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Summary

NON-INVASIVE CLINICAL SAMPLING AND PRESERVATION OF SMALL INTESTINE LUMINAL CONTENT FOR MICROBIOME AND METABOLOMIC ANALYSIS: THE SMALL INTESTINE MICROBIOME ASPIRATION (SIMBA) CAPSULE VS. ENDOSCOPY ASPIRATES

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A novel ingestible pH-sensitive capsule (SIMBA) successfully sampled small intestinal luminal fluid in 30 subjects, demonstrating 94% retrieval rate and microbiome/metabolome profiles distinct from fecal samples and comparable to endoscopic aspirates.

KEY POINTS

- In 10 healthy volunteers, 10 IBS-C patients, and 10 IBS-D patients, 113 of 120 SIMBA capsules (94%) were successfully retrieved with median gut transit time of 47 hours and no adverse events.
- X-ray monitoring showed 92% of capsules deployed in the small intestine, mostly in jejunum and ileum, with no significant performance differences between healthy and IBS groups.
- Multi-omic analysis revealed significantly different microbiota and metabolomic composition between SIMBA contents and fecal samples within the same subjects.
- SIMBA microbiome profiles were similar to endoscopic aspirates but less affected by oral microbiota interference, and captured small intestine-specific metabolites including amino acids and bile acids.
- The authors conclude SIMBA appears safe and reliable for non-invasive small intestinal sampling suitable for multi-omics analysis of digestive conditions, complementing fecal sampling.

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