Microbiota Diagnosis of Appendicitis

Summary

Appendicitis is one of the most common surgical emergencies. Delays in diagnosis beyond 24-36 hours from the initiation of symptoms can lead to increased mortality, morbidity, and costs associated with its complications. Its diagnosis, however, is complicated because its symptoms are indicative of many other conditions such as diverticulitis, inflammatory bowel disease, bacterial enteritis, and viral gastroenteritis. Although there were high hopes that high-resolution CT would identify appendiceal inflammation and improve the diagnosis and treatment of appendicitis, the results thus far have been modest at best. Rates of unnecessary appendectomies remain as high as 3-30%, and unnecessary ruptures occur 30-45% of the time. Researchers at UMB have developed a non-invasive method and assay kit for determining the likelihood of appendicitis in a subject, and have tested it in a pediatric population. The approach uses the relative abundance of particular microorganisms from a patient and compares them to one or more operational taxonomic units.

Key Investigator

Anthony Sandler
Claire M. Fraser
Emmanuel Mongodin
Hope Jackson
Katherine Davenport
Steven L. Zeichner

Field

Internal Medicine
Diagnostics

Technology

Diagnostic test

Advantages

Cheaper, faster, and more precise than imaging-based tests for appendicitis

Does not require CT or ultrasound equipment nor a highly skilled radiologist or ultrasonographer

Status

Available for licensing
Available for sponsored research

Patent Status

U.S. Patent Allowed

UMB Docket Reference

CF-2014-074

External Reference

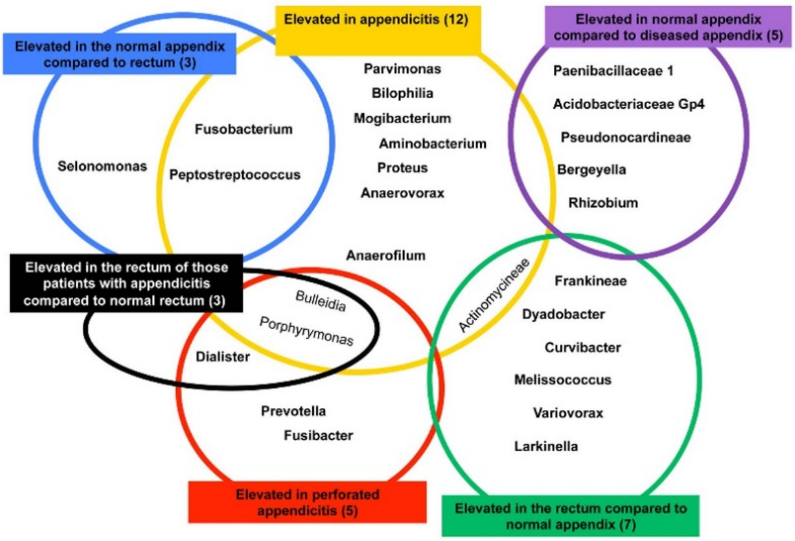
Jackson HT et al. (2014) *PLOS ONE.* 9(4). e95414.

Market

The lifetime risk of appendicitis is estimated at 7-14%. Approximately 300,000 people in the US undergo an appendectomy each year. In contrast, the Healthcare Cost and Utilization Project reports an estimated 195,000 cases of appendicitis in the US per year. This discrepancy suggests the rate of misdiagnosis and therefore potentially unnecessary surgical procedures is very high. The lack of a definitive diagnostic test increases the associated healthcare cost, as physicians use a combination of bloodwork results, ultrasound, and CT to make their diagnosis. CT is used in 98% of patients undergoing appendectomy in the US. However, the rates of unnecessary appendectomies and ruptures remain high even with the use of CT. This technology is a safer, cheaper and more accurate alternative to current methods.

Technology

A culture-independent, 16S rRNA gene analysis was used to analyze the microbiota of pediatric patients diagnosed with either appendicitis or undergoing appendectomy incidental to abdominal surgery for another indication. The relative abundance of bacteria in the appendix and rectal samples was cataloged and compared. Distinct differences in the appendix and rectal microbiota were found, as well as differences between patients with or without appendicitis (see figure). These microbiota "signatures" may be used to guide the treatment and diagnosis of appendicitis.



Technology Status

This technology has been tested in the appendix and rectal samples from 21 children undergoing an appendectomy, six with normal appendices and fifteen with appendicitis.

Contact: Mark Wozniak
Mark.Wozniak@umaryland.edu
410-706-7293

University of Maryland, Baltimore
620 W. Lexington St., 4th Floor
Baltimore, MD 21201