

# A RANDOMIZED, BLINDED, PLACEBO-CONTROLLED CROSSOVER STUDY OF DIPYRONE TO CONTROL FEVER IN HORSES

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## INTRODUCTION

### Dipyron

Dipyron is a novel non-steroidal drug (NSAID) also known as metamizole in Europe.

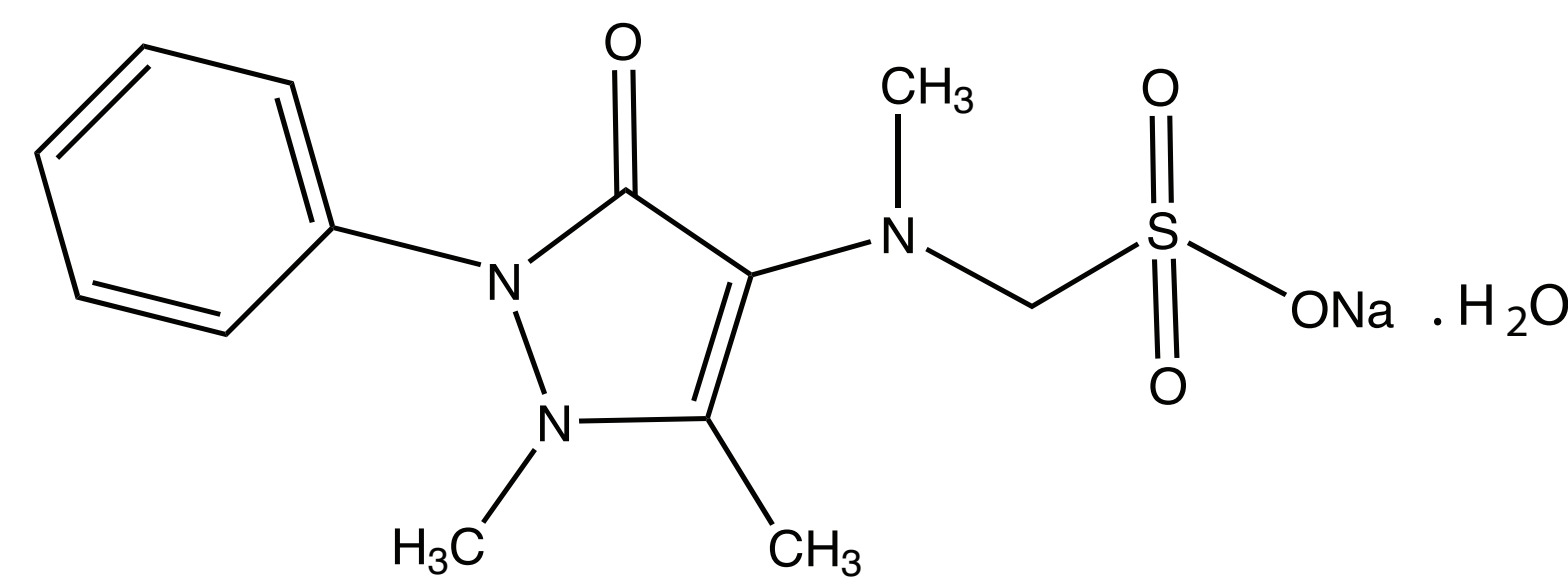
Dipyron is a prodrug, which is converted to active metabolites with analgesic, antipyretic, and anti-spasmodic effects.

Compared to other drugs in the NSAID class, dipyron is well tolerated with respect to gastrointestinal side effects.

Dipyron is available as an injectable formulation in Europe; however, no oral formulation which is bioavailable has been developed for use in horses.

The commonly accepted dose is 30 mg/kg administered intravenously (IV) [1].

Figure 1: Chemical structure of dipyron



Molecular Formula: C<sub>13</sub>H<sub>16</sub>N<sub>3</sub>NaSO<sub>4</sub> · H<sub>2</sub>O Molecular Weight: 351 g/mol

## OBJECTIVE

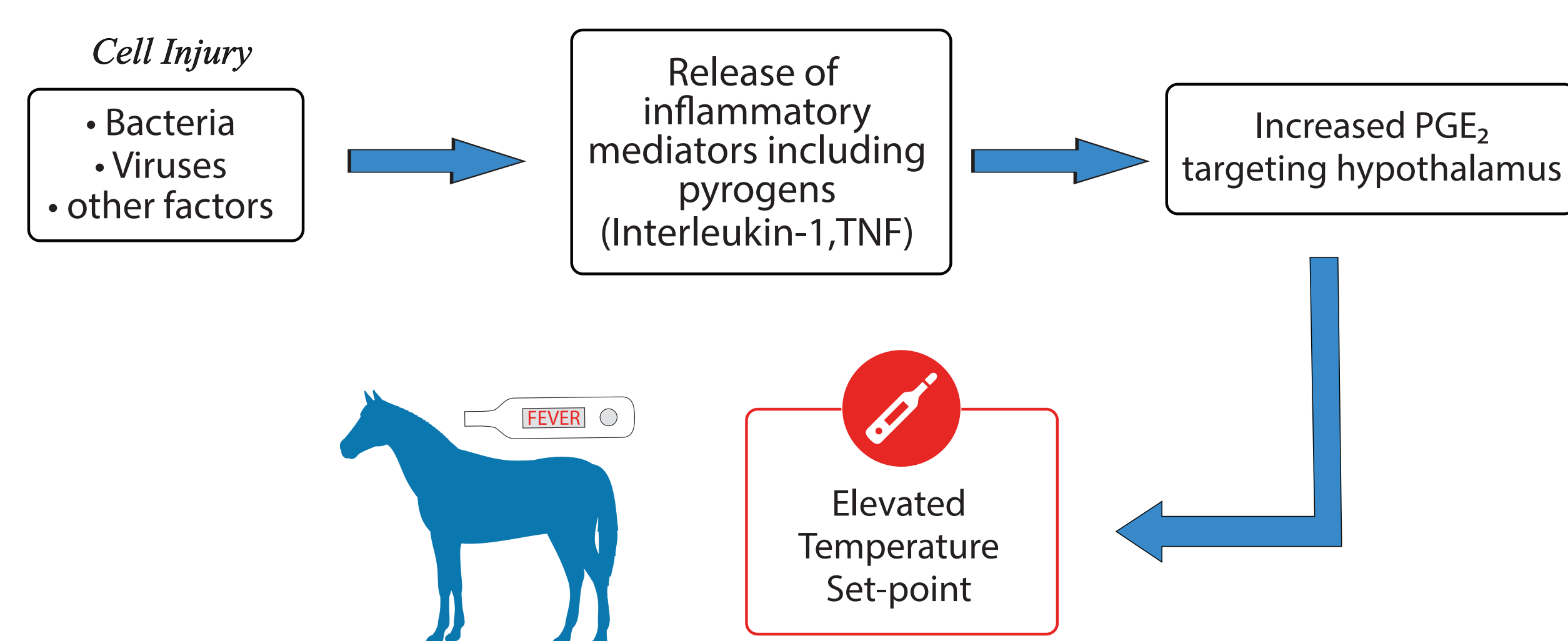
This study evaluated the efficacy of dipyron administered intravenously to control fever in horses compared to placebo.

## METHODS

This was a blinded, randomized, placebo-controlled pilot study with two treatment groups conducted at a single site.

Thirty-one horses with fever (rectal temperature ≥ 102.0°F) from naturally occurring disease were randomized in two treatment groups.

Figure 2: Mechanism of fever in the horse



## METHODS (CONT'D)

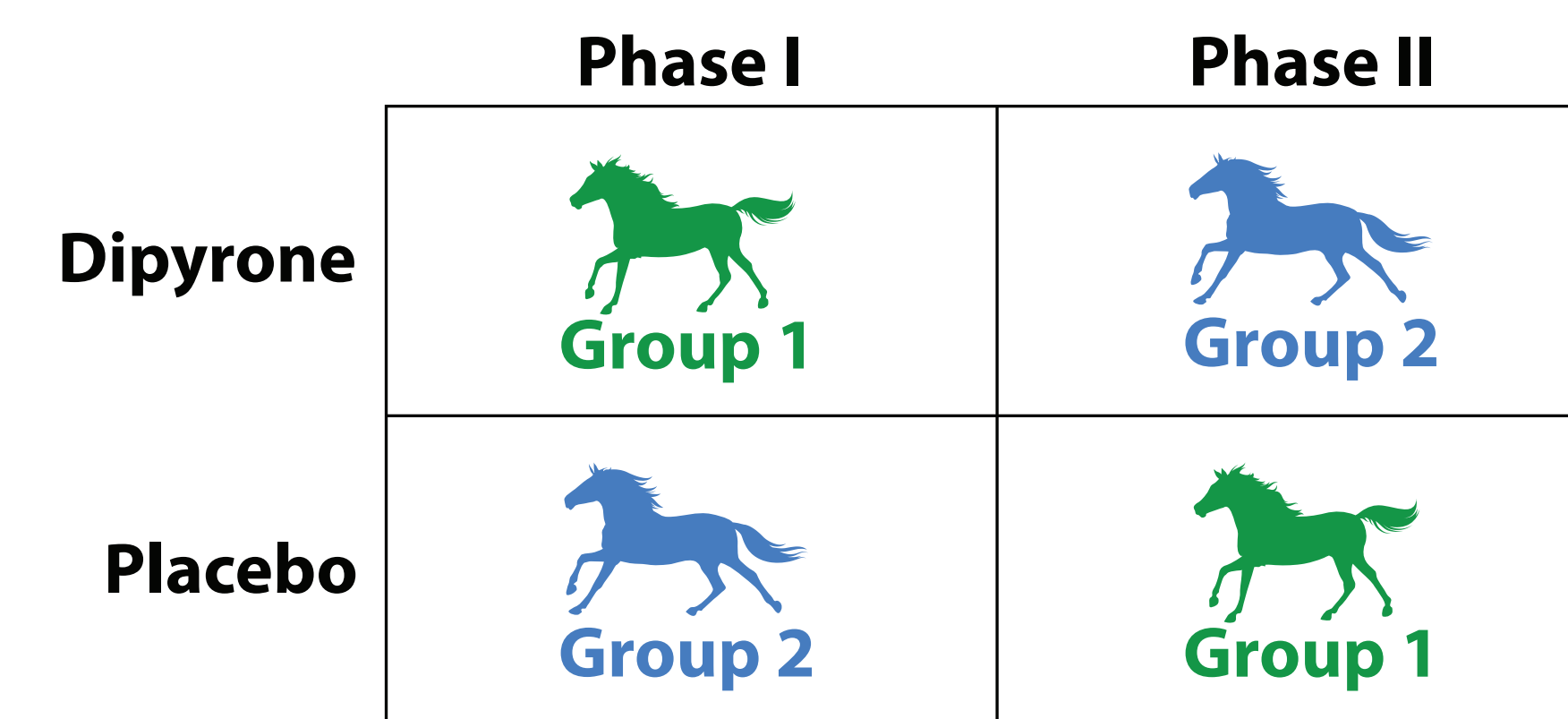
### PHASE I

The dipyron group was treated with a single dose of 30 mg/kg dipyron IV.

The placebo group was treated with a single matched volume dose of 0.9% sodium chloride IV.

### PHASE II

Horses were crossed over to the other treatment group if they had a rectal temperature of ≥ 102°F 24 to 30 hours following treatment in Phase I.



### Rescue Medication

- Eligible if fever ≥ 105.0°F for 8 consecutive hours after dose 1
- Antibiotics allowed immediately and a NSAID administered 8 hours after last dose of study drug

### Assessments

- Rectal temperature at 0, 4, 6 and 24 hours after treatment administration

### Response Definition

- Decrease in rectal temperature of either ≥ 2.0°F from baseline or a return to normothermia (≤ 101.0°F) 6 hours after treatment

### Statistical Comparison

- Between groups using a two-sided Fisher's Exact Test

## RESULTS

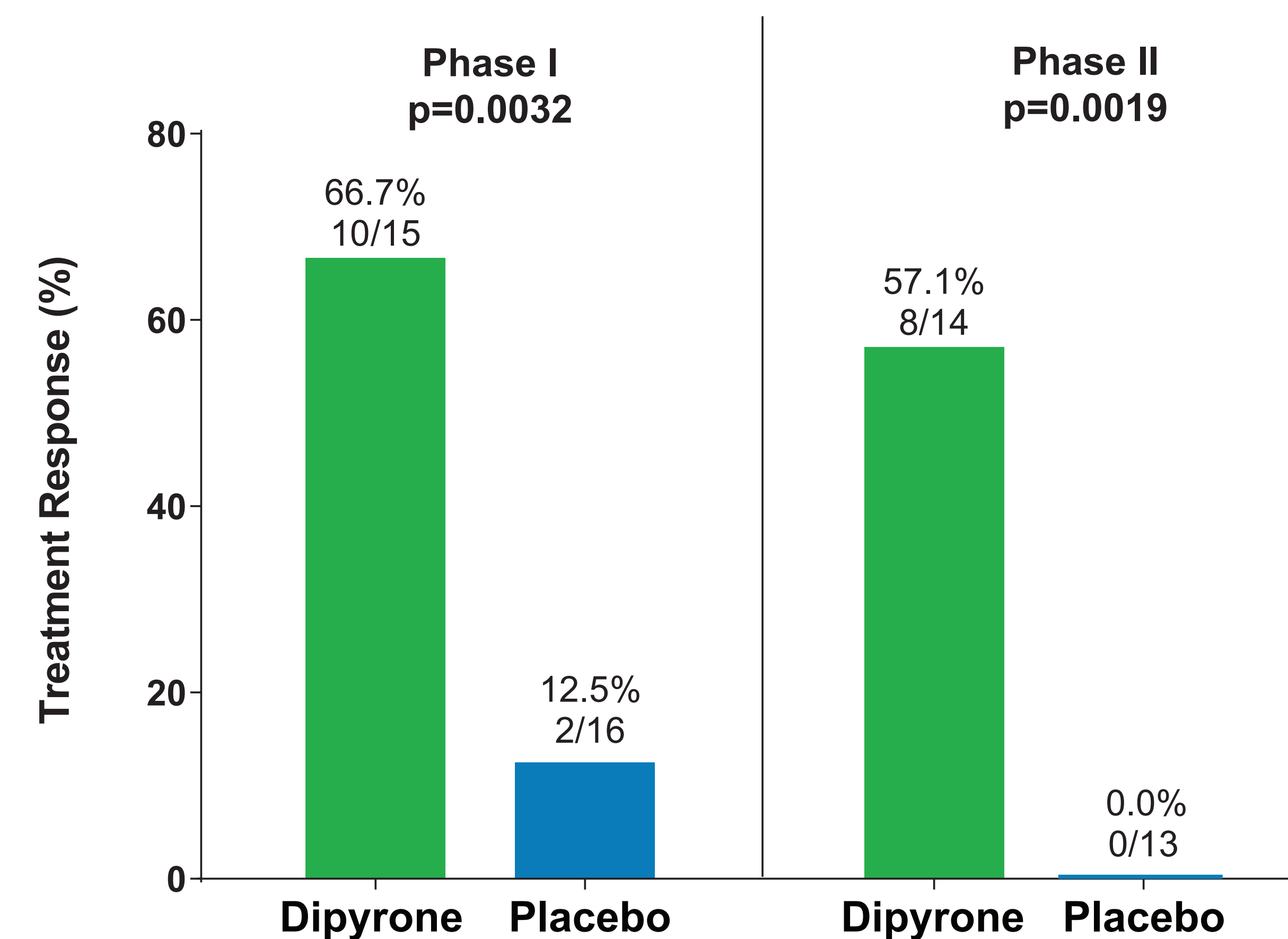
**Phase I:** 15 horses treated with dipyron and 16 horses treated with placebo

**Phase II:** 14 horses treated with dipyron and 13 horses treated with placebo

Sex	Approximate Mean age	Breed
Male Castrated: 10	8 years (range 3-20)	13 Tennessee Walking Horses (TWH)
		13 Quarter Horses
Female intact: 21		4 Paint Horses
1 Mixed TWH/Paint		

## RESULTS (CONT'D)

Figure 3: Treatment response rate



Response: decrease in rectal temperature of either ≥ 2.0°F from baseline or a return to normothermia (≤ 101.0°F) 6 hours after treatment

Figure 4: Mean temperature over time

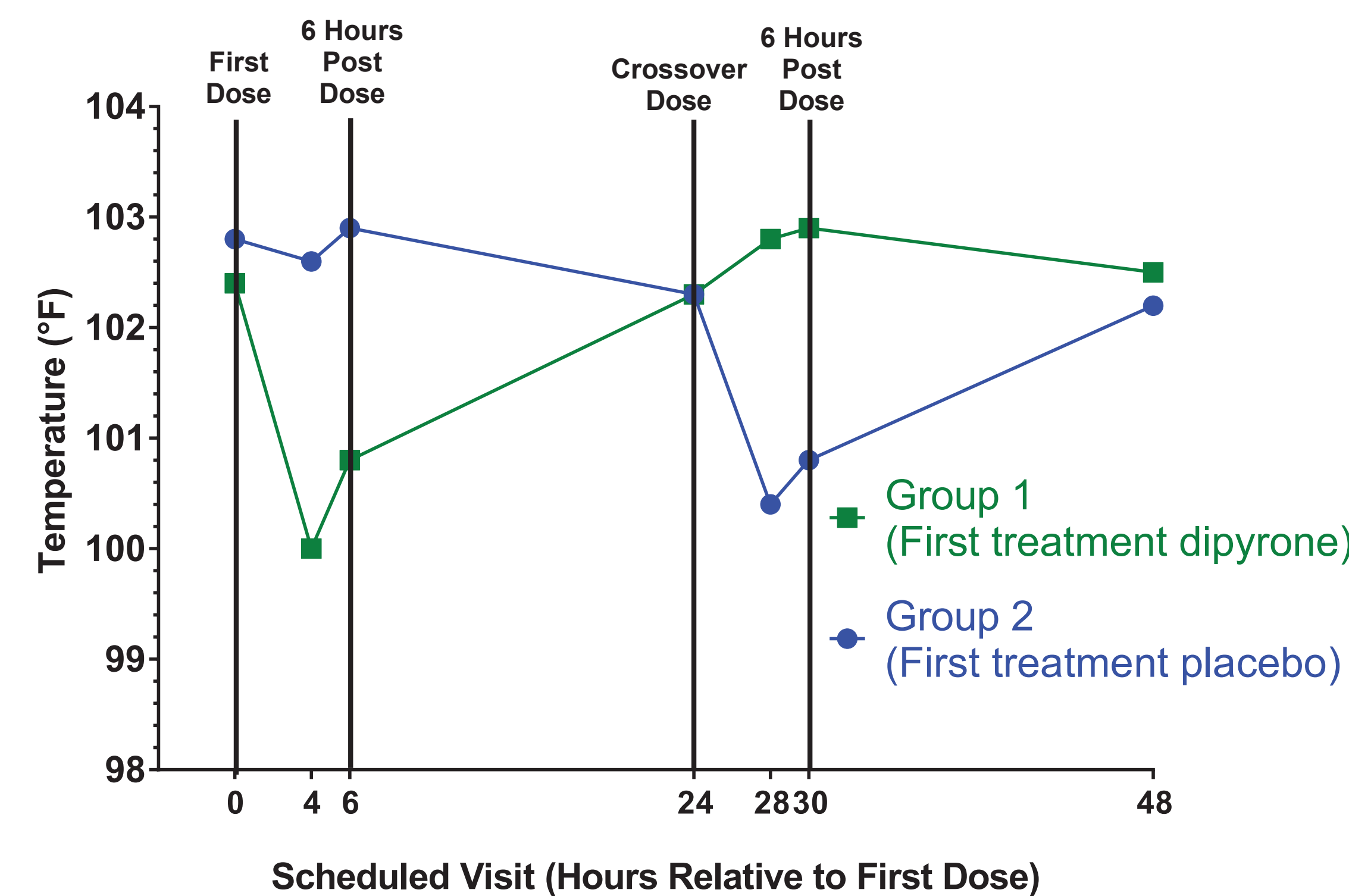


Table 1: Response at 6 hours following the first dose and crossover dose

Response Criteria	Horses n (%)
Response with dipyron and placebo (+,+)	0 (0)
Non-response with dipyron and placebo (-,-)	10 (37)
Response with dipyron; non-response with placebo (+,-)	17 (63)
Non-response with dipyron; response with placebo (-,+)	0 (0)
<b>Total*</b>	<b>27 (100)</b>

\*Includes horses which had both the first and crossover treatment

## DISCUSSION

Dipyron administered IV at 30 mg/kg effectively reduced pyrexia in 10 of 15 horses in Phase I and 8 of 14 horses in Phase II. The findings of the combined Phase I and Phase II results show that dipyron was effective in controlling fever in 18/29 horses.

The placebo response rate in Phase 1 (2/16 horses) is consistent with the placebo response rate found in evaluating fever in horses [1]. Additionally, horses in Phase II had additional time for the underlying disease to progress, which is indicated by the lack of response in placebo treated horses in Phase 2.

Treated horses did not exhibit adverse events related to dipyron administered IV at 30 mg/kg and all reported adverse events were expected and considered related to the underlying disease process.

## CONCLUSIONS

**A single dose of dipyron IV effectively controlled fever for 6 hours post administration and was superior to placebo.**

**The measured anti-pyretic effect was maximized at approximately 4 hours post administration.**

**Dipyron was well tolerated in horses with naturally occurring respiratory disease.**

## DISCLOSURES

Ryan Avenatti, Ming Yin, Tianhua Hu, Melinda Poole, and Emily Sundman are/were employees of Kindred Biosciences, Inc. Craig Reinemeyer is a contractor for Kindred Biosciences, Inc.

## REFERENCES

1. Sundman E, Ming Y, Hu T et al. Double-blind, placebo-controlled, randomized study of dipyron as a treatment for pyrexia in horses. 2016. AAEP Proc Vol 62: p 228-29.



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