the Color Guide**
   Refer to Figure 5.2 to assess the red-orange hue of your urine sample **before centrifugation**.
2. **Determine the Dilution Ratio**
   Based on the color intensity, choose the appropriate dilution ratio (eg, 1:2, 1:5, or 1:8).
3. **Add Sterile Saline**
   Using **Table 5.2** as a reference, add sterile saline to the sample preparation tube according to your chosen dilution:

1:2 dilution	Fill saline up to the **1 mL** line.
1:5 dilution	Fill saline up to the **2 mL** line.
1:8 dilution	Fill saline up to the **3 mL** line.

Dilution Guide

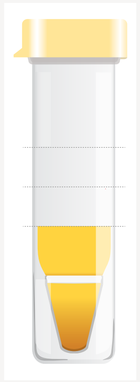
Table 5.2 *Dilution Preparation*

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

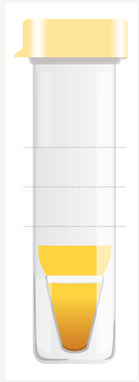
Dilution Ratio (Approximate)	Approximate Residual Concentrate Urine Volume	Sterile Saline Volume (0.9% NaCl)	Corresponding fill line on sample preparation tube
1:2	0.35 mL	0.65 mL	1 mL
1:5	0.35 mL	1.65 mL	2 mL
1:8	0.35 mL	2.65 mL	3 mL

Figure 5.3 *Dilution Process*

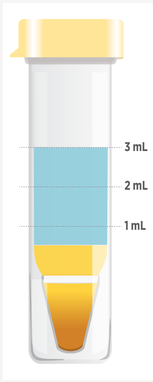
Centrifuge, decant supernatant, and add the appropriate saline volume. Note that the correct amount of saline will fill the tube to the 1 mL, 2 mL, or 3 mL lines.



Centrifuged Sample



Supernatant Decanted



Diluted Sample
Mix sample well prior to adding to slide

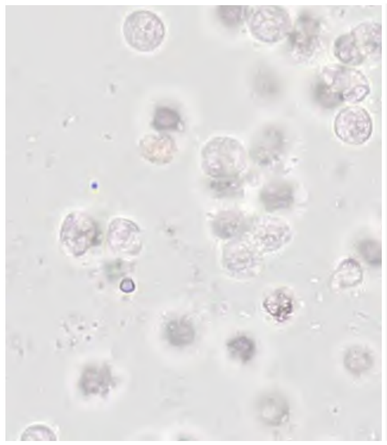
Interpretation Guide and Suggested Reference Intervals

A complete urinalysis should accompany every complete blood count (CBC) and blood chemistry profile, as it provides essential diagnostic insights that other tests may not reveal. Urine sediment examination, a key component of urinalysis, offers valuable information about urinary tract health. While manual microscopic sediment analysis is low-cost, it can be time-consuming, labor-intensive, and lacks consistency across evaluations. Vetscan Imagyst AI Urine Sediment addresses these challenges by automatically analyzing sediment elements with high reliability. Using advanced AI technology, it detects and identifies bacteria, crystals, cells, spermatozoa, and casts—supporting veterinarians in diagnosing urinary tract conditions and guiding further diagnostic and treatment decisions.

Urine Sediment Elements: Detection, Classification, and Clinical Relevance

The Vetscan Imagyst AI Urine Sediment algorithm semi-quantitatively detects and reports the elements listed in Table 6.1. For visual reference and further clarification, additional example images are provided in Figure 6.1. It's important to note that the VetScan Imagyst system evaluates the equivalent of approximately **1,000 high-power fields (HPFs)**. While the total number of elements reported may appear high, clinical interpretation should focus on the number of elements per HPF or low-power field (LPF), as this is the standard metric for assessing diagnostic relevance.

Table 6.1 *Urine Sediment Elements*

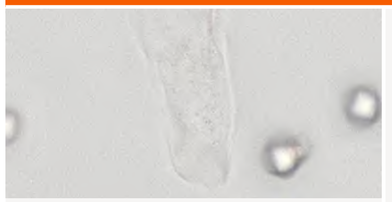
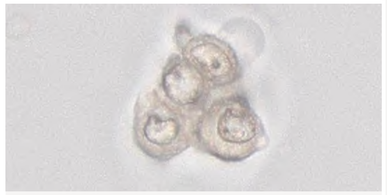
Urine Sediment Elements*	
	**Red Blood Cells (RBCs)** The most common causes of hematuria in veterinary medicine are bacterial infections, neoplasia and trauma (cystocentesis, urolithiasis, injury). The causes of hematuria can be grouped in categories such as renal parenchymal disease, renal vascular 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.
	**White Blood Cells (WBCs)** White blood cells (WBCs) in the urine sediment of dogs and cats typically indicate inflammation or infection within the urinary tract. While 0-5 WBCs per high-power field (HPF) may be considered within normal limits in well-concentrated urine, this range may not be normal in dilute urine (hyposthenuria), where even low numbers of WBCs can be clinically significant. Elevated WBC counts—referred to as pyuria—can signal a variety of conditions. The most common causes in veterinary medicine include urinary tract infections (upper or lower), urolithiasis, neoplasia, and inflammation or infection of the genital tract. Accurate interpretation requires consideration of the urine's concentration, collection method, and accompanying sediment findings, as contamination—especially in free-catch samples—can lead to falsely elevated WBC counts. Integrating these findings with clinical signs is essential for appropriate diagnosis and treatment planning.[1]

*Multiple magnifications shown.

Reference: 1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pg 177-219.

Interpretation Guide and Suggested Reference Intervals

Table 6.1 *Urine Sediment Elements (Cont'd)*

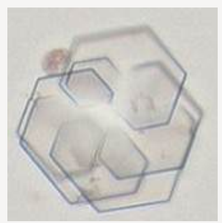
Urine Sediment Elements*	
 Squamous  Other Epithelial	**Squamous, Transitional (Urothelial), and Renal Tubular Epithelial Cells** Increased numbers of squamous epithelial cells most commonly occur due to estrus, neoplasia and collection of urine via catherization. Small numbers are also common with voided samples as a result of normal cell turnover in the urinary tract. 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.
 Struvite	**Struvite and Calcium Oxalate Dihydrate Crystals** **Struvite –** Also known as ammonium phosphate crystals, they are a common finding in dog and cat urine samples. Classically they are colorless, refractile and variable in size. They can be oblong and coffin-shaped but can be found in other formations. Alkaline and concentrated urine encourages their precipitation. The presence of urease-producing bacteria (either because of a UTI or sample contamination) leads to increased urine pH and encourages struvite formation.[2] In a 2001 study designed to evaluate the reliability of the diagnosis of struvite crystalluria in stored urine samples, Sturgess et al found that in SPF cats fed a diet of mixed wet and dry food, any storage of their urine samples, whether bench top or in the refrigerator, could result in precipitation of struvite crystals. Crystalluria was detected in at least one stored sample in 92% of cats fed a mixed wet/dry food diet compared to 24% in the fresh sample. Further, re-suspending and re-warming the remainder of the sample did not result in significant re-dissolution of struvite crystals that had precipitated out during refrigeration. Interestingly, urine samples from cats fed a wet food-only diet, did not precipitate crystals during storage.[2]
 Calcium Oxalate Dihydrate	**Calcium Oxalate Dihydrate –** Also common in both cats and dogs and generally associated with more acidic urine. Rarely they may be associated with hypercalcemia. The crystals are square with a classic Maltese Cross formation.[1]

*Multiple magnifications shown.

References: 1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pg 177-219. **2.** Sturgess, CP, Hesford, A, Owen, H and Privett, R. An investigation into the effects of storage on the diagnosis of crystalluria in cats. Journal of Feline Medicine and Surgery (2001) 3, pg 81–85 doi:10.1053/jfms.2001.0118.

Interpretation Guide and Suggested Reference Intervals

Table 6.1 *Urine Sediment Elements (Cont'd)*

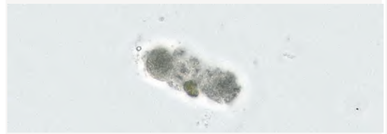
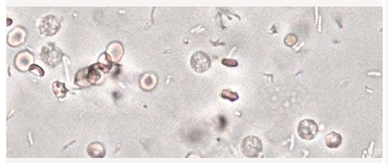
Urine Sediment Elements*	
	**Ammonium Urate (Biurate)** Urate crystals are spherical and have a characteristic yellow-brown color. The spheres can be smooth or have projections from the surface sometimes referred to as "thorn apple". Ammonium urate and amorphous urates are common in the urine sediment of Dalmatians and English bulldogs. Urate crystals can be observed in dogs of these breeds whether or not urate urolithiasis is present because of breed-specific genetic mutations for synthesis of uric acid transporters in the kidney and liver. The presence of ammonium biurate crystals in the urine of other breeds of dogs and in cats can be associated with high blood ammonia concentrations because of congenital or acquired portosystemic shunting or severe hepatic disease. Cats with urate urolithiasis most often have urate crystalluria that is not associated with hepatic disorders. The Egyptian Mau, Birman, and Siamese breeds are at increased risk for urate urolithiasis, and presumably this predisposition is associated with increased urate crystalluria observed on urine sediment examination.[1]
	**Bilirubin** Bilirubin crystals occur as single needles or clusters (sheaves) of needles. These crystals are dark orange to golden brown in color. Dogs normally have a low renal threshold for excretion of conjugated bilirubin, and male dogs excrete more bilirubin into their urine than do females. Consequently, small numbers of bilirubin crystals are considered normal in concentrated urine samples from dogs, but not in cats. The finding of increased numbers of bilirubin crystals has the same clinical relevance as does a positive dipstrip chemical reaction for bilirubin (ie, hemolytic, primary hepatic, and post-hepatic diseases).[1]
	**Cystine** Cystine crystals appear as colorless flat hexagonal sheets of variable thickness. The observation of cystine crystals in urine sediment is never normal as it indicates the presence of the metabolic disorder of cystinuria. In health, nearly all cystine is reabsorbed from tubular fluid by transporters along the proximal tubule. Cystinuria is caused by a congenital or acquired defect in these transport systems linked to specific genes (Type 1 in Labrador Retrievers and Newfoundlands; Type 2 in Australian Cattle Dogs and Miniature Pinshcers) or androgen hormone (Type 3 most often seen in English Bulldogs, French Bulldogs, and English Mastiffs).[2] Siamese and American Domestic Shorthair cats are at increased risk for cystinuria and cystine uroliths.

*Multiple magnifications shown.

References: 1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pg 177-219. **2.** Ettinger SJ, Feldman EC, Côté E, eds. Textbook of Veterinary Internal Medicine: Diseases of the Dog and the Cat. 8th ed. Elsevier; 2017.

Interpretation Guide and Suggested Reference Intervals

Table 6.1 *Urine Sediment Elements (Cont'd)*

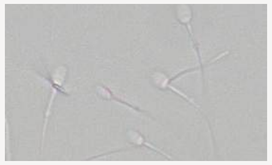
Urine Sediment Elements*	
	Cystine (contd.) While Newfoundland, English Bulldog, Dachshund, Chihuahua, Mastiff, Australian Cattle Dog, Bullmastiff, and American Staffordshire terriers can all have a genetic defect solely affecting the transport of cystine, Basenjis can have a genetic defect affecting all amino acid transport.[1] Compared to castrated male dogs intact male dogs have an increased risk of cystine urolith formation and castration can result in a marked decrease in cystinuria in intact dogs with androgen dependent cystinurias.[2]
 Hyaline  Non–hyaline	**Hyaline and Non–hyaline Casts** Casts are cylindrical structures formed in the renal tubules and excreted into the urine, often serving as important indicators of kidney health. Even in low numbers, their presence can suggest renal pathology. Because casts begin to degrade quickly after urine is collected, analyzing a fresh sample—ideally within 15 minutes—is essential for accurate detection. Their size and shape vary depending on where they form in the nephron, but they typically have rounded ends and may be composed of matrix proteins, cells, or granules. On the VetScan Imagyst AI Urine Sediment platform, casts are categorized into two main groups: hyaline and non-hyaline. Hyaline casts are the most common, appearing as clear, hard-to-see structures that may be found in small numbers in healthy animals but can increase with kidney disease. All other types—granular, waxy, and cellular casts—are grouped as non-hyaline. Granular casts originate from cell debris and may indicate active kidney issues when present in larger amounts. Waxy casts, which are highly refractive and brittle, are always abnormal and suggest chronic kidney damage. Cellular casts, composed of red or white blood cells or renal tubular epithelial cells, are rare and always signal underlying kidney disease. Occasionally, structures known as pseudocasts—such as mucus strands or clumps of cells—may resemble true casts but lack their uniform structure and require careful interpretation. An increase in non-hyaline casts typically points to renal pathology, while a rise in hyaline casts may reflect proteinuria from either pre-renal or renal causes. For complex or uncertain cases, an Expert Review is recommended.
 Cocci  Rod	**Cocci and Rod Bacteria** 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.

*Multiple magnifications shown.
†Additional costs may apply.

References: 1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pg 177-219. **2.** Hesse A, Hoffmann J, Orzekowsky H, Neiger R. Canine cystine urolithiasis: a review of 1760 submissions over 35 years (1979–2013). Can Vet J. 2016;57(3): pg 277–281.

Interpretation Guide and Suggested Reference Intervals

Urine Sediment Elements*



Spermatozoa

Spermatozoa is regularly found in the urine of intact male dogs and occasionally intact male cats. They can also be normal in the urine of a recently bred female.[1]

Recognizing and Managing Urine Sediment Artifacts

Urine can commonly contain contaminants or objects that can be difficult to identify, regardless of the urine collection method (Table 6.2). 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 6.2 *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.

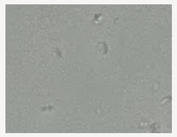
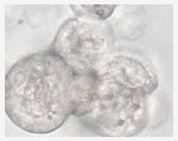
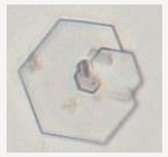
Reference: 1. Chew, Dennis and Schenck, Patricia A. Urinalysis in the Dog and Cat. First edition. Wiley Blackwell. 2023: pg 177-219.

Interpretation Guide and Suggested Reference Intervals

Urine Sediment Flags and Recommended Clinical Action

All Vetscan Imagyst AI Urine Sediment results and images should be interpreted alongside the patient's clinical history and physical examination findings. The platform's flags and clinical profiles are designed to offer additional diagnostic context based on the elements detected by the analyzer. For a quick reference to specific flag criteria, associated clinical profiles, and recommended actions, please refer to Table 6.3 below.

Table 6.3 *Urine Sediment Flags and Recommended Clinical Action*

Clinical Profile	Flag Criteria	Review Images*	Recommended Action
Infection	WBC >5/HPF		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 (cocci or rods) ≥ 1+		If clinical signs support a urinary tract infection, culture and sensitivity are recommended to aid in appropriate antimicrobial selection
	WBC >5/HPF AND Bacteria (cocci or rods) ≥ 1+		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.
Epithelial Cells	Epithelial cells (squamous or other) >2–4 cells/HPF		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.
Casts	>0.5 casts/LPF		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.
Cystine	<0.1 cystine found AND 4 high confidence images are shown		<0.1 cystine crystals/HPF were detected in this sample. Review of cystine images is strongly recommended, as any cystine crystals in urine sediment requires further evaluation. Add-On Expert Review† of crystals is available.

*Multiple magnifications shown.
†Additional costs may apply.

Interpretation Guide and Suggested Reference Intervals

Visual Reference Guide: Urine Sediment Atlas

Figure 6.1 *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

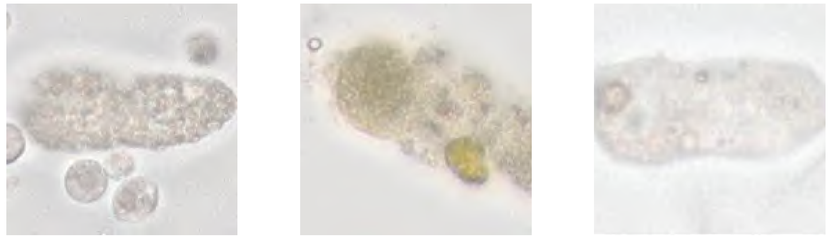
Interpretation Guide and Suggested Reference Intervals

Figure 6.1 *Urine Sediment Atlas*

All images shown at 40x magnification.

Hyaline Casts

Non-hyaline Casts



Cocci Bacteria

Rod Bacteria

Miscellaneous

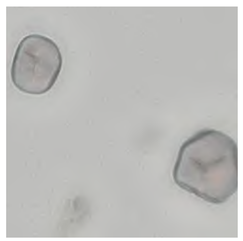
While these objects are not reported or quantified in the final results, they are incorporated into the system's training to enhance accuracy and reduce the risk of misidentifying them as other urinary elements. As a result, you may observe them on the whole slide image (WSI), but they will not be highlighted or included in the object count.

Airbubble

Alternaria

Amorphous Crystals

Pollen



Starch or
Glove Powder

Interpretation Guide and Suggested Reference Intervals

Interpreting Reference Intervals for Urine Sediment Elements

The suggested reference intervals outlined in Table 6.4 represent the typical range of urine sediment elements considered "normal," taking into account the method of urine collection and sample handling. When interpreting results, it is essential to consider the patient's clinical signs, the collection technique, urine chemistry findings, specific gravity, and blood chemistry values to ensure accurate and clinically relevant conclusions.

Table 6.4 *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	2-10
Calcium Oxalate Dihydrate Crystals	Fresh, Warm Urine	0
	Refrigerated/Stored	2-10
Bilirubin Crystals	Fresh, Warm Urine	0-2**
	Refrigerated	2-10
Ammonium Biurate Crystals	Fresh, Warm Urine or Refrigerated	0
Cystine Crystals	Fresh, Warm Urine or Refrigerated	0
Bacteria	Voided/Catheterization	0-1+
	Cystocentesis	0
Epithelial Cells	Squamous	0-4
	Other	0-4***
Casts*	Hyaline	0-2/LPF
	Non-hyaline	0-1/LPF****

*All elements recorded per HPF (40X) except for casts which are reported per LPF (10X).
**Low numbers may be seen in "healthy" dog, especially in concentrated urine and male dogs.
***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 6.2).[1]

Figure 6.2 *Intracellular Cocci Bacteria*

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

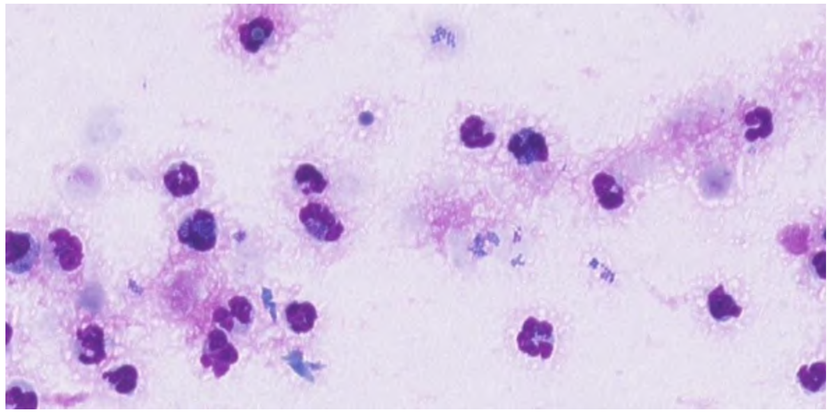
References: 1. Skeldon, N. and Ristić, J. BSAVA Manual of Canine and Feline Clinical Pathology (3rd Edition). Quedgeley, Gloucester: BSAVA, 2016, pg 184-205. **2.** Sink, C.A. and Weinstein, N.M. Practical Veterinary Urinalysis. Wiley-Blackwell, 2012, pg 134. **3.** Swenson CL, Boisvert AM, Gibbons-Burgener 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 6.3 *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 6.3).[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 6.5 *Excerpt from a Zoetis Reference Laboratories Urine Culture & Sensitivity Report*

Urine C&S (Culture & Sensitivity)

Urine Collection Method: Cystocentesis

Media Plated
Culture Results
Organism:
Quantity

Culture plated on 09/12/2023
Growth Present
Escherichia coli
4+ Growth (> 100,000 cfu/mL)

Sensitivity	Escherichia coli
Amikacin	S, <=2
Amoxicillin/Clavulanic Acid	S, <=2
Ampicillin	S, <=2
Cefalexin	S, 8
Cefovecin	S, <=0.5
Cefpodoxime	S, <=0.25
Ceftazidime	S, <=0.12
Ceftiofur	S, <=1
Chloramphenicol	S, 4

Sensitivity	Escherichia coli
Ciprofloxacin	S, <=0.06
Doxycycline	S, 1
Enrofloxacin	S, <=0.12
Florfenicol	S
Imipenem	S, <=0.25
Marbofloxacin	S, <=0.5
Nitrofurantoin	S, <=16
Trimethoprim-sulfamethoxazole	S, <=20
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]

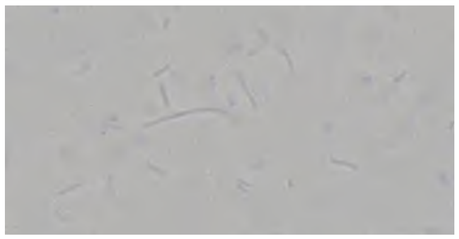
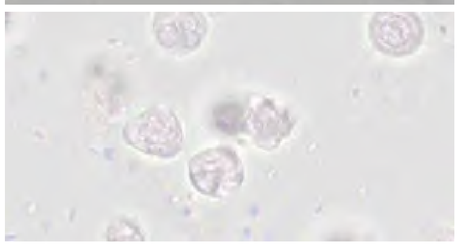
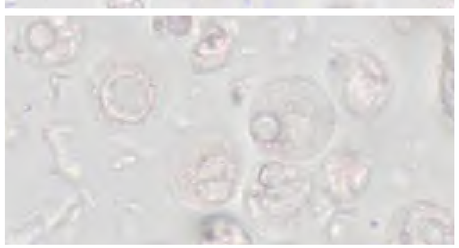
Ideally, urine samples are processed immediately to avoid false increases or decreases in bacterial counts. A urine culture and sensitivity test identifies the bacterial isolate(s) and provides information regarding appropriate selection of antimicrobials (Table 6.5).[4]

Given the variables involved in interpreting urine sediment results in a suspected urinary tract infection, sometimes it can be a clinical challenge. Clinical history and physical exam finding are invaluable. On the following page, Table 6.6 provides guidance on recommended action to take following when clinical signs and visualization of urine sediment elements are found.

References: 1. Sink, C.A. and Weinstein, N.M. Practical Veterinary Urinalysis. Wiley-Blackwell, 2012, pg 134. **2.** Skeldon, N. and Ristić, J. BSAVA Manual of Canine and Feline Clinical Pathology (3rd Edition). Quedgeley, Gloucester: BSAVA, 2016, pg 184-205. **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, pg 152.

Interpretation Guide and Suggested Reference Intervals

Table 6.6 Quick Guide for Interpretation of Possible UTI

Urine sediment digital slide image	Clinical Signs of UTI Present	Recommended Action
None	No	None ***Bacteria: None to Rare***
None	Yes	Review WSI. Consider Add-On Expert Review* with a stained, air dried smear. Consider C&S. ***Bacteria: None to Rare***
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] ***Bacteria: 3+***
WBC 	Yes	Consider sending a C&S. Consider Add-On Expert Review* to evaluate WBC morphology. ***Bacteria: None to rare, WBC: 6-20/HPF***
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. ***Bacteria: 2+, WBC: 6-20/HPF***

*Additional costs may apply.

Reference 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 Virtual Laboratory is an integrated support network of board-certified specialists paired with expert-level AI[1-12], enhancing every element of your diagnostic practice to make diagnostic and treatment decisions with confidence.

- ✓ **Best-in-class* AI**
  Powerful deep-learning AI analysis, backed by years of demonstrated reliability and millions of scans completed[†]
- ✓ **Anytime[‡] expert support**
  Convenient expert review and complimentary specialist consultations available via Zoom™ [§] or email, for the support you need to diagnose any case
- ✓ **Connected diagnostic insights**
  Fully integrated workflow with point-of-care results, specialist consultation insights and Zoetis Reference Laboratories — all accessible in your ZoetisDx portal

Figure 7.1 *The Zoetis Diagnostics Portfolio*

*Vetscan Imagyst is the only commercial AI analyzer available on the market offering six testing capabilities.
[†]Completed on Vetscan Imagyst.
[‡]Dependent on consultant availability.
[§]Zoom is a trademark of Zoom Video Communications, Inc.

References: 1. Data on file, Study No. DHXMZ-US-25-285, 2025, Zoetis Inc. **2.** Data on file, Study No. DHXMZ-US-25-286, 2025, Zoetis Inc. **3.** Data on file, Study No. DHX6Z-US-23-205, 2024, Zoetis Inc. **4.** Data on file, Study No. DHX6Z-US-23-206, 2024, Zoetis Inc. **5.** Data on file, Study No. DHX6Z-US-23-209, 2024, Zoetis Inc. **6.** Data on file, Study No. DHX6Z-US-24-257, 2024, Zoetis Inc. **7.** Data on file. Study No. DHX6Z-US-24-242, 2024, Zoetis Inc. **8.** Data on file, Study No. DHX6Z-US-24-275, 2024, Zoetis Inc. **9.** Data on file, Study No. DHX6Z-US-24-276, 2024, Zoetis Inc. **10.** Data on file, Study No. DHX6Z-US-23-222, 2023, Zoetis Inc. **11.** Data on file, Study No. DHX6Z-US-22-131, 2022, Zoetis Inc. **12**. Data on file. Study No. DHXMZ-US-24-235, 2024, Zoetis Inc.

More on The Zoetis Virtual Laboratory

A More Complete Diagnostic Picture

Cutting-edge AI and specialist expertise combine in the Virtual Laboratory to offer comprehensive results that can help you elevate your diagnostic workup and individualize patient care. The best-in-class AI algorithm that powers Vetscan Imagyst analysis is trained by board-certified clinical specialists and backed by years of demonstrated reliability. Complimentary specialist consultations are available on any case, anytime*.

End–to–End Expert Support

The Virtual Laboratory provides access to a global support network of board-certified specialists across 14 different specialties for complimentary consultations and the ability for Add-on Expert Review† with the Vetscan Imagyst.

How to Schedule a Complimentary Consultation

You can schedule consultations through your ZoetisDx portal, online or in the mobile app. Connect via email anytime or Zoom™‡ appointment on the date and time of your choosing — whether you need recommendations for further diagnostic testing, guidance on diagnosis and treatment, or a second opinion.

1. After logging in, start a New Consultation request from either the main navigation or the right side panel of the home page
2. Choose the Specialty and Consultation Type, and select either a scheduled Zoom appointment or an emailed response Click **Let's Go**
3. Complete the request form. Zoetis specialists are already able to view all Zoetis test results in your account, but you can add any relevant case details
4. When finished, click **Submit**
5. If you selected a Zoom appointment, you will receive an email confirmation with the date, time and Zoom link

Note: Detailed case reports are available within 24 business hours after every consultation. You can access them on the home, patient information and consultation pages of your ZoetisDx portal.

*Dependent on consultant availability.
†Additional costs may apply.
‡Zoom is a trademark of Zoom Video Communications, Inc.

More on The Zoetis Virtual Laboratory

How to Request Add-On Expert Review

If you would like an expert clinical pathologist to review any of your AI Urine Sediment, you can request an Add-on Expert Review.*
For detailed instructions, see Steps 4-5: Using Vetscan Imagyst Urine Sediment.

Figure 7.2 *The Vetscan Imagyst Workflow*

*Add-on Expert Reviews are available for Vetscan Imagyst cases when clinically warranted. Option to send digital slide image to our network of clinical parasitologists or pathologists as needed. Additional costs may apply.

Reference: 1. Data on file, Study No. TI-11711 2024, Zoetis Inc.

Vetscan Imagyst Maintenance Guide

Routine Cleaning

Required Materials

Regular cleaning is vital to keeping your Vetscan Imagyst in good working order. It's important to follow the cleaning protocol and use only the recommended materials to avoid damaging the Vetscan Imagyst.

When cleaning the Vetscan Imagyst, you'll need the following materials:

Figure 8.1 *Vetscan Imagyst AI Urine Sediment Required Materials for Routine Cleaning*

Distilled water

Soft, damp, lint-free cloth

Isopropyl alcohol

Protective cloth

Microfiber cloth

Swab/foam tip

Vetscan Imagyst Maintenance Guide

Vetscan Imagyst Scanner Cleaning Protocol

Follow these simple steps to safely clean your scanner and maintain optimal image quality:

1. **Power Off**
   Press the power button to turn off the scanner.
2. **Unplug**
   Disconnect both the power and network cables.
3. **Access the Interior**
   Gently slide the top plate forward to expose internal surfaces.
4. **Wipe Surfaces**
   Use a soft, damp, lint-free cloth with distilled water to wipe all surfaces. For deeper cleaning, you may use a microscope cleaner or a 70% isopropyl alcohol and 30% distilled water solution. *(The Ocus® scanner is compatible with Reagena™ microscope detergent.)*
5. **Clean Edges**
   Use a foam tip or cleaning swab with distilled water to clean around the edges.
6. **Dry Thoroughly**
   Dry all surfaces using a clean, lint-free cloth or Kimwipes™.
7. **Reposition the Plate**
   Slide the top plate back into its original position.
8. **Protect the Objective**
   Place a protective cloth over the glass beneath the objective lens.
9. **Clean the Objective Lens**
   Start by gently wiping the lens in place with a microfiber cloth or lens paper. If needed, use warm distilled water on the cloth or a foam swab for more thorough cleaning.
10. **Reconnect and Power On**
    Plug the cables back in and turn the scanner on
11. **Verify Image Quality**
    If scans were blurry before cleaning, re-scan a known sample and check:
    - The overview camera produces clear images.
    - The microscope camera's live view is sharp.
    - The scanned sample slide shows good image quality.
12. **Repeat if Needed**
    If image quality is still poor, repeat the cleaning steps above and use isopropyl alcohol when cleaning. If image quality is still poor, follow the In-Depth Cleaning Procedure (pg 50) to clean the scanner objective.

IMPORTANT: Never pour or spray any liquids directly on the scanner.

Vetscan Imagyst Maintenance Guide

In–Depth Cleaning: The Objective

Required Materials

Regular cleaning is vital to keeping your Vetscan Imagyst in good working order. It's important to follow the cleaning protocol and use only the recommended materials to avoid damaging the Vetscan Imagyst.

When cleaning the Vetscan Imagyst objective, you'll need the following materials:

Figure 8.2 *Vetscan Imagyst AI Urine Sediment Required Materials for In–Depth Cleaning*

Distilled water*

Microfiber cloth

Bulb syringe

Protective cloth

Soft, damp, lint-free cloth

Swab/foam tip

*You can use a microscope cleaner or a solution of 70% isopropyl alcohol and 30% distilled water.

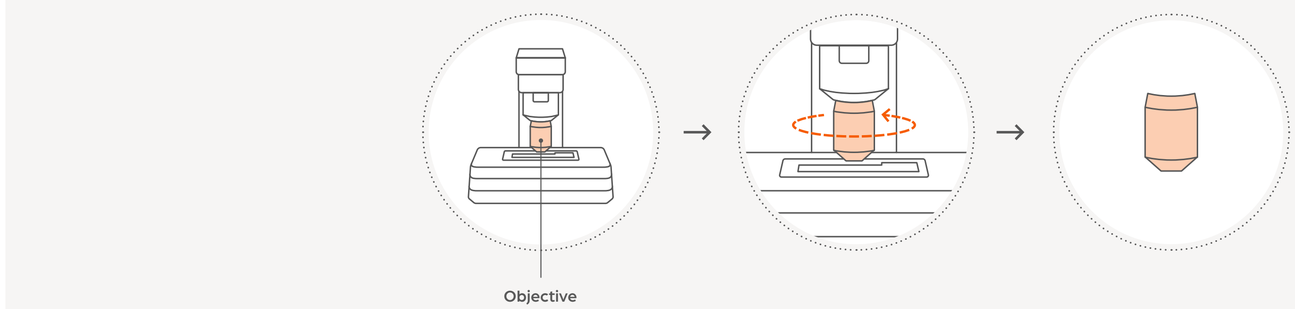
Vetscan Imagyst Maintenance Guide

Follow these steps for a thorough cleaning of the scanner's objective lens and internal components:

1. **Power Down the Scanner**
   Press the power button to turn off the scanner.
2. **Unplug the Scanner**
   Disconnect both the power and network cables.
3. **Protect the Glass Surface**
   Place a soft, protective cloth over the glass beneath the objective lens to prevent damage during cleaning.
4. **Clean the Objective Lens (In Place) – Performed by Zoetis personnel only**
   Start by gently wiping the lens with a microfiber cloth or lens paper. If needed, dampen the cloth with warm distilled water or use a foam tip/swab with lukewarm distilled water for more effective cleaning.

IMPORTANT: Never pour or spray any liquids directly on the scanner.

Figure 8.3 *How to Unscrew the Objective*



5. **Remove the Objective (If Needed) – Performed by Zoetis personnel only**
   If the lens remains dirty, carefully unscrew the objective for direct access. *(See Figure 8.3 for guidance.)*
6. **Clean the Lens Thoroughly – Performed by Zoetis personnel only**
   Use a microfiber cloth and warm distilled water to gently clean the lens surface.
7. **Remove Dust**
   Use a bulb syringe to blow away any dust from the lens and surrounding scanner components.
8. **Reattach the Objective**
   Gently screw the objective back into place.
9. **Reconnect and Power On**
   Remove the protective cloth, reconnect the power and network cables, and turn the scanner back on.
10. **Run a Test Scan**
    Perform a test scan to ensure the scanner is functioning properly and image quality has improved.

Vetscan Imagyst Maintenance Guide

Tips for Success

Do	Don't
✓ Use warm distilled water, isopropyl alcohol or microscopic cleaning fluid to clean immersion oil from the lens	× Pour or spray any liquids directly on the scanner
✓ Use isopropyl alcohol or isopropyl alcohol wipes sparingly	× Use acetone or xylene to clean the lens, as they may damage it. However, if the lens is covered with glue/adhesive, cleaning the lens may require using stronger cleaners
✓ Contact Diagnostic Technical Support for further help if needed	× If removed, forcefully screw the objective back onto the scanner

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

- **How to Clean the Lens**
  https://www.youtube.com/watch?v=lOnEgSGD1Bw
- **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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https://www.zoetisdiagnostics.com/