Docket #: S24-389

Systems, Devices, and Methods Analyzing Exhaled Breath to Detect Indications of a Bacterial Infection

Necrotizing enterocolitis is a life-threatening illness almost exclusively affecting the gastrointestinal tract of neonates. It's caused by bacterial invasion of the intestinal wall, which leads to inflammation and cellular destruction of the wall of the intestine. If unrecognized and untreated, an intestinal perforation may occur, causing spillage of intestinal contents into the peritoneum and resulting in peritonitis. The specific mechanism and cause of this bacterial invasion are not yet understood. Current detection methods are time-consuming that often result in late-stage disease, leading to poor neurodevelopmental outcomes and high mortality rates. Thus, early detection and treatment methods are necessary to improved patient outcomes.

Researchers at Stanford have developed a device for early disease detection of necrotizing enterocolitis by using breath-based biomarkers. Bacterial species in the gut microbiome commonly produce byproducts of hydrogen, methane, and hydrogen sulfide. The invention detects the presence of these byproducts by directly sampling the breath of the patient. This not only provides a quick and noninvasive method for early disease detection, but it also provides method that could be to prevent disease overtreatment.

Stage of Development
Prototype

Applications

- Bacterial detection
- Medical diagnostic device
- Early disease detection and screening

Advantages

- There are currently no methods or devices for early diagnosis of necrotizing enterocolitis.
- First breath gas monitoring system

Patents

- Published Application: WO2026060046

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