Project Goal
Develop and test a device that distinguishes lesions from surrounding lung tissue on-site and real-time during bronchoscopic procedures.

Current Diagnostic Procedure

- **Low Risk Patient**
  - Lesion <8mm
  - Lesion often in distal regions
  - Physician waits for development of lesion

- **High Risk Patient**
  - Lesion >20mm
  - Lesion often in major airways
  - Physician proceeds with lesion biopsy using bronchoscope

- **Medium Risk Patient**
  - Lesion 8-20 mm
  - Lesion often in distal regions
  - Patient waits for development of lesion

Bronchoscopic Procedure

In a bronchoscopy, a thin, flexible tube called a bronchoscope is threaded down the patient’s trachea and into the lungs. A camera at the end of the bronchoscope helps physicians navigate to a lesion site. In distal airways, however, a smaller, non-visual probe must be used to navigate to the lesion.

Non-Visual Probes

- **Electromagnetic Navigation**
  - Bronchoscopy (ENB): 3D map is generated from LDCT. Probe has location sensor on tip.

- **Endobronchial Ultrasound (EBUS)**
  - Ultrasound probe makes comparisons based on density.

Designing and Testing our Device

- **Researched lesion identification methods**
- **Researched lesion properties**
- **Chose and validated one method**
- **Built lesion identification system**
- **Variables Tested**
  - **Depth**
  - **Location**
  - **Inter-patient Differences**

<table>
<thead>
<tr>
<th>Variables Tested</th>
<th>Significance</th>
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<tbody>
<tr>
<td>Depth</td>
<td>Lesions can protrude into the bronchiole or can be located between bronchioles</td>
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<tr>
<td>Location</td>
<td>Lesions can be located in distal or proximal regions</td>
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<td>Inter-patient</td>
<td>Biological properties often vary widely between individuals, and patient-to-patient calibration is time consuming and difficult</td>
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- **Improved device**
- **Extensive testing and analysis**
- **Presented promise and limitations**

Our device can be used to accurately detect lesions at various depths and locations in the lung, and may not need to be calibrated for each patient individually. Further in vivo testing will be necessary.

Our team strongly suggests that Boston Scientific move forward with device development. We believe it could assist physicians in accurately diagnosing medium risk patients by improving reliability of biopsies.