



## TEST SERVICE UPDATE: Fructosamine Testing

### Introduction

Occasionally Phoenix Lab finds that reagents used for diagnostic testing are no longer available or do not provide the level of diagnostic accuracy Phoenix requires. Recently our previous fructosamine reagent was discontinued and for a short period of time we sent out our fructosamine testing to the Veterinary Diagnostic Laboratory at Colorado State University (CSU). We identified a new reagent for fructosamine using the same methodology as done previously. After extensive testing and correlation studies of this new fructosamine assay with CSU, we are now able to bring fructosamine back on line at Phoenix Lab. Although fructosamine concentrations run at Phoenix Lab using our new reagent was found to correlate with CSU's results, the actual results were lower. Therefore, new reference intervals were established for both dogs and cats. Keep this in mind when comparing fructosamine results prior to Jun 8, 2018.

### Reference Intervals

#### **New Fructosamine reference interval (as of June 8, 2018)**

Cat: 176-324 umol/L  
Dog: 180-292 umol/L

#### **Old Fructosamine reference interval (prior to June 8, 2018)**

Cat/Dog: 0-400 umol/L

### Clinical Assessment

Fructosamine is the product of an irreversible reaction between glucose and the amino groups of plasma proteins. It is generally assumed to reflect the mean blood glucose concentration of the preceding approximately 2 weeks although this has not been well established in dogs and cats and may actually be shorter.

**Diagnosis of Diabetes:** Fructosamine may be helpful in distinguishing stress-induced hyperglycemia from diabetes. Fructosamine is not affected by short term increases in blood sugar and therefore fructosamine is usually normal in stress hyperglycemia.

**Insulin Regulation of Diabetes:** It remains important that the pet's clinical signs, attitude, owner's assessment of their pet's control, pet's weight, presence/absence of glucosuria and a glucose curve be assessed prior to evaluating a fructosamine concentration. A low fructosamine concentration may be helpful in identifying persistent hypoglycemia due to insulin over dosage, but a normal to high concentration can occur with hypoglycemia, normoglycemia or hyperglycemia. Individuals with a Somogyi effect can have low, normal or high fructosamine concentrations; diagnosis should be based on low (nadir) glucose concentrations.

Fructosamine results need to be correlated with a glucose curve (and clinical assessment as noted above). Minimally, a blood glucose should be run concurrently with every fructosamine. Fructosamine should never be used as the sole indicator of diabetic control, but is most useful when trending control over time.

*Note also that protein concentrations, marked hyperlipidemia, marked hemolysis and thyroid status can significantly affect the fructosamine concentration. A recent study showed that uncontrolled feline hyperthyroidism alone can decrease the fructosamine by up to 200 umol/L (Vet Sci 2017, 4, 17) which may result in a misdiagnosis of stress hyperglycemia in a hyperthyroid cat that may in fact be diabetic. Another study (Vet Res Commun 2002, 26, 531) showed that uncontrolled hypothyroidism in nondiabetic dogs can falsely increase fructosamine but in those patients, fructosamine was < 440 umol/L. Following therapy, fructosamine values returned to the reference range in 8 to 24 weeks, lagging behind resolution of hypothyroidism with supplementation.*

### Fructosamine in Diabetes

The following ranges may be used to get a sense of diabetic control in conjunction with clinical assessments as listed above: (Feldman et al: Canine and Feline Endocrinology 4th Edition, 2015). Note again that our reference concentrations are lower and the following ranges should just be used as guidelines only.

#### Fructosamine Canine

##### Diabetic on Insulin, Control is:

Excellent: 350 - 400 umol/L  
Good: 400 - 450 umol/L  
Fair: 450 - 500 umol/L  
Poor: > 500 umol/L  
Prolonged hypoglycemia: < 300 umol/L

#### Fructosamine Feline:

##### Diabetic on insulin, control is:

Good: 350-450 umol/L  
Fair: 450 - 550 umol/L  
Poor: >550 - 600 umol/L  
Prolonged hypoglycemia, concurrent hypoproteinemia or hyperthyroidism: <350 umol/L



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