ProtectLife
International Biomedical Inc.

Learning

Insights into Urine Microalbumin (mALB) and Urine Protein (UP)

Health Educational Propaganda

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AmiShield
Veterinary Chemistry Analyzer

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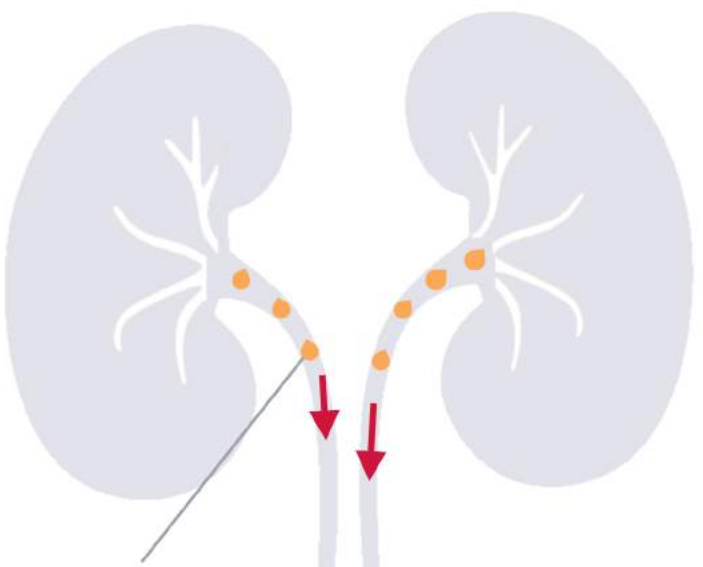
What are mALB and UP?

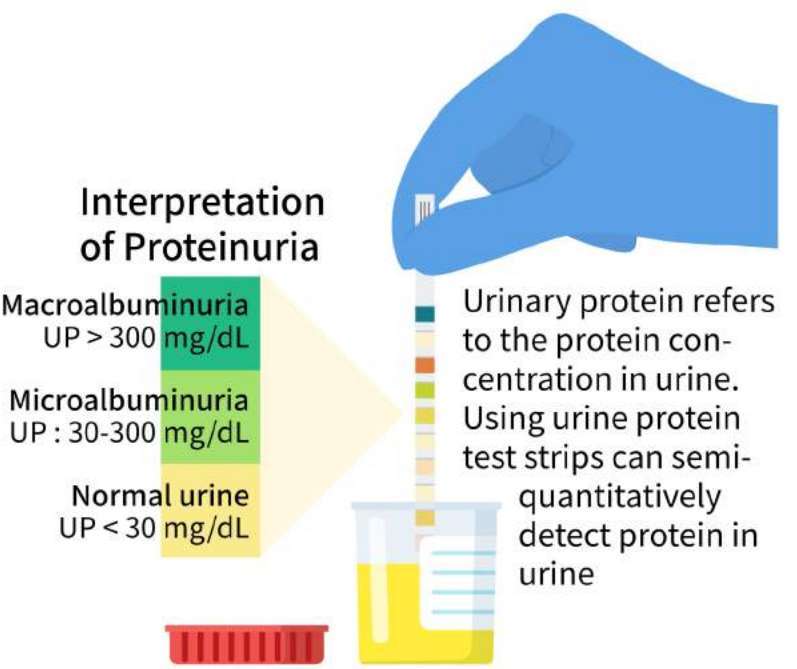
Albumin is a small molecule protein that exists in large amounts in the blood but not in the urine. All proteins are recycled in the kidneys for use in the body. Animals may not be effectively recycling the protein in their urine due to inflammation, infection, metabolic disease, or kidney disease, leaving protein or albumin (small molecule protein) in the urine shown as Figure 1; clinically through tracking and measurement total protein or albumin in urine can assess whether kidney function is healthy.

▶ Figure 1



Albumin that is not recycled by the kidneys and is excreted with the urine

▶ Figure 2



In the urine of patients with primary kidney disease, when microalbuminuria begins to appear, almost all other test data, including: blood urea nitrogen (BUN), creatinine, urine protein (UP), etc., cannot show that kidney disease has begun to occur. Only urine albumin (mALB) can reflect it earliest, so it can be used as an early indicator of primary kidney disease. When a general urine protein test paper shows a positive reaction, the microalbumin concentration in the urine has already exceeded 30mg/dL shown as Figure 2, and the kidney disease has often developed into an irreversible stage and requires lifelong treatment.

What are Albumin-to-Creatinine Ratio (ACR) and Urine Protein Creatinine Ratio (UPCR)?

Creatinine is a metabolite produced by muscle activity and is excreted by the kidneys at a constant rate. Since the concentration of albumin and total protein in random urine will be affected by the concentrating or diluting effect of fluid intake (Figure 3), leading to misjudgment, therefore, dividing the concentration of albumin and total protein by the concentration of urine creatinine can counteract the effects of water intake. Using ACR and UPCR can more objectively evaluate glomerular function.

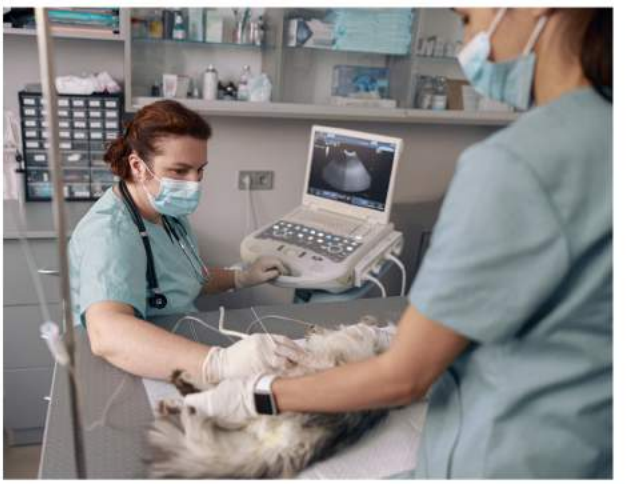
▶ **Figure 3**

The amount of water one drinks affects the concentration of albumin and total protein in urine

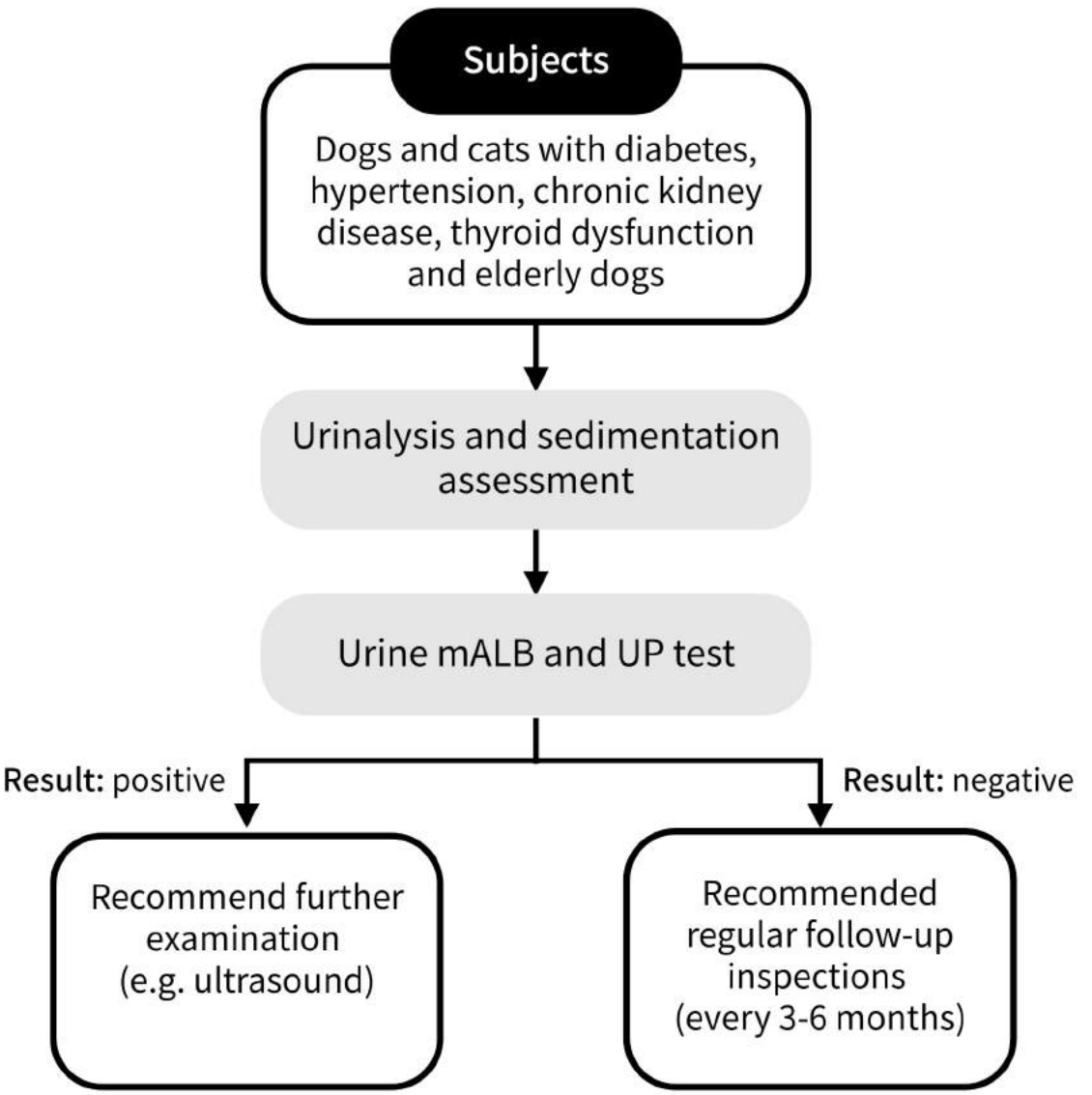
Timing to detect urine microalbumin and urine protein

It is mainly used to monitor kidney function in dogs and cats with diabetes, hypertension, chronic kidney disease, thyroid dysfunction, etc. When there is obvious inflammation, infection or bleeding in the urinary system, it may cause false positives, so testing is not recommended. Before measurement, it is recommended to complete urinalysis and sediment assessment to determine whether the urine sample is suitable for ACR and UPCR testing.

If the test result is positive, it is recommended to further conduct ultrasound testing and measurement of blood urea nitrogen (BUN) and blood creatinine (CREA) to find and confirm the cause. If there is no possibility of underlying disease, regular follow-up examinations every 3-6 months will be recommended to monitor your pet's health.



▶ **Figure 4**



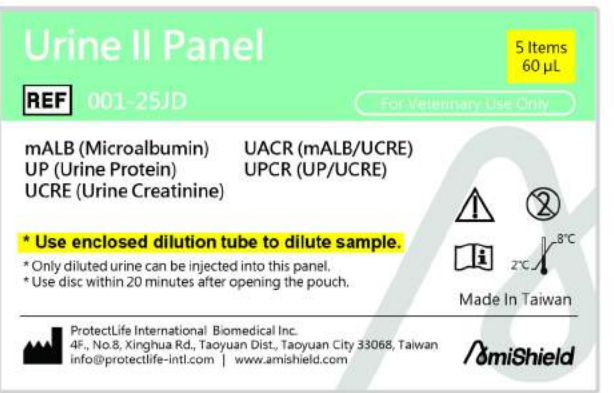
AmiShield Urine II Panel

The second generation of AmiShield urine test panel can quantitatively detect mALB and UP concentrations in urine, and also includes the parameter of urine creatinine (UCRE). By calculating the urine albumin to creatinine ratio UACR (which is equal to mALB/UCRE), the urine volume is excluded which causes errors in estimating mALB concentration and effectively screens patients for early renal disease.

Here is the reference range table:

▶ Figure 5

Parameter	Dog / Cat	Unit
mALB	< 2.5	mg/dL
UP	< 20	mg/dL
UCRE	4.0 - 400.0	mg/dL
UACR (mALB / UCRE)	< 30.0	mg/g
UPCR (UP / UCRE)	< 0.2	-



If you wish to understand more about our Urine tests, scan the QR code below to watch the operation video on our YouTube Channel.

♦ Reference

Special thanks to Yu-Hsin Kuo, a student at National Pingtung University of Science and Technology, for her help in organizing the abstracts of literature.

1. J Vet Intern Med. 2023;37(6):2261-2268. Biological variation of urinary protein: Creatinine ratio and urine specific gravity in cats.
2. J Vet Clin. 2023; 40(6): 399-407. Evaluation of Albumin Creatinine Ratio as an Early Urinary Biomarker for Chronic Kidney Disease in Dogs.