SDMA reference interval update

Use of the IDEXX SDMA Test to assess kidney function in puppies and kittens

In July 2015, IDEXX Reference Laboratories introduced the IDEXX SDMA® Test, a revolutionary new kidney function test. SDMA (symmetric dimethylarginine) is a renal biomarker specific to kidney function. It has proven to be a more reliable indicator of kidney function than creatinine, enabling veterinarians to detect both acute kidney injury (AKI) and chronic kidney disease (CKD) earlier than ever before.[1–3] One of the key attributes of SDMA is its high specificity for assessing kidney function. SDMA is less impacted by extrarenal factors than creatinine, including body condition, advanced age, and disease state.[4,5]

Puppy SDMA reference interval: **0–16 µg/dL**

Unlike creatinine, SDMA is not affected by lean body mass.[4,5] Therefore, SDMA is more reliable for assessing kidney function in animals with chronic kidney disease or other conditions that result in weight and muscle loss, such as hyperthyroidism.[4–6] Puppies and kittens are often less muscled compared to adults, decreasing the utility of creatinine in assessing kidney function in these patients. Therefore, SDMA should be a more sensitive and reliable indicator of kidney dysfunction in young puppies and kittens.

Kitten SDMA reference interval: **0–14 µg/dL**

IDEXX is dedicated to providing the diagnostic tools you need for patients of all ages. Pediatric reference intervals for many routine laboratory tests differ from those seen in adult animals for a variety of other reasons, including differences in metabolism, clearance, homeostasis, organ maturity, and physiologic changes associated with the rapid-growth phase. Therefore, in order to determine reference intervals in puppies and kittens, IDEXX Reference Laboratories took part in two separate reference interval studies, one for puppies and one for kittens.

SDMA in puppies

IDEXX followed the Clinical and Laboratory Standards Institute (CLSI) guidelines to determine a puppy SDMA reference interval. Healthy populations of puppies were enrolled into the study by participating universities, research institutions, and shelters. Blood was collected during the normal course of patient care. Puppies ages 3–12 months of various breeds were included in the study. Puppies were characterized as healthy based on history, physical examination, and assessment of a complete blood count (CBC) and chemistry panel. Based on their SDMA concentrations, **the SDMA reference interval for puppies was determined to be 0–16 µg/dL**, slightly higher than the adult reference interval of 0–14 µg/dL.[7]

When this puppy reference interval is applied to the historic patient results at IDEXX, the majority of puppies (90% of patient population) have results that fall within the adult reference interval, and another 6% have a result within the extended puppy reference interval. The SDMA reference interval normalizes as puppies achieve adulthood. The exact age at which an individual dog reaches maturity varies by breed, with toy breed dogs completing their rapid-growth phase significantly earlier than giant breeds. The cause of the slight increase in SDMA concentration in some healthy growing puppies is unknown at this time, but physiological roles for protein arginine methylation, including signal transduction, mRNA splicing, transcriptional control, DNA repair, and protein translocation, are postulated to be increased in growing animals, resulting in increased SDMA generation.

Impact of dog breed size on age of maturity

A retrospective study of SDMA patient results evaluated the relationship of breed size (toy/small, medium, large, and giant breeds) and age in puppies.[7] It was determined that on average, dogs achieve the adult SDMA reference interval by around 1 year of age. However, much like other puppyhood chemistry changes (e.g., alkaline phosphatase and phosphorus), the exact age that this change occurs will vary depending on breed/size. SDMA in small-breed dogs may normalize as early as 6 months, while large to giant breeds may take up to 2 years to fully mature. Mildly increased (15 or 16 µg/dL) SDMA concentrations in a puppy should therefore be interpreted in light of the growth phase as well as other evidence of kidney disease.

SDMA in kittens

A pediatric reference interval study was also performed to determine the impact of age on SDMA concentrations in kittens. Clinically healthy kittens (ages 1–12 months) were enrolled in the study from several shelters from across the United States. Kittens were also characterized as healthy based on history, physical examination, and assessment of a complete blood count (CBC) and chemistry panel. Blood was collected during the normal course of patient care. Unlike in puppies, clinically healthy kittens demonstrated no difference in SDMA concentrations when compared to adult healthy cats.[7] **This study confirmed that the adult cat reference interval of 0–14 µg/dL is appropriate for use in kittens.**

Impact of sedation on kittens

Some of the samples submitted for the study were obtained from kittens who had been sedated in preparation for other procedures (e.g., neuter). An initial analysis demonstrated that sedation was a confounding factor in the interpretation of the results, therefore the sedated kittens were excluded from the reference interval study. Further evaluation of the SDMA results from these otherwise healthy kittens confirmed that sedated kittens less than 6 months of age had significantly increased SDMA concentrations compared to unsedated kittens.[7] Sedated healthy kittens over 6 months of age did not demonstrate increased SDMA concentrations. The degree to which SDMA concentrations were increased in the younger sedated kittens varied with the sedation protocol utilized and was most dramatic in the youngest kittens (ages 1–3 months). The increased SDMA concentrations seen in young sedated kittens are likely due to vasoconstriction resulting in reduced renal blood flow leading to decreased glomerular filtration rate (GFR).

Based on these findings it is recommended to draw blood for laboratory testing in unsedated kittens. These observations also highlight the need to support renal blood flow to maintain adequate perfusion pressures in these vulnerable patients during procedures that require prolonged sedation or anesthesia. If SDMA results are still increased in a sample drawn in an unsedated kitten, refer to the IDEXX SDMA Test diagnostic algorithm for information on recommended actions as well as considerations for adjusting your anesthetic protocols to support the kidneys before, during, and after anesthesia.

Conclusions

The IDEXX SDMA® Test is a valuable measure of kidney function in pediatric patients as well as in adult animals, but the test must be interpreted in light of age-appropriate reference intervals. No impact of age on SDMA reference intervals was observed in healthy unsedated kittens. Although the majority of puppies will fall within the adult reference interval, mildly increased SDMA concentrations (15 or 16 µg/dL) may be seen in a small proportion of puppies during the rapid-growth phase. In these cases, it is recommended to evaluate a complete urinalysis and assess for other evidence of kidney disease and consider rechecking an SDMA concentration as the puppy's growth phase slows.

Learn more about how to use the IDEXX SDMA Test in the diagnosis and management of kidney disease by visiting idexx.com/SDMAalgorithm.

References

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