



Fecal D-/L-lactate concentrations and abundance of lactic acid bacteria in dogs with exocrine pancreatic insufficiency



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Introduction

Exocrine pancreatic insufficiency (EPI) in dogs is characterized by maldigestion as a result of inadequate synthesis and secretion of pancreatic enzymes. Dogs with EPI often have small intestinal dysbiosis and may require concurrent antibiotic therapy in addition to pancreatic enzyme replacement therapy.¹ In human patients with short bowel syndrome, which is also characterized by maldigestion and intestinal dysbiosis, increased fecal lactate concentrations have been reported.^{2,3}

Before treatment⁴



After treatment⁴



Objective

- To compare lactic acid bacteria and fecal lactate concentrations between healthy dogs and dogs with EPI

Materials and Methods

- 40 dogs were enrolled into the study
 - Healthy dogs (n=18) had no clinical signs of GI disease
 - Dogs treated for EPI (n=17) received enzyme replacement therapy at the time of collection
 - Dogs with untreated EPI (n=5) did not receive enzyme replacement therapy
- Inclusion criteria for dogs with EPI:
 - Serum cTLI concentration $\leq 2.5 \mu\text{g/L}$
 - At least 1 year of age
 - Clinical signs of EPI present
 - No other concurrent disease
- Fecal samples were collected for three consecutive days and pooled
 - Isolated fecal DNA (MOBIO- PowerSoil® DNA Isolation Kit)
 - Deproteinized and fecal D- and L- lactate measured with enzymatic D-/L-lactic acid kit (R-Biopharm)
 - Bacterial groups analyzed by qPCR: *Lactobacillus*, *Bifidobacterium*, *Enterococcus*, *Blautia*, *Streptococcus*, *E. coli*
- Data was tested for normality using the Shapiro-Wilk test and groups were compared using a Kruskal Wallis test followed by a Dunn's post-test

Results

Table 1. Median [min-max] values for fecal lactate concentration (mM). Groups not sharing a common letter are significantly different.

	Treated EPI	Healthy	Untreated EPI
D-lactate (mM)	4.3 ^a [0.2-20.8]; p=0.0081	0.4 ^b [0.1-0.7]	11.5 ^a [5.7-26.5]; p=0.0013
L-lactate (mM)	18.3 ^a [0.3-32.6]; p=0.0023	0.5 ^b [0.2-2.8]	23.3 ^a [13.3-24.8]; p=0.0019
Total lactate (mM)	28.0 ^a [0.5-50.1]; p=0.0027	0.8 ^b [0.3-3.3]	30.2 ^a [23.5-49.8]; p=0.0018

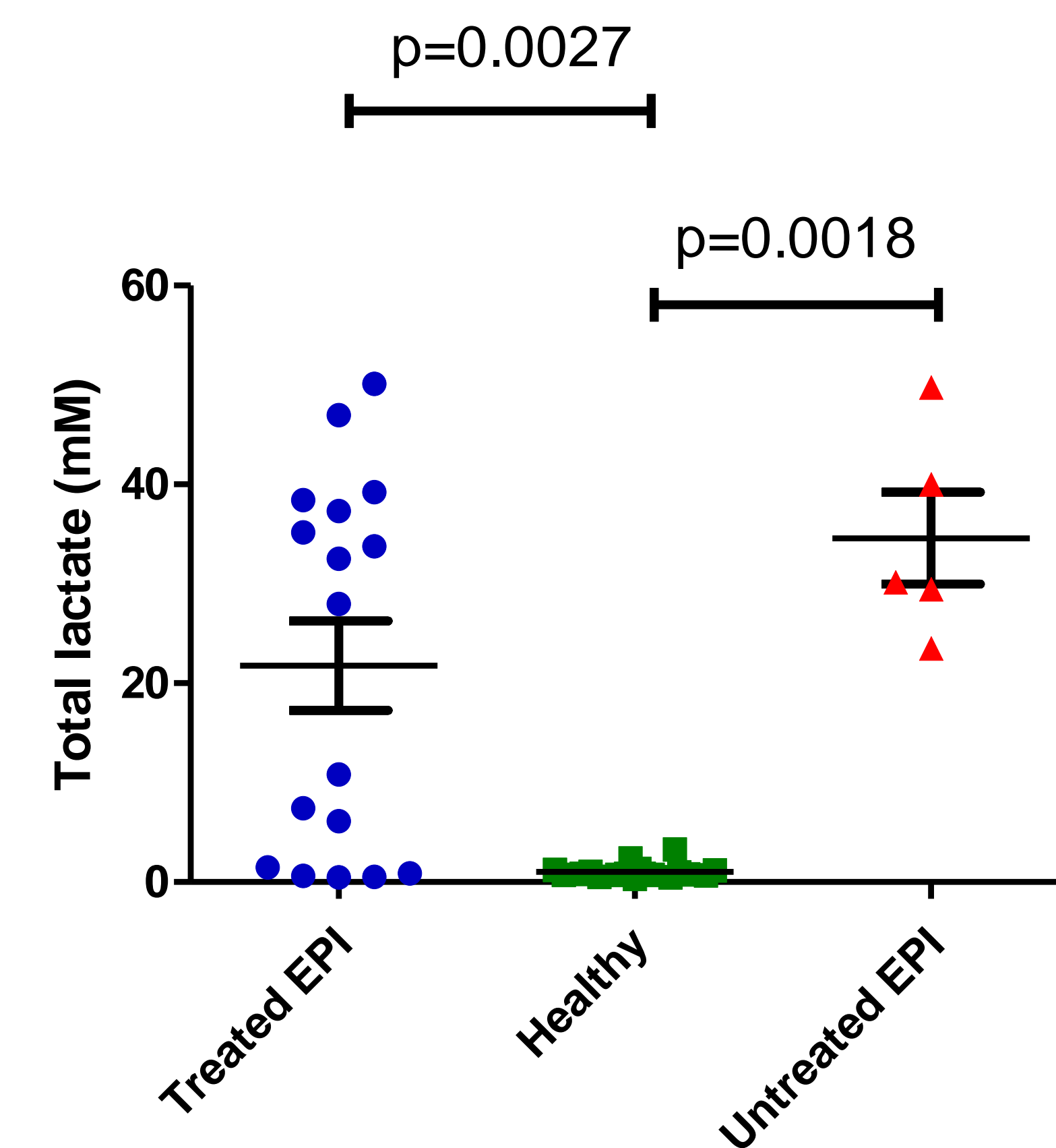


Figure 1. Total Lactate concentration (mM)

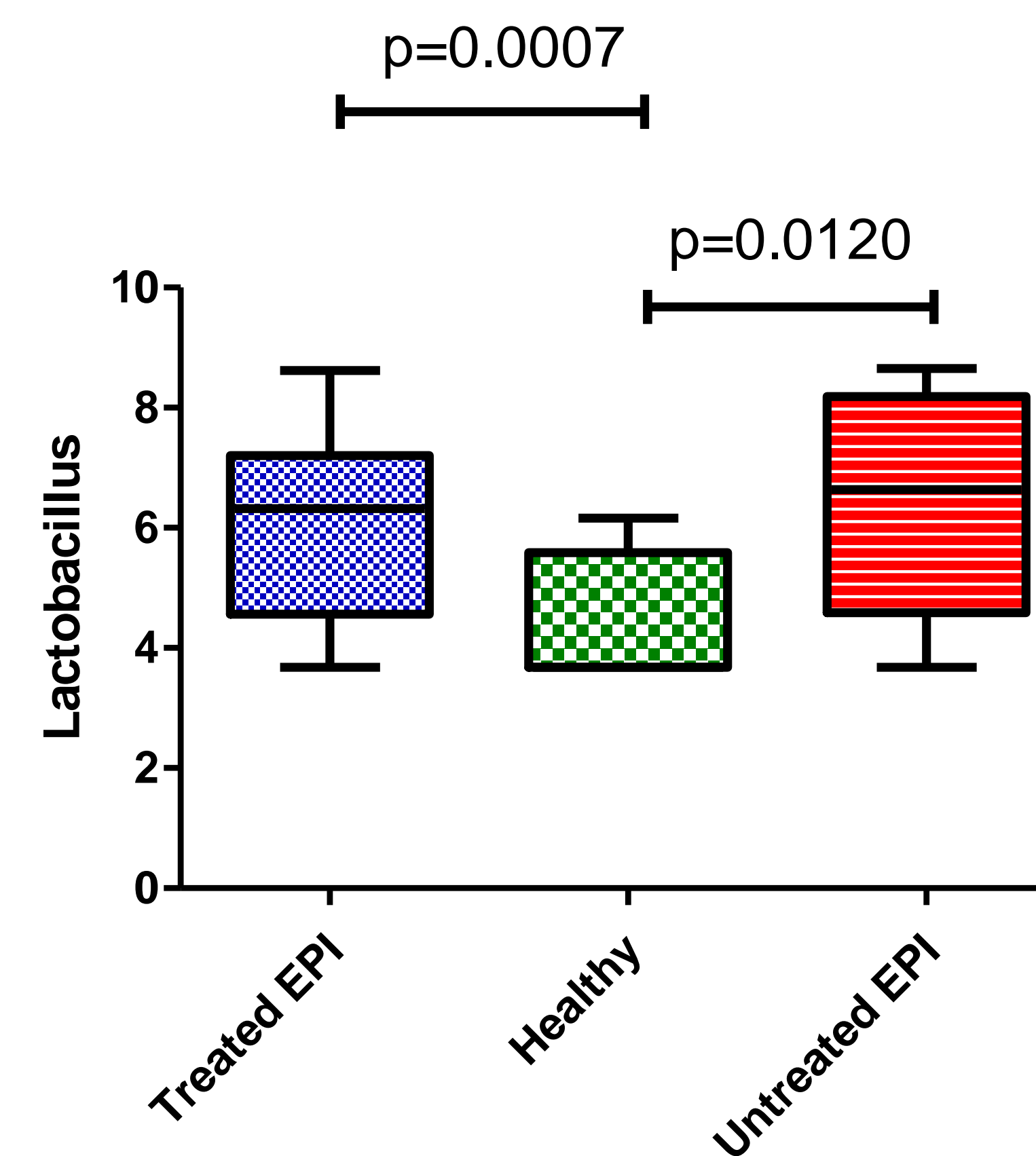


Figure 2. *Lactobacillus* spp. are increased in dogs with EPI

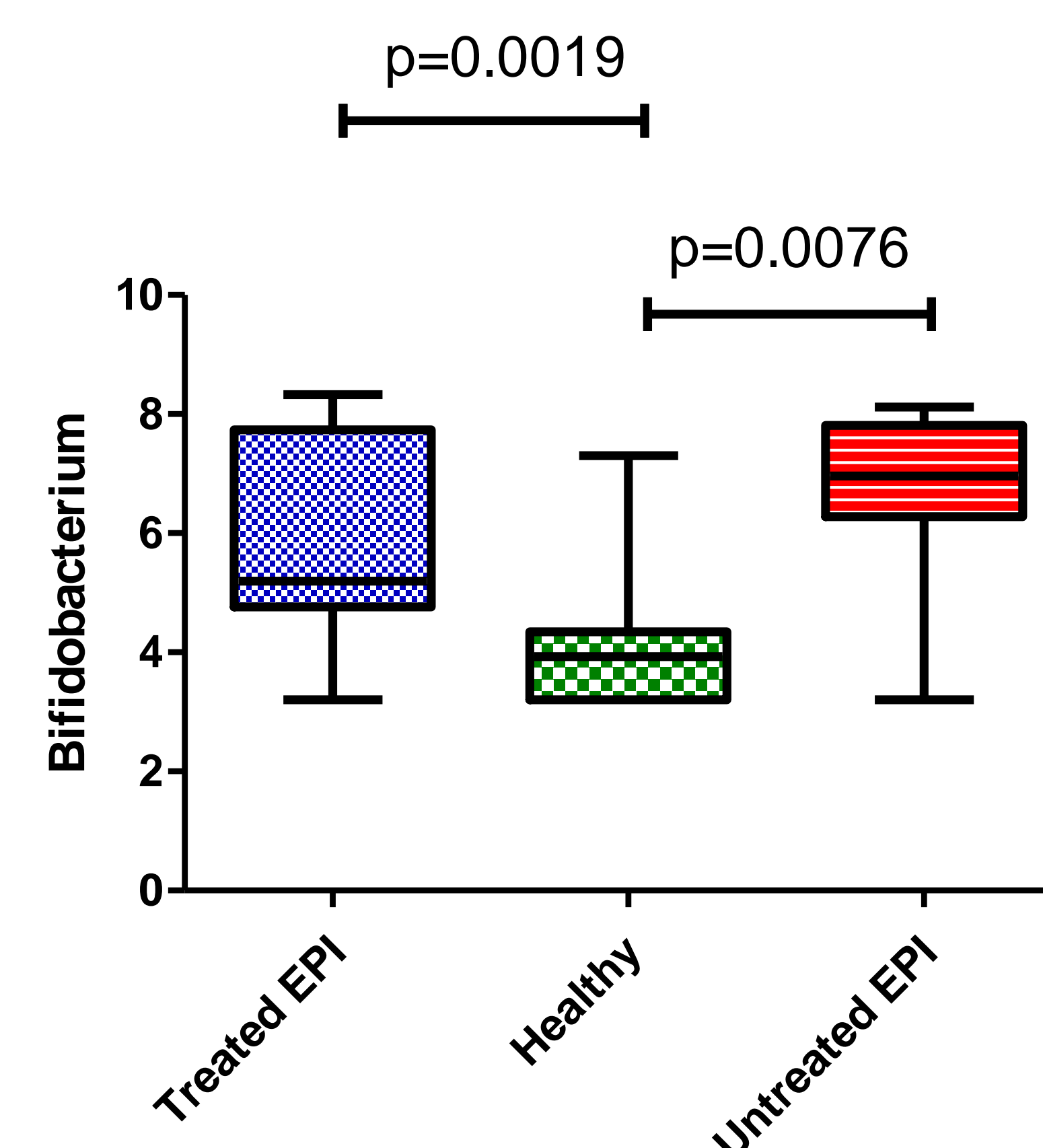


Figure 3. *Bifidobacterium* spp. are increased in dogs with EPI

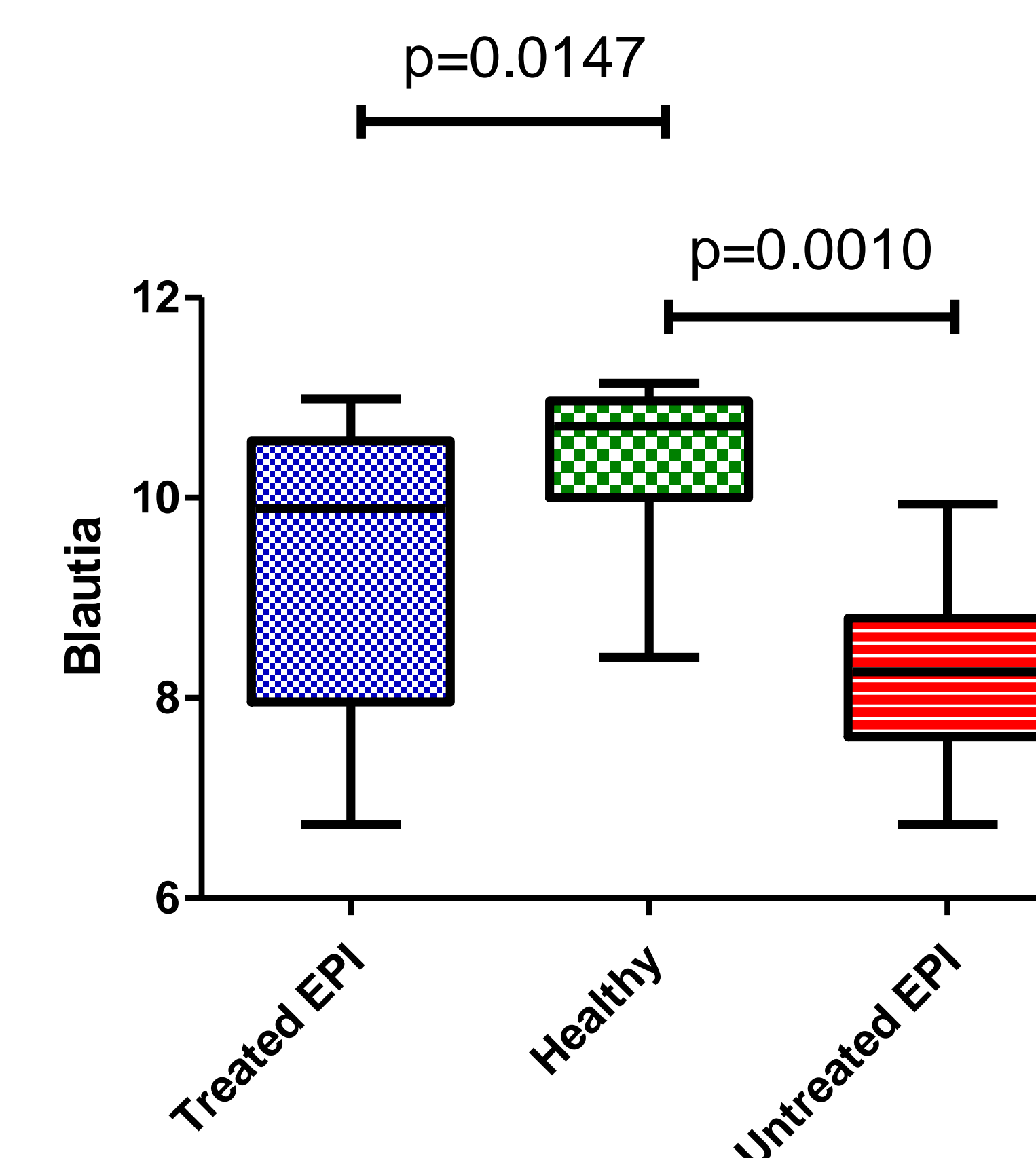


Figure 4. *Blautia* spp. are decreased in dogs with EPI

Results

- Fecal D-lactate was increased in dogs treated for EPI (p=0.0081) and dogs not treated for EPI (p=0.0013) compared to healthy dogs (**Table 1**)
- Fecal L-lactate was increased in dogs treated for EPI (p=0.0023) and dogs not treated for EPI (p=0.0019) compared to healthy dogs (**Table 1**)
- Total fecal lactate was increased in dogs treated for EPI (p=0.0027) and dogs not treated for EPI (p=0.0018) compared to healthy dogs (**Figure 1**)
- Lactobacillus* and *Bifidobacterium* spp. were increased in dogs with EPI (**Figure 2 and Figure 3**)
- Blautia* spp. were decreased in dogs with EPI (**Figure 4**)

Discussion

- Blautia* spp. are a major bacterial group in the GI tract, and a decrease of this group in dogs with EPI indicates major shifts in the microbiome
- The effect of dysbiosis on the treatment of EPI warrants future studies

Conclusion

- Dogs with EPI have fecal dysbiosis with concurrent metabolic changes of the microbiota

References

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- Images retrieved from www.epi4dogs.com

Disclosure

The authors have no conflicts of interest to disclose.