SDMA ELISA

Early Detection of Chronic Kidney Disease

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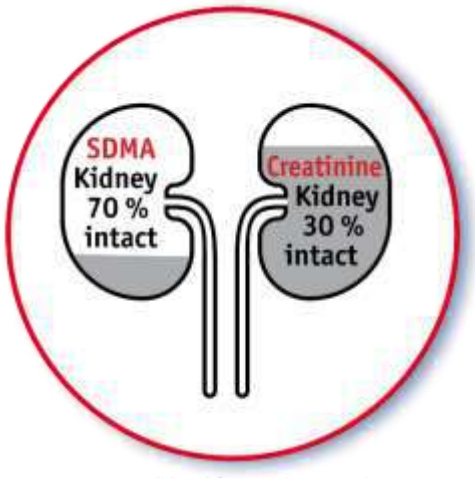
SDMA ELISA – Early Detection of Chronic Kidney Disease in Cats and Dogs

Since the most commonly used parameter for renal function, the serum creatinine level, does not rise with slight impairment there is a need for sensitive markers for early detection of such impairment. SDMA is a methylated metabolite of the amino acid arginine. SDMA is exclusively excreted via the kidney.

Chronic kidney disease is prevalent, progressive and insidious. It is recognized that kidney disease affects nearly one out of three cats and one out of ten dogs. Although the glomerular filtration rate is the gold standard measurement for assessing kidney function in pets, this analysis is impractical and rarely used.

SDMA is independent of muscular mass and, therefore, well suited for monitoring senior animals and animals with low muscle mass. With decreasing glomerular filtration rate (GFR) SDMA and creatinine increase in a linear fashion. This increase starts with 30% reduction of GFR in case of SDMA, but only at 70% reduction in case of creatinine. In both dogs and cats, SDMA increased much earlier in comparison to creatinine.



SDMA ELISA was validated for veterinary use and is successfully used in the routine diagnosis of animal species. Methods used so far for determination of SDMA are based on chemical procedures like high pressure liquid chromatography HPLC or liquid chromatography with subsequent mass spectrometry LC-MS/MS. These methods are very time-consuming and expensive, need highly specialized personnel and are, therefore, not suitable for routine diagnostics. The SDMA ELISA offers the advantages of a specific and sensitive method for routine use with clear superiority against HPLC and LCMS/ MS in terms of personnel expenses and technical effort. The SDMA ELISA contains reagents for the quantitative determination of derivated SDMA in serum and plasma. The derivatisation takes place during the sample preparation. SDMA is quantitatively converted into N-acyl-SDMA by the acylation reagent. The SDMA ELISA is a competitive enzyme immunoassay (see figure 1). Solid phase bound and sample antigen compete for a fixed number of antibody binding sites. For veterinary use, our ELISA is unique in the market. The robust test can be performed easily, quickly and safely in each laboratory. An inconvenient and expensive dispatch to external labs is no longer required. Long waiting times for results do not need to be tolerated. Total incubation time of the ELISA is 3.5 hours.

The detection range of the SDMA ELISA is 0.2 to 3.0 µmol/L (corresponding to 4.0 to 60 µg/dL). The reference ranges for dogs and cats are the following:

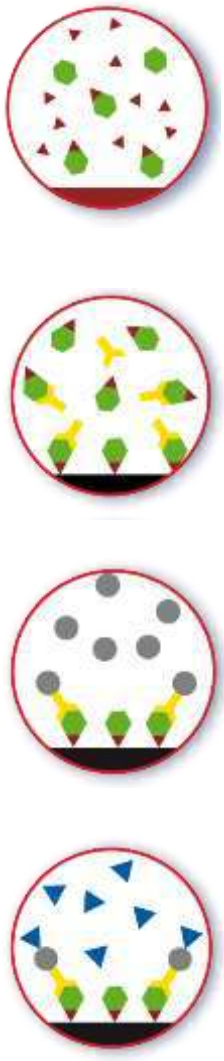
Cats: 0 to 0.84 µmol/L (corresponding to 17.0 µg/dL)

Dogs: 0 to 0.7 µmol/L (corresponding to 14.0 µg/dL)

Persistent high levels point to a diminished renal elimination and thus to a possible restricted renal function.

The range given should be considered as a guideline. Each laboratory should establish its own reference ranges.

Figure 1



Acylation

in pp plate

▲ acylation reagent

⬢ symmetric dimethylarginine

Transfer to Microtiter Plate

Antigen Antibody Reaction

in microtiter plate, addition of antiserum

⬢ N-Acyl-SDMA

Y rabbit anti N-acyl-SDMA

Washing

Conjugate Reaction

addition of enzyme conjugate

● anti rabbit IgG peroxidase

Washing

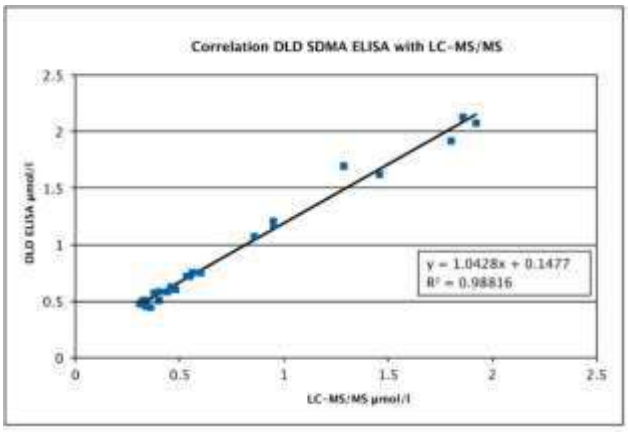
Substrate Reaction

addition TMB – blue colour develops
stopping – yellow colour
reading at 450 nm

▼ substrate, TMB

SDMA values should always be assessed together with the creatinine values and other urine parameters, especially the urine specific gravity. Samples within this range of 0.7 to 0.95 µmol/L (corresponding to 14 to 19 µg/dL) should be continuously monitored. The SDMA ELISA is well suited for small sample volumes (20 µl). The ELISA convinces by its high specificity, sensitivity, linearity and reproducibility. The ELISA shows an excellent correlation to the LCMS/ MS method (see figure 2).

Figure 2: Correlation of ELISA to LC-MS/MS (n=40)



These studies demonstrate a very high precision and accuracy of SDMA ELISA
(see table 1).

Table 1: Accuracy and Precision characterized by arithmetic mean of 40 serum samples and their precision as coefficient of variation in %

intra assay variation (n=40)
dog

sample	mean (µmol/l)	cv (%)
1	0,53	11,5
2	0,80	8,4

intra assay variation (n=40)
cat

1	0,77	7,6
2	0,86	5,7

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