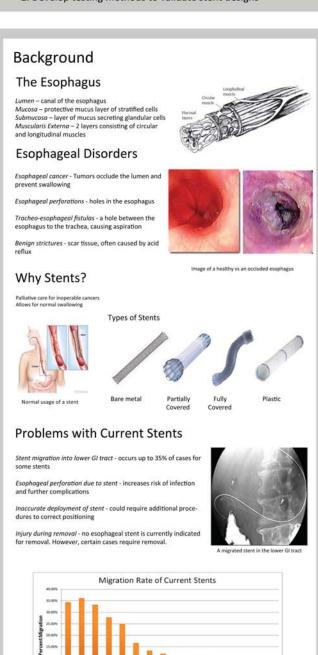
# Boston Cientific Design of Esophageal Stent Delivering what's next." with Decreased Migration



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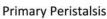
- 1. Design a stent or stent-like device that
- a. Separates the esophageal lumen from the biological tissue
- b. Decreases stent migration
- 2. Develop testing methods to validate stent designs

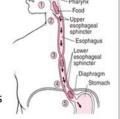


## Mechanisms of Stent Migration

#### **Basics of Swallowing**

- (1) Food is masticated into a bolus.
- (2) The bolus moves past the upper esophageal sphincter.
  (3) Peristalsis then carries the bolus down the esophagus.
- (4) The lower esophageal sphincter opens to allow the food
- into the stomach. (5) The bolus is digested in the stomach.





Consists of involuntary muscle movements Longitudinal muscles contract ahead of the bolus (distal) Increases the diameter of the lumen and the concentrates circular muscles around the bolus

The circular muscles contract above the bolus Completely occludes the lumen and pushes it down into the wider lumen

The peristaltic wave moves at a velocity independent of the bolus

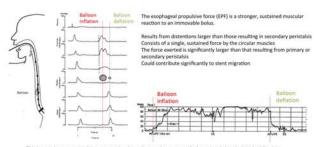
#### Secondary peristalsis

A natural reflex of the circular muscles to accommodate leftover food passed over by the peristaltic wave.

Depends on continual distention of the esophageal tissue.

Independent of any neuronal activity and can be induced ex vivo.

#### Esophageal Propulsive Force (EPF)

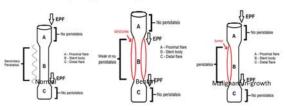


This image shows a peristalitic wave moving down the esophagus towards the stomach (vertical axis) while also showing the movement of the peristalitic wave in time (horizontal axis). Note that the there are no peristalitic wave immediately above or below the bolus. The peristalitic wave appears trapped proximal to the bolus. Once the ballo is deflated (30s), the peristalitic wave continues down the esophagus.

	Distension Diameter (mm)	Distension Duration (sec)		Type of Contraction	Location
Secondary Peristalsis	≤ 21.2	<5	40-100	Peristaltic weve	Proximal to obstruction
Esophageal Propulsive Force	226.6	>10	4-200	Sustained contraction	Proximal to obstruction

Distention thresholds to induce secondary peristalsis (motor threshold), patient discomfort (sensation threshold), and maximum tolerated sensation

### Possible Esophageal Responses to Stent Placement



#### References