

Introduction

- Lyme disease affects nearly 476,000 individuals each year, with annual healthcare costs exceeding 1.3 billion dollars (1).
- Lyme disease is thought to be caused by microbes in the Spirochetes phylum, transmitted by black-legged ticks.
- Nearly 1 in 5 patients with Lyme disease experience GI symptoms including nausea, anorexia, abdominal pain, and diarrhea (2).
- *Bifidobacterium* are known for their beneficial probiotic actions in the human gut microbiome, with reductions implicated in several chronic disease states (3-5).
- The purpose of this study was to investigate the presence of *Bifidobacterium* in fecal samples of patients with Lyme disease compared to healthy controls.

Methods

Fecal samples were assessed for Relative Abundance of genus *Bifidobacterium* in healthy control subjects without Lyme disease (n = 20) compared to patients with Lyme disease (n = 39). The average symptom duration in patients with Lyme disease was 5 years (range of 1 month-20 years). No patients were on antibiotics 2 weeks prior to sample collection, although all treated initially with antibiotics. This study was IRB approved. Metagenomics Next Generation sequencing was performed on fecal samples, where DNA samples were extracted and normalized for library downstream analysis using Shotgun Methodology. The Mann-Whitney test was used to compare *Bifidobacterium* Relative Abundance levels between study groups.

Results

Study Group	Relative Abundance of <i>Bifidobacterium</i> (Median, IQR)
Control (n = 20)	4.175 % (1.72-10.27%)
Lyme disease (n = 39)	0.0014% (0.00-0.96%)

Table 1. Relative Abundance of *Bifidobacterium* between study groups.

- p < 0.001 for comparing Relative Abundance in Lyme disease patients vs. controls.

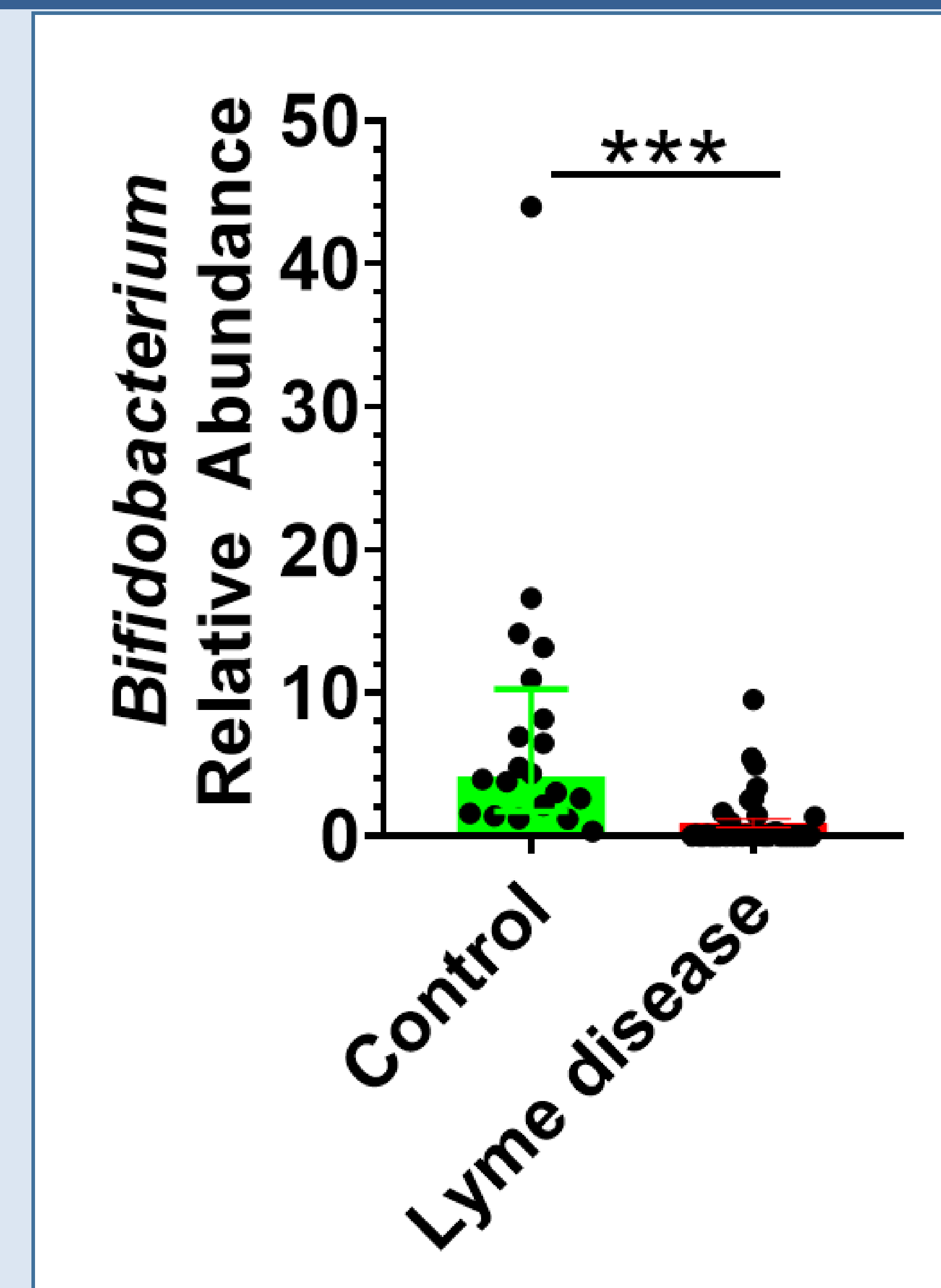


Figure 1. Patients with Lyme disease have significantly reduced Relative Abundance of genus *Bifidobacterium*.

Discussion

- This study is the first to demonstrate low levels of *Bifidobacterium* in patients with chronic Lyme disease.
- Relative Abundance of *Bifidobacterium* was significantly decreased in patients with Lyme disease compared to healthy controls.
- 9/39 (23%) of patient stool samples possessed < 1% Relative Abundance of *Bifidobacterium*.
- Only 1 Lyme patient showed presence of Spirochetes.
- Results suggest further examination into the mechanisms underlying *Bifidobacterium* loss, and the potential for therapeutic restoration of *Bifidobacterium* in patients with Lyme disease.

References

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