

horse	1	2	3	4	5	
	pm	am	pm	am	pm	mean
1	39.9	38.4	43.8	41.4	65.6	45.82
2	52.2	31.6	29	42.6	43.7	39.82
3	54.8	45.1	74.9	49.8	51.2	55.16
4	41.8	31.8	34.9	31.8	34.9	35.04
5	43.8	28.9	53.2	47.7	37.5	42.22
6	37.4	61.4	64.7	61.1	57.6	56.36
7	41.9	34.9	40.1	34.5	38.6	38
8	38.6	36.4	40.3	24.9	35.6	35.16
9	48.9	42.2	82.7	45.7	45.1	52.92
10	68.8	36.8	68	51.7	53.7	55.8
11	34.9	36.7	55.7	46.9	35	41.84
12	26.1	42.2	47.1	25.1	41.7	36.44
13	53.6	43.9	53	45	49.5	49
14	53.9	35.7	59.9	47.6	42.7	47.96
15	55	49.4	34.3	51.6	51.3	48.32
16	50.1	39.1	47.3	38.3	45	43.96

Anova: Single Factor

SUMMARY				
Groups	Count	Sum	Average	Variance
pm	48	184.3333	3.840278	0.056638
am	32	118.2804	3.696262	0.049041

ANOVA.

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.398218	1	0.398218	7.263624	0.008615	3.963472
Within Groups	4.276242	78	0.054824			
Total	4.67446	79				

Using data taken from "Endogenous concentrations, pharmacokinetics, and selected pharmacokinetics effects of a single dose of exogenous GABA in horses" by H.K. Knych (2014)

parametric calculation

UCL 95	63.89	4sd	90.06 ng/mL
UCL 99	71.85	UCL 99.95	83.54 ng/mL
mean	45.23875	UCL 99.99	88.96 ng/mL
Geomean	3.774917	UCL 99.999	96.10 ng/mL

t-value (95)	1.664	t-value (99.95)	3.418
t-value (99)	2.374	t-value (99.99)	3.901
		t-value (99.999)	4.538

log normal calculations

UCL 95	65.35 ng/mL	4sd	115.34 ng/mL
UCL 99	77.67 ng/mL	UCL 99.95	100.12 ng/mL
		UCL 99.999	112.60 ng/mL
		UCL 99.999	131.48 ng/mL

Discussion

Samples were collected from a number of horses to assess variability in endogenous GABA concentrations between breeds and different age groups as well as within a single horse at different times. Based on findings from the current study, there appears to be a great deal of variability in GABA plasma concentrations between horses, but no trends with respect to breed or age could be established. For assessment of variability in GABA concentrations within an individual horse, samples were collected from the same horses at five different points in time over the course of 2-weeks. While this method of assessment does not lend itself to statistical analysis of concentrations from individual horses at the different collection times, there are obvious disparities in concentrations between samples collected on different occasions from the same animal that is beyond analysis variability. This suggests that determining a normal threshold concentration may require incorporation of a safety factor to account for this variability. Interestingly, however, the variability noted at the different sampling times does not appear to be related to the time of day at which the samples were collected (am or pm).

Statistical analysis

Statistical analyses using commercially available software (SAS, Cary, NC, USA) were performed to assess significant differences in physiologic variables for individual horses following intravenous and oral GABA administration. Raw data for all variables were checked for normality using the Wilk-Shapiro test and then log-transformed or Winsorized as necessary to bring the residual distribution in close agreement with a normal distribution. Data for all variables were subsequently analyzed using a mixed model ANOVA with repeated measures. Significance was set at $P < 0.05$.