

# Larynx Adapter Product Design Specifications

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Whitney Johnson, Kelsey Hoegh, Clayton Lepak, Sarah Switalski, John Renfrew

## Problem Statement:

There is a testing apparatus which uses an excised canine larynx to measure sub-glottal pressure, and indicator of vocal health. Our objective is to create an airtight, rigid, and transparent enclosure to obtain a more controlled testing environment; this enclosure will interface between a pressure measurement device and the canine larynx

## Client requirements:

- Airtight
- Must accommodate pressure up to 100cm of H<sub>2</sub>O without changing shape
- Transparent
- Max volume = 200cm<sup>3</sup>
- Compatible with current larynx testing apparatus set-up
- Larynx must be accessible between tests without removal of enclosure
- Needs a system to manipulate the larynx shape up to 3 cm in 3 Cartesian directions

## Design requirements:

### 1. Physical and Operational Characteristics

a. *Performance requirements*: The device will be used for 5 days every 3-4 months. The device must withstand testing for 2-3 hours at a time with an accessible opening to hydrate the larynx every 30 seconds. The enclosure must withstand up to 300 pressure ramps during each study while maintaining an airtight nature in each trial.

b. *Safety*: Must avoid latex as a material if possible.

c. *Accuracy and Reliability*: The device must withstand 10-15 pressure ramps for each larynx tested. The positioning system must move up to 3 cm in each Cartesian direction, but it must move on a scale of millimeters during testing (accurate measurements not necessary because larynx shape is qualitative.)

d. *Life in Service*: Does not need to be portable. Not used for extended periods of time.

e. *Shelf Life*: Stored in testing lab at room temperature and standard pressure.

f. *Operating Environment*: Experiments will be recorded with a high speed camera which requires bright lights that must not glare off the box. The device must handle 0-100 cm H<sub>2</sub>O of pressure without failing in airtight connection. The device must rest on shelf of current testing unit.

g. *Ergonomics*: Must have an accessible opening to keep the larynx hydrated during testing. Positioning system must be accessible to the human hand.

h. *Size*: Maximum volume of 200 cm<sup>3</sup>.

i. *Weight*: N/A

j. *Materials*: Must be transparent, cannot allow glare, and must maintain shape under pressure. Possible materials include: Plexiglas, acrylic, latex, leather.

k. *Aesthetics, Appearance, and Finish*: N/A

## **2. Production Characteristics**

a. *Quantity*: One.

b. *Target Product Cost*: No cost specified, funding available from grant.

## **3. Miscellaneous**

a. *Standards and Specifications*: N/A

b. *Customer*: N/A

c. *Patient-related concerns*: N/A

d. *Competition*: No, device is highly specific for the client.