

Comparing Refractometers

In this study, the authors compared a refractometer designed especially for feline urine (PAL-USG [CAT], atago.net) with a Schmidt and Haensch “Goldberg” type refractometer (S+H) (schmidt-haensch.com). The benefit of the PAL-USG (CAT) is its ability to read specific gravity (SG) over a wider range, from 1.000 to 1.080; the S+H refractometer reads SG only up to 1.040. Any samples more concentrated than 1.040 must be diluted with an equal amount of water to determine the exact SG.

Specific gravity readings were obtained for 47 canine and feline urine samples as well as samples of 10% glucose, 10% NaCl, 3% albumin, and distilled water. Distilled water should have an SG of 1.000, and both refractometers consistently reported this result. In general, for the other samples the PAL-USG (CAT) refractometer reported lower SGs than the S+H refractometer. For 10 urine samples, the S+H refractometer reported an SG of >1.030 , whereas the PAL-USG (CAT) refractometer gave SGs

between 1.023 and 1.028. An SG >1.030 is often used as a cutoff for determining if a dog has adequate kidney function; consideration must be taken when relying on an SG value from a PAL-USG (CAT) refractometer to determine kidney function.

Commentary

In an older study, feline urine was suggested to have higher specific refractivity than human or canine urine.¹ Consequently, it was thought that human refractometer scales might give falsely high results for feline samples. This study led to the development of feline-specific SG scales, feline-specific refractometers, and “correction factors” for use in cats—all based on the notion that human and dog refractometer scales could not be used in cats. However, this was all based on a 1957 study that has not been re-evaluated and did not document some important facts, including diet.²

The study highlighted here should be read along with another recent publication from the same primary author.³ Together, these studies challenge the long-held belief that a separate scale is necessary for the correct interpretation of the refractometry of feline urine

samples and show that refractometers have inherent inaccuracies. In other words, care is always needed when interpreting results, and absolute cutoff values to diagnose disease should be treated with extreme caution.

These are important studies that have considerable clinical implications and challenge previously held assumptions about urinalysis and USG assessment.
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References

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2. George JW. The usefulness and limitations of hand-held refractometers in veterinary laboratory medicine: an historical and technical review. *Vet Clin Pathol*. 2001;30(4):201-210.
3. Tvedten HW, Ouchterlony H, Lilliehöök IE. Comparison of specific gravity analysis of feline and canine urine, using five refractometers, to pycnometric analysis and total solids by drying. *N Z Vet J*. 2015;63(5):254-259.

Source

Tvedten HW, Norén A. Comparison of a Schmidt and Haensch refractometer and an Atago PAL-USG Cat refractometer for determination of urine specific gravity in dogs and cats. *Vet Clin Pathol*. 2014;43(1):63-66.

Together, these studies challenge the long-held belief that a separate scale is necessary for the correct interpretation of the refractometry of feline urine samples and show that refractometers have inherent inaccuracies.