

# Comparison of Resting and Dynamic Adrenocorticotrophic Hormone Following Administration of Thyrotropin-Releasing Hormone During Fall and Non-Fall Seasons in Horses<sup>1</sup>

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## Introduction

Circannual variation in equine adrenocorticotrophic hormone (ACTH) creates challenges in predicting early signs of Pituitary Pars Intermedia Dysfunction (PPID) without established fall reference values.

## Study Objective

The goal was to establish predictive ACTH concentrations for early signs of PPID during fall, based on established non-fall predictors, using a thyrotropin-releasing hormone (TRH) test.

## Materials and Methods

ACTH concentrations in 32 horses aged 1 to 17 yrs were evaluated before and after administration of TRH during June (non-fall) and October (fall). Venous samples were collected into EDTA-treated tubes before (PRE) 1 mg TRH administered i.v. and 10 (T10) and 30 (T30) min post-TRH. Blood was chilled and centrifuged within 2 hours, and plasma stored at -80°C pending ACTH analysis using a sequential immunometric assay. Horses were scored for muscle wasting, hirsutism, sweating and abnormal fat deposits.

## Results

Frequency histograms of the fall ACTH data indicated two populations at each sample time, confidence intervals were used to designate the break between these populations. The 95% confidence breakpoint indicated PPID “Positive” at ACTH greater than 80, 620 and 230 pg/mL, and “Negative” at ACTH less than 60, 340 and 190 pg/mL, at PRE, T10 and T30 respectively. Chi-square measures of association indicated no difference in non-fall vs fall predictions of PPID at PRE, T10, or T30 ( $P > 0.27$ ). Age positively correlated with PRE ( $R^2=0.37$ ;  $P=0.04$ ) and T10 ( $R^2=0.43$ ;  $P=0.01$ ). Muscle wasting scores positively correlated with age ( $R^2=0.50$ ;  $P=0.004$ ) and PRE ( $R^2=0.63$ ;  $P < 0.001$ ). Hirsutism scores positively correlated with T10 ( $R^2=0.46$ ;  $P=0.01$ ), T30 ( $R^2=0.42$ ;  $P=0.015$ ) and sweating scores ( $R^2=0.46$ ;  $P=0.01$ ).

## Discussion

**Fall ACTH Concentrations (pg/mL)**

Sample Time	Negative PPID	Positive PPID
Pre-TRH	<60	>80
10 minutes	<340	>620
30 minutes	<190	>230

**Fall ACTH Concentrations (pg/mL)**

Sample Time	Low Mean	High Mean	P Value
Pre-TRH	40 +/- 3	344 +/- 45	0.0001
10 minutes	253 +/- 30	933 +/- 88	0.0001
30 minutes	100 +/- 11	492 +/- 116	0.0001

The results of this study suggest that ACTH concentrations in autumn are equally predictive of Equine PPID as non-autumn values. Furthermore, Pre-TRH levels were equally predictive of Equine PPID as 10 and 30 min post TRH values. Therefore, a single blood sample for ACTH testing may be sufficient for early detection of Equine PPID in the autumn season. Further research is necessary to confirm the predictive value of autumn TRH testing of horses for Equine PPID.

## Take Home Message

In this study, ACTH concentrations in autumn were equally predictive of Equine PPID as non-autumn values, and resting ACTH testing may be sufficient for early detection of Equine PPID in the autumn season. Further studies in a larger population of horses are required to determine adequate reference ranges for autumn TRH testing.

## Acknowledgments

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## References

1. Haffner J, Hoffman R, Grubbs S. Comparison of resting and dynamic adrenocorticotropic hormone following administration of thyrotropin-releasing hormone during fall and non-fall seasons in horses. *J Vet Intern Med* 2014; 28: 1112.