One Step® Kidney Check for Cats & Dogs

INTENDED USE

Chronic kidney disease is a major cause of morbidity and mortality in dogs and cats. Urinalysis is an important tool in disease detection, as well as monitoring and screening animal health. Each ONE STEP® KIDNEY CHECK FOR CATS & DOGS measures 3 key parameters in the diagnosis of kidney disease - Specific gravity, Protein and Creatinine.

By checking these 3 parameters, you can calculate the urine protein:creatinine ratio, which measures how much protein is being lost through the kidneys, and how dilute the urine is. Creatinine is excreted by the kidney at a constant rate, which means it can be used as a gauge to assess the rate of excretion of other substances. For example, the urine protein:creatinine ratio measures whether the excretion of protein is greater than expected when compared to the excretion of creatinine. However, losing trace amounts of protein through the kidneys may not be significant if the kidneys are working well otherwise, and the urine is well concentrated. Therefore, it is important to also test the specific gravity of the urine. If the urine is consistently dilute, then even a scant amount of protein in the urine could be an indicator of true kidney disease and even kidney failure.

STORAGE AND HANDLING

Store in a cool, dry place at temperatures between 2℃~30℃. Do not store the strips in a refrigerator or freezer. Store away from moisture and light. When stored in the original container, the product is stable up to the expiry date printed on the foil. Do not touch the test areas of the urine reagent strips. Do not open the foil until ready to use. Discolouration or darkening of the test pads may indicate deterioration. If this is evident, or if test results are questionable or inconsistent with expected finding, confirm that the product is within its expiration date and is reacting properly using known negative and positive control materials. Do not use after the expiry date.

QUALITY CONTROL

For best results, performance of reagent strips should be confirmed by testing known negative and positive specimen or controls (e.g., Quantimetrix Dipper Urine Dipstick, Dropper Urine Dipstick, Dip&Spin Urine Dipstick; Bio-Rad qUAntify Plus Control; Thermo SCIENTIFIC MAS UA Control). Each laboratory should establish its own goals for adequate standards of performance. Each lab worker should ensure that it complies with government and local requirements.

SAMPLE COLLECTION

Urine should be collected in a clean, dry container that is free of any disinfecting or cleaning chemicals. Samples may be collected by free catch of voided sample, manual bladder expression, catheterization, or cystocentesis.

Voided samples are the easiest and least invasive samples to collect. However, voided samples may have contaminants that include bacteria, epithelial cells, and white blood cells. Red blood cells should not be found in normal voided samples. Voided samples should be collected midstream to lessen contaminants from the vagina or prepuce. Collection of samples from surfaces such as floors, cages, and litter boxes should be avoided, since these will introduce environmental contaminants.

Manual expression of the bladder is another technique used in urine collection. In this method, the patient's bladder is gently squeezed until urine is expressed. This technique may lead to bladder trauma resulting in haematuria, and in some instances (such as urethral obstruction) may result in a ruptured bladder. This method may have the same cellular contaminants as a voided sample.

Catheterization is performed by placing a small hollow tube into the urethra to the level of the bladder. Urine is then withdrawn from the bladder using a syringe. Catheterized samples have less contamination from the distal urogenital tract; however, contamination from the urethra may still occur. Contaminants include epithelial cells or red blood cells. Poor catheterization technique may lead to trauma or, less commonly, infection.

Cystocentesis samples are collected by inserting a sterile needle through the body wall into the bladder. Urine is withdrawn from the bladder using a syringe. A lateral or ventral approach to the bladder may be made without causing severe trauma to any vital region of the bladder. Clipping or surgical preparation of the area along the body wall is not necessary prior to sample collection. Often a 1 inch or 1.5 inch 22 gauge needle is used attached to a 6 or 12 cc syringe. The bladder is manually immobilized and the needle is inserted through the abdominal wall into the bladder, and the urine is withdrawn. It is important to stop aspirating prior to withdrawing the needle as this may lead to aspiration of blood cells or epithelium from the bladder wall. Animals often tolerate cystocentesis very well and little restraint is needed. Contaminants that may be found include iatrogenically introduced red blood cells. Rarely, enterocentesis may occur which results in a sample containing bacteria, intestinal villi and other intestinal contents.

SAMPLE HANDLING

In order to obtain accurate results, the urine collection, storage and handling must be sterile and follow standard procedures. The dipstick analysis should be performed as soon after collection as possible (ideally within 30 minutes of collection) and the sample should be well mixed prior to testing. If for some reason the test cannot be performed immediately, the sample may be covered and refrigerated. It should be allowed to return to room temperature prior to testing. The dipsticks should be stored in the original airtight container to maintain reagent reactivity.

TESTING METHODS

It is important not to touch the reagent areas of the strip as this may alter test results. Each reagent area should be immersed in urine by dipping. The excess urine should be removed to prevent dilution of reagents or mixing of reagents between pads. This can be achieved by tilting the strip and allowing the urine to run off the edges. While blotting excess urine, ensure the chemicals from the different tests do not mix.

The reagent pads should be read at the times specified on the colour comparison chart.

Urine discolouration may create difficulty in visually interpreting the test results. Colour changes may be masked, or read as false positive test results. If the urine is noticeably discoloured, the sample may be centrifuged and the supernatant used for analysis.

Specific Gravity

Urine specific gravity is based on the ratio of weight of urine to weight of an equivalent volume of pure water – i.e. how concentrated the urine is. This test is used to measure tubular function. The dipstick measures specific gravity by measuring the change in pKa of polyelectrolytes in relation to ionic concentration. Although dipstick strips do have a method of approximating specific gravity, this measurement is best made with a refractometer.

Urine specific gravity measured by the dipstick can be falsely elevated by moderate to high concentrations of protein. Low reading may occur if the urine is alkaline. High lipid content in urine may also alter the results by either raising or lowering the specific gravity measurement.

Protein

Dogs and cats normally have small proteins that pass through the glomerular filter, however a majority of these proteins are resorbed by the renal tubules. The renal nephron does excrete a small amount of Tamm Horsfall protein. Thus, only a very small amount of protein is normally excreted in the urine, which is not usually clinically detectable.

The protein portion of the dipstick reagent strip measures the protein based on a pH dye indicator method using bromphenol blue. Due to the negative charge of albumin, if protein (albumin) is present in urine, the pH increases, and a positive test result occurs. This test is primarily sensitive to albumin is relatively insensitive for the detection of globulins and Bence-Jones proteins Positive protein results must be evaluated in relationship to the patient's history, physical examination, method of urine collection, urine specific gravity, and microscopic sediment examination. Proteinuria may be due to haemorrhage, infection, intravascular haemolysis, or renal disease. Haemorrhage is confirmed by a positive occult blood reaction on the dipstick and the presence of red blood cells in the sediment. A urinary infection or cystitis can be confirmed by observing bacteria and white blood cells on sediment examination. Cases of intravascular haemolysis have haemoglobinuria leading to a positive occult blood test.

Proteinuria of renal disease may be due to glomerular and/or tubular lesions. If the proteinuria is due to renal disease, the occult blood test will be negative and the sediment may or may not contain casts. Determination of the urine protein/urine creatinine ratio is helpful in confirming renal proteinuria.

Protein results must be analyzed with the urine specific gravity. Trace proteinuria may represent significant protein loss with low specific gravity, but not with high specific gravity. False positive protein reactions may occur with alkaline urine or if a disinfectant residue is in the urine, possibly from improper cleaning of the collection container. Samples containing urease- producing bacteria may have an elevated pH resulting in a false positive test result.

False negative test results may occur in dilute or acidic urine.

If the urine protein dipstick is positive for protein, the sample should be further analyzed with a quantitative method at an outside laboratory.

Creatinine

Copper creatinine complex has pseudoperoxidase activity that catalyze the oxidation of a chromagen to a coloured end product. Visibly dark brown colour urine may affect the results. Substances that cause abnormal urine colour, such as drug containing azo dyes, nitrofurantoin, riboflavin may affect the results.

The urine of healthy individuals contains 10~300mg/dl of creatinine. Very low creatinine results can be caused by adulteration of the urine specimen or by severe renal failure.

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The urine of healthy individuals contains 10~300mg/dl of creatinine. Very low creatinine results can be caused by adulteration of the urine specimen or by severe renal failure.

Protein to Creatinine Ratio(UP/C)

Guidelines for interpretation of UPC in dogs	
UPC	**Interpretation**
<0.2	Negative for proteinuria
0.2 to 0.5	Borderline proteinuria
>0.5	Overt proteinuria
Guidelines for interpretation of UPC in cats	
UPC	**Interpretation**
<0.2	Negative for proteinuria
0.2 to 0.4	Borderline proteinuria
>0.4	Overt proteinuria

Table 1 Guidelines for interpretation of UPC in dogs and cats (International Renal Interest Society, IRIS Staging of CKD, modified 2015)

The following table is used to obtain the Protein to Creatinine ratio for cats

UPC Results interpretation		Creatinine (mg/dL)				
		10 (1)	50 (2)	100 (3)	200 (4)	300 (5)
Protein (mg/dL)	20 (A)	2.00	0.40	0.20	0.10	0.07
	40 (B)	4.00	0.80	0.40	0.20	0.13
	100 (C)	10.00	2.00	1.00	0.50	0.33
	150 (D)	15.00	3.00	1.50	0.75	0.50
	300 (E)	30.00	6.00	3.00	1.50	1.00

The following table is used to obtain the Protein to Creatinine ratio for dogs

UPC Results interpretation		Creatinine (mg/dL)				
		10 (1)	50 (2)	100 (3)	200 (4)	300 (5)
Protein (mg/dL)	20 (A)	2.00	0.40	0.20	0.10	0.07
	40 (B)	4.00	0.80	0.40	0.20	0.13
	100 (C)	10.00	2.00	1.00	0.50	0.33
	150 (D)	15.00	3.00	1.50	0.75	0.50
	300 (E)	30.00	6.00	3.00	1.50	1.00

CALCULATIONS:

Determine Protein / Creatinine Ratio as follows: Protein/Creatinine Ratio = Protein Result (mg/dL) / Creatinine Result (mg/dL)

Suggested interpretation of dipstick and USG results for cats	
USG (Urine S.G)	**Suggested interpretation**
<1.035	Radiographs and ultrasound, UP/C ratio should be required
≥1.035	Clinical evaluation (if underlying systemic abnormalities, correct and re-evaluate within 6 months)
Suggested interpretation of dipstick and USG results for dogs	
USG (Urine S.G)	**Suggested interpretation**
<1.030	Radiographs and ultrasound, UP/C ratio should be required
≥1.030	Clinical evaluation (if underlying systemic abnormalities, correct and re-evaluate within 6 months)

Table 2 Suggested interpretation of dipstick and USG results (Data from International Renal Interest Society, IRIS Staging of CKD, Algorithm for Staging of Chronic kidney Disease)

NOTES ON SYMBOLS

Consult instructions for use		Number of test strips		Keep away from sunlight	
Use By /Expiry Date		Do not reuse		Store at	

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Protein to Creatinine Ratio(UP/C)

Table 1 Guidelines for interpretation of UPC in dogs and cats (International Renal Interest Society, IRIS Staging of CKD, modified 2015)

The following table is used to obtain the Protein to Creatinine ratio for cats

The following table is used to obtain the Protein to Creatinine ratio for dogs

CALCULATIONS:

Determine Protein / Creatinine Ratio as follows: Protein/Creatinine Ratio = Protein Result (mg/dL) / Creatinine Result (mg/dL)

Table 2 Suggested interpretation of dipstick and USG results (Data from International Renal Interest Society, IRIS Staging of CKD, Algorithm for Staging of Chronic kidney Disease)

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