



ZOETIS DIAGNOSTICS

**GetWell**

# Polyuria/Polydipsia

Guidance on diagnostic decision-making for polyuria (PU) and polydipsia (PD) in cats and dogs

**zoetis**

# Polyuria (PU) and polydipsia (PD) are a frequent reason for vet visits and always occur together, though most pet owners only see PU or PD.<sup>1</sup>

A minimum initial database, including CBC, serum biochemistry profile, urinalysis (USG, dipstick, and sediment exam), and assessment of thyroid function (in cats), should always be performed when PU/PD is strongly suspected.<sup>2</sup>

**Polydipsia (PD):** Excessive water intake  
(>100 ml/kg per day in dogs; >50 ml/kg per day in cats)<sup>3</sup>

Note: Water intake in healthy animals can be extremely variable and may be significantly influenced by:<sup>3</sup>

- ✓ Environmental temperature and humidity
- ✓ Activity level/behavior
- ✓ Water content of diet

**Polyuria (PU):** Excessive urine production  
(>100 ml/kg per day in dogs; >50 ml/kg per day in cats)<sup>3</sup>

Defined by conscious voiding of large volumes of urine, not to be confused with pollakiuria (frequent urination) or stranguria (straining to urinate).<sup>4</sup>

**Diagnostic evaluation in patients with PU/PD** is aimed at identification of the underlying disease, rather than focusing on the specific urinary concentrating defect.<sup>2</sup>

With over 30 causes of PU/PD, the diagnostic workup can seem daunting to both clinician and client, but is simplified by a consistent, methodical approach guided by history, physical exam, and routine laboratory findings.<sup>1</sup>

## Urine Concentration Range and Function Impairment

Function/Process Affected	Range of USG	Causes
Permanent loss of or temporary damage to functional nephron mass	1.008-1.012*	<ul style="list-style-type: none"> <li>✓ Chronic kidney disease (CKD)</li> <li>✓ Acute kidney injury (AKI)</li> </ul>
Loss of normal corticomedullary concentration gradient ("medullary washout")	>1.008	<ul style="list-style-type: none"> <li>✓ Iatrogenic (e.g., crystalloid diuresis, loop diuretics)</li> <li>✓ Increased renal tubular blood flow (e.g., hyperthyroidism)</li> <li>✓ Hyponatremia (e.g., hypoadrenocorticism)</li> <li>✓ Decreased BUN (e.g., portosystemic shunt, hepatic synthetic failure, ultra low protein diet)</li> </ul>
Increased osmolality of tubular filtrate causing osmotic diuresis	>1.008	<ul style="list-style-type: none"> <li>✓ CKD</li> <li>✓ Post obstructive (e.g., urethral or ureteral obstruction) diuresis</li> <li>✓ Glucosuria (e.g., diabetes mellitus, primary renal)</li> <li>✓ Polyuric AKI</li> </ul>
Lack of antidiuretic hormone (ADH) production causing central diabetes insipidus	<1.008, <1.015 (partial)	<ul style="list-style-type: none"> <li>✓ Idiopathic</li> <li>✓ Neoplasia</li> <li>✓ Head trauma</li> <li>✓ (Erythrocytosis)</li> <li>✓ (Hyperaldosteronism)</li> </ul>
Decreased renal tubular response to ADH causing nephrogenic diabetes insipidus (NDI)	1.001-1.030	<ul style="list-style-type: none"> <li>✓ Endogenous or exogenous glucocorticoids</li> <li>✓ Hypercalcemia of any cause</li> <li>✓ Leptospirosis</li> <li>✓ E. coli endotoxemia (e.g., pyometra, prostatic abscess)</li> <li>✓ (Hypokalemia)</li> <li>✓ (Primary NDI)</li> </ul>
Inappropriately increased water intake (primary/psychogenic polydipsia)	1.001-1.045	<ul style="list-style-type: none"> <li>✓ Behavioral (e.g., stress/anxiety-induced, obsessional, displacement)</li> <li>✓ Encephalopathic (particularly hepatic)</li> <li>✓ (Splenomegaly)</li> </ul>

BUN = blood urea nitrogen; USG = urine specific gravity

\*Depending on the degree of nephron loss, USG up to 1.029 is possible in dogs. Cats with chronic kidney disease may retain the ability to concentrate their urine to a USG of 1.040 or 1.045 and therefore be azotemic without significant polyuria/polydipsia.<sup>5</sup>



# Things to know

## PU/PD in dogs and cats



The most common causes in dogs are

**Chronic kidney disease (CKD)  
Diabetes mellitus  
Hyperadrenocorticism<sup>2</sup>**



The most common causes in cats are

**Chronic kidney disease (CKD)  
Diabetes mellitus,  
Hyperthyroidism<sup>2</sup>**

- 1 PU/PD is not a final diagnosis, but rather evidence of an underlying medical condition requiring further investigation and identification. A search for the root cause entails comprehensive clinical evaluation, rooted in the history, physical examination, and diagnostic minimum database.
- 2 PU and PD almost invariably occur in combination. In most instances, obligatory PU is followed by compensatory PD. Occasionally, PD is the primary problem with compensatory PU.
- 3 Dog owners tend to recognize polydipsia more reliably than polyuria, since dogs are often let outside to urinate. Cat owners tend to recognize polyuria more reliably since it's evident in litterboxes.
- 4 It's important to ask about current medications and supplements, and identify any that could interfere with normal concentrating mechanisms. Common examples are glucocorticoids (including inhaled forms as well as those in topical skin, ear, or eye medications), diuretics, and phenobarbital.

- 5 Routine serum biochemistry assessment can suggest kidney, liver, or adrenal gland dysfunction, which causes PU/PD via decreased renal sensitivity to ADH (secondary nephrogenic diabetes insipidus) and/or decreased ADH release from the pituitary.
- 6 Water deprivation testing is very rarely indicated in a PU/PD workup. This test chiefly differentiates between central diabetes insipidus and primary (psychogenic) polydipsia after all other possible etiologies have been ruled out. Frequently, this determination can be made more safely by a desmopressin (DDAVP) test.



**Water deprivation testing should never be performed in a patient with preexisting azotemia, hypernatremia, or obvious dehydration on physical examination. Water restriction can be extremely dangerous for obligate polyuric animals (which most PU/PD patients are) and should only be performed in a controlled setting with close monitoring of specific parameters.**

- 7 PU/PD management focuses on identification and treatment of the underlying cause. Pet owners should allow free access to water during the diagnostic process.

### Key urination history questions

1. What changes have you noticed in your pet's urination habits?
2. How frequently does your pet urinate?
3. Does your pet urinate a single large volume or multiple small volumes?
4. Does your pet strain, vocalize, or seem uncomfortable when urinating?
5. Does your pet seem aware that they are urinating?
  - Does your pet posture normally to urinate and hold that posture until finished?
  - Can they immediately initiate a strong, continuous urine stream?
6. Do you find puddles of urine where your pet has been resting?
7. Does your pet dribble urine while walking or at rest?
8. Does your dog ask to go outside more often?
9. Can your dog make it through the night without asking to go outside?
10. Is there blood in your pet's urine?
11. Does your pet have increased licking of their genitals?

# Diagnosing PU/PD

## Evaluate water intake and urine specific gravity

### The importance of urine specific gravity

Urine specific gravity (USG) is a cornerstone in the diagnostic workup for PU/PD. While not necessarily associated with a specific diagnosis, USG helps determine the kidney's ability to concentrate urine—a key step in narrowing down the underlying cause(s) of PU/PD—and helps focus the workup on more specific categories of disease.

- ✓ **Well-concentrated urine** (USG >1.030 in dogs, >1.035 in cats) indicates normal urine concentrating ability.
- ✓ **Isosthenuric urine** (USG 1.008–1.012 in dogs and cats) may be consistent with loss of urine concentrating ability.
- ✓ **Hyposthenuria** (USG <1.008 in dogs and cats) indicates ability to dilute urine and therefore excludes renal insufficiency.

### Key considerations

- ✓ First morning urine samples are typically the most concentrated, since most dogs and cats consume less water overnight.
- ✓ No true reference range: USG values in healthy dogs and cats can vary widely, even with morning samples (dogs 1.006-1.050 / cats 1.005-1.090).
- ✓ In general, the mean USG is higher in healthy cats vs. healthy dogs.
- ✓ Guidelines: USG >1.030 for dogs and >1.035 for cats is not indicative or consistent with PU/PD.
- ✓ Many intrinsic and extrinsic factors can influence USG, even in normal animals:
  - ✓ Causes of increased USG: hypovolemia/dehydration (potentially marked increase) or large amounts of glucose or protein (slight increase)
  - ✓ Causes of decreased USG: fluid therapy, glucocorticoids, diuretics, significantly increased sodium intake, significantly decreased protein intake
- ✓ The pet owner's collection of multiple urine samples at home over several days can help determine their pet's USG range.



Explore additional resources for sick pet testing in your **GetWell toolbox**

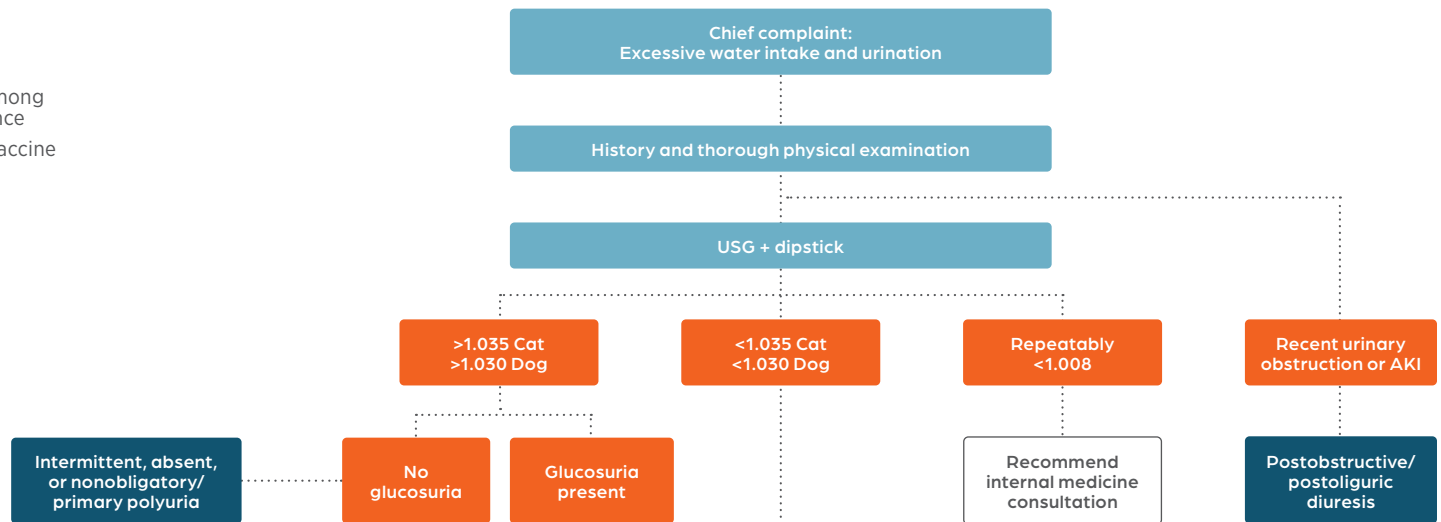
**References:** 1. Schmid, S. M., A Stepwise Diagnostic Approach to Polyuria and Polydipsia. Today's Veterinary Practice Continuing Education, 2023. 2. Chew, D.J., Schenck, P.A. Physical Properties of Urine. Urinalysis in the Dog and Cat. Wiley & Sons, 2023, p. 86. 3. Chew DJ, DiBartola SP, Schenck PA. Chapter 15: Approach to Polyuria and Polydipsia (p. 465) in Canine and Feline Nephrology and Urology, 2nd edition, Chew, DiBartola, and Schenck, eds. (2011). 4. Feldman EC, Nelson RW: Canine and Feline Endocrinology and Reproduction. St. Louis, WB Saunders, 2004. 5. Tripathi NK, Gregory CR, Latimer KS. Urinary system. In: Latimer KS, ed. Duncan and Prasse's Veterinary Laboratory Medicine: Clinical Pathology. 5th ed. Wiley-Blackwell; 2011:253-282.

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# Individualized care starts with comprehensive diagnostic insights

## STEP 1 Establish presence of PU/PD

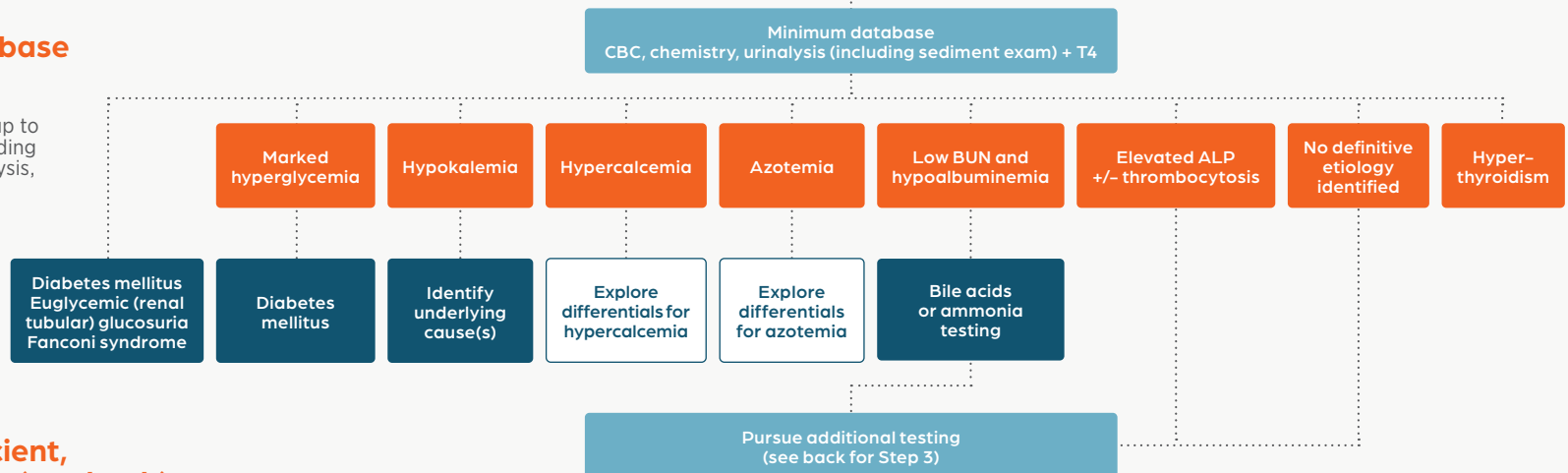
- ✓ Obtain a detailed history to distinguish among PU/PD, pollakiuria, and urinary incontinence
- ✓ Verify signalment (age, breed, sex, diet, vaccine status) and perform physical exam
- ✓ Check urine specific gravity (USG)



## STEP 2 Conduct minimum database (MDB) testing

- ✓ Complete a full diagnostic workup to establish baseline insights, including CBC, chemistry, complete urinalysis, electrolytes and TT4:

Vetscan VS2®  
Vetscan Opticell™  
Vetscan Imagyst®  
AI Urine Sediment  
Vetscan UA® Urine Analyzer

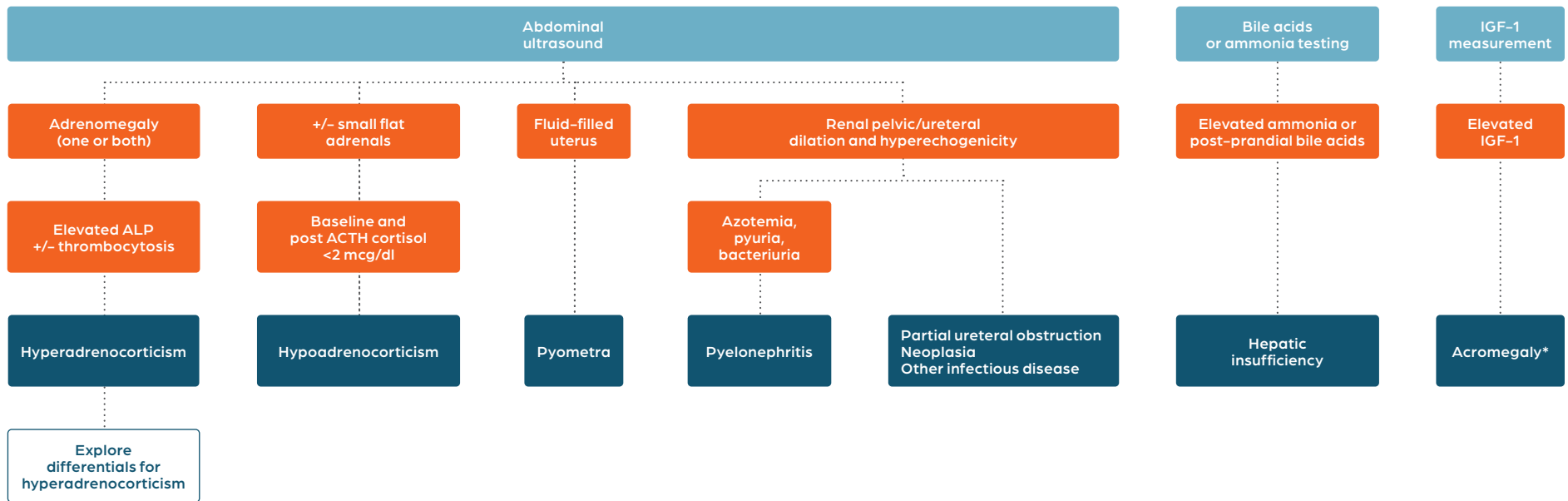


## STEP 3 If MDB testing is insufficient, perform additional tests (see back).

# Individualized care starts with comprehensive diagnostic insights

**STEP 3**

**If MDB testing is insufficient, perform additional tests to confirm or refine the differential diagnosis, or consult an internal medicine specialist for guidance.**



**Schedule a complimentary consultation with a board-certified specialist anytime<sup>†</sup> via Zoom or email for additional guidance and support.**

\* This disease leads to secondary diabetes in cats  
 † Dependent on consultant availability

