



# Cervical Biopsy Device

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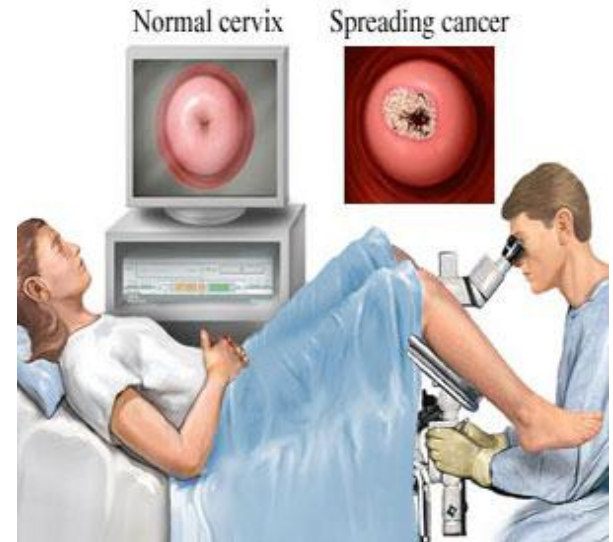
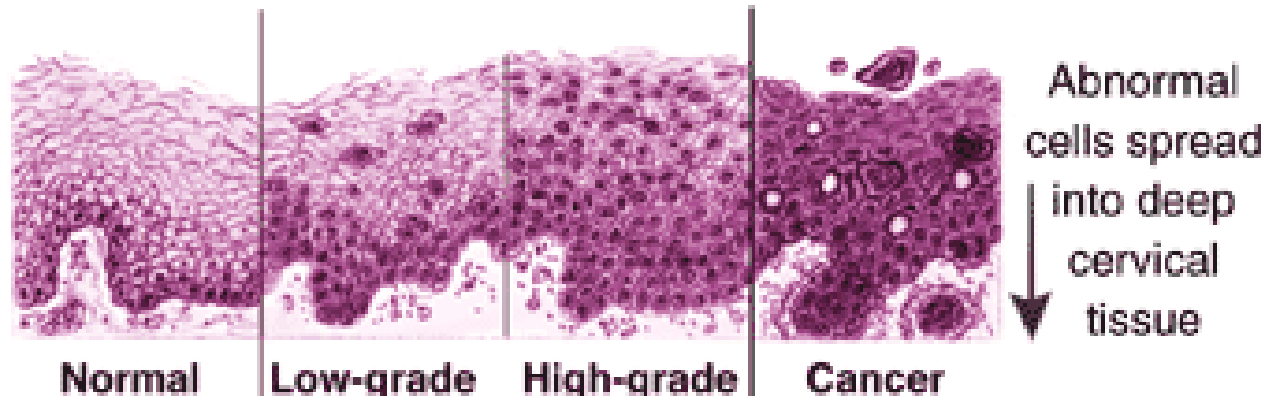
*Client:* Dr. Lisa Sullivan-Vedder

*Advisor:* Professor Naomi Chesler

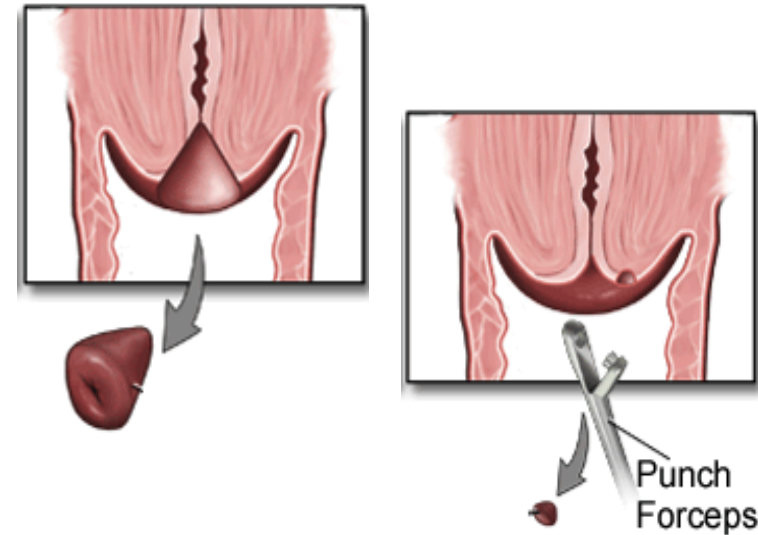
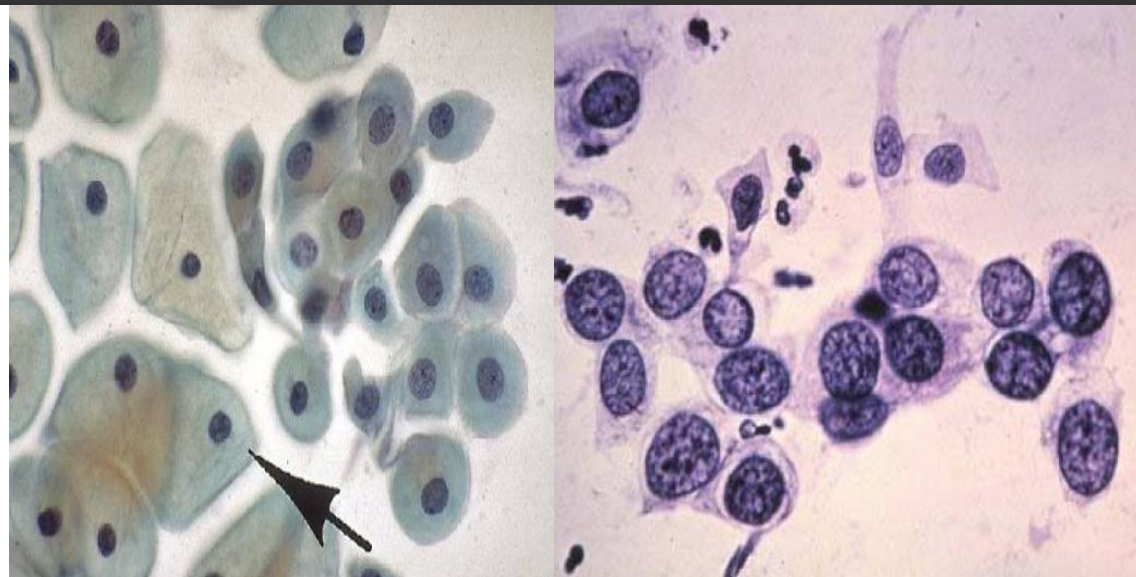


# Overview

- Background
- Designs
- Final Design
- Future Work



# Background



# Biopsy Procedure

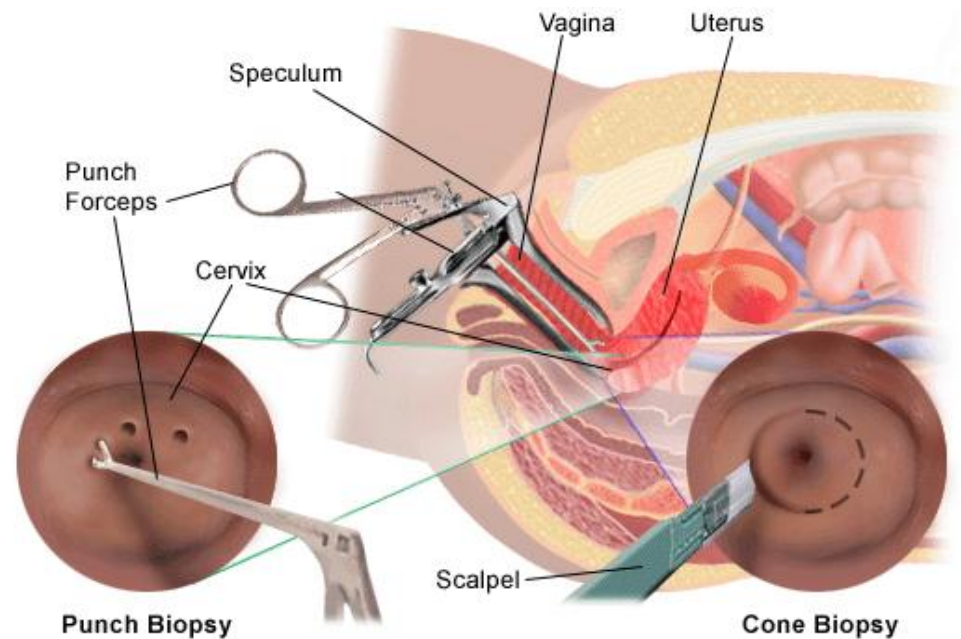
## Types of biopsies

- Punch

- Cone

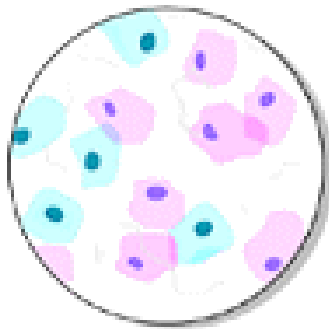
- Endocervical

- Swab with vinegar or iodine-based solution

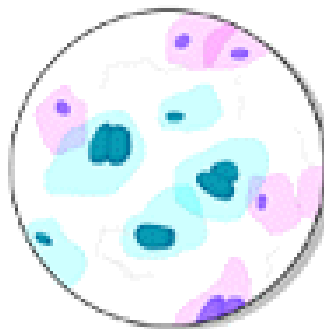


# Biopsy Procedure

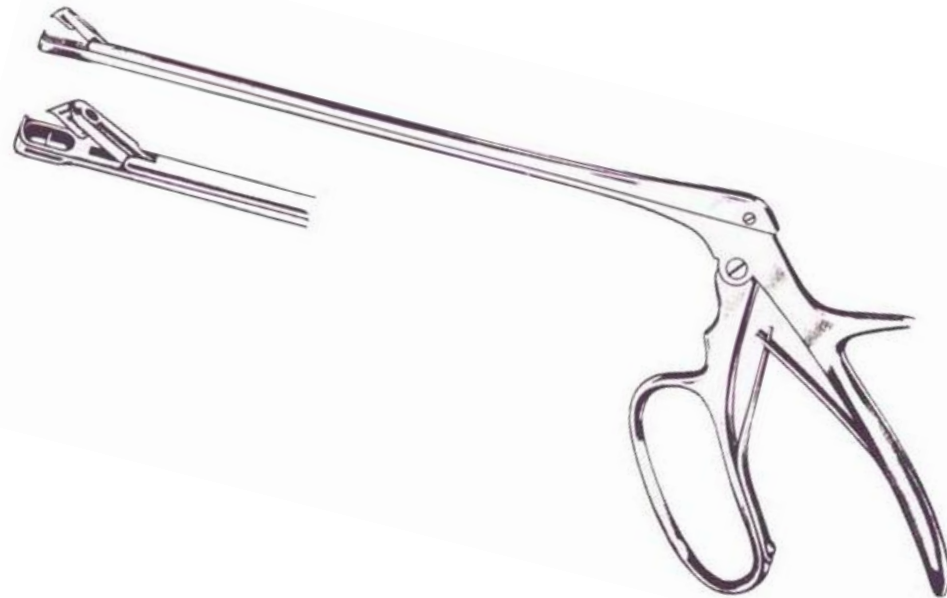
- Biopsy performed to test for abnormal cellular growth or precancerous tissues



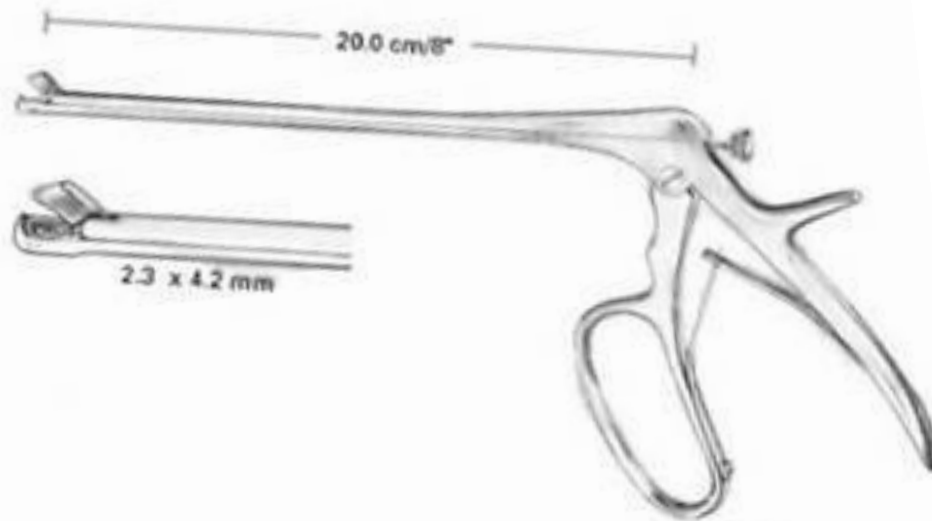
**normal cells**



**abnormal cells present**



# Competition



## Tischler and Baby Tischler Forceps

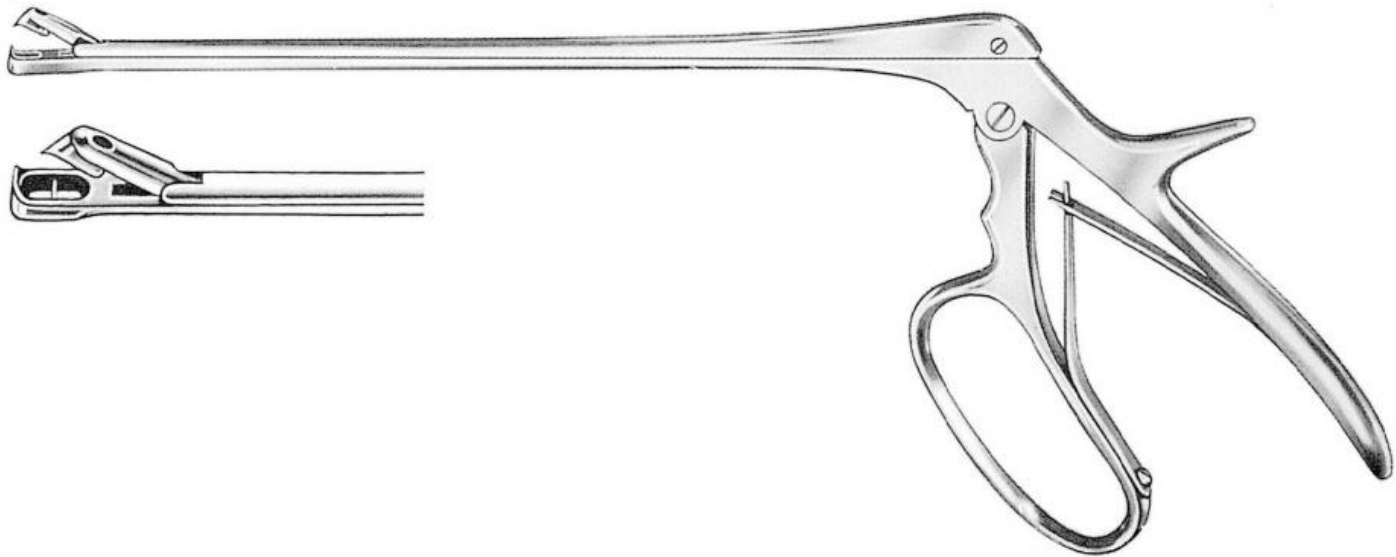
[http://www.medical-supplies-equipment-company.com/product/ppf/id/28013/new\\_prod\\_full.asp](http://www.medical-supplies-equipment-company.com/product/ppf/id/28013/new_prod_full.asp)



## Kevorkian Forceps

<http://www.hnmmedical.com/ob-gyn-instruments-1/tischler-kevorkian-biopsy-forceps.html>

# Problem Statement



# Design Criteria

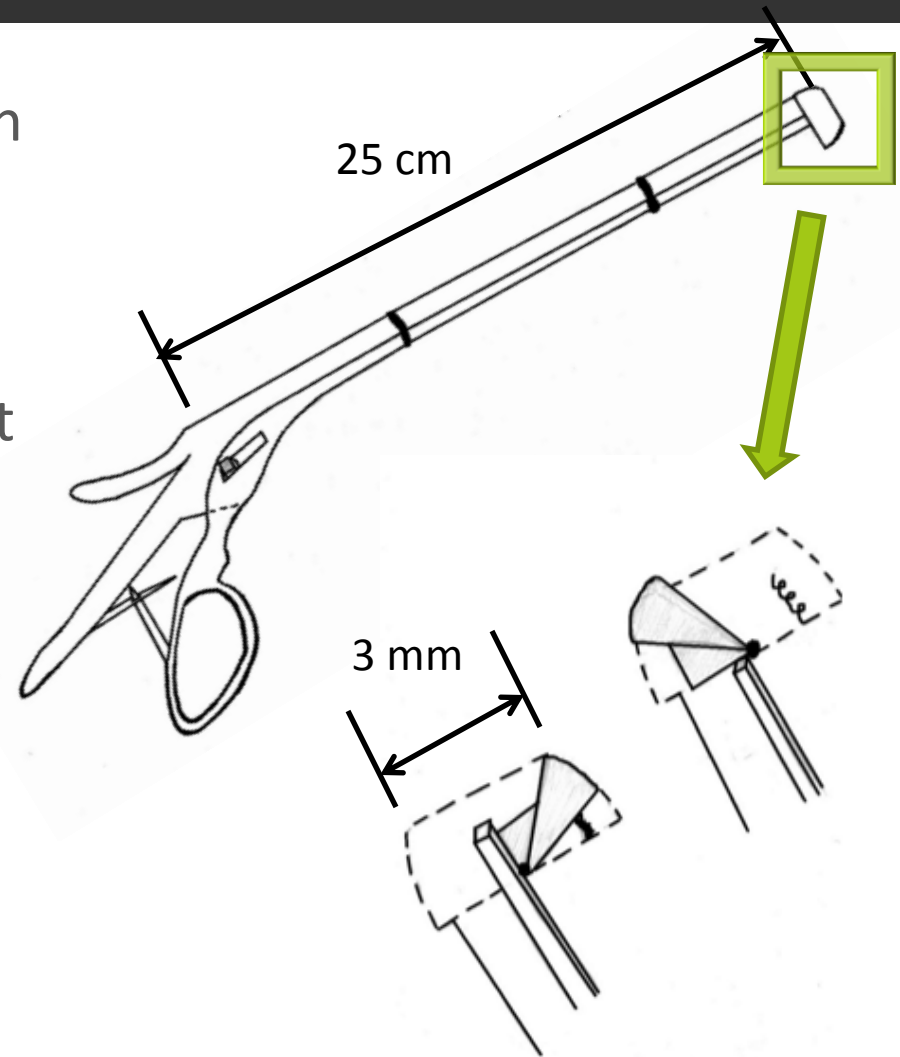
- Reliable tissue sample size
  - 3mm × 3mm x 2mm
- Minimize patient discomfort
- Easy to handle
- Maintain short procedure time





# Design Alternatives: Scoop Design

- Sample stored in hollow portion closed off by blade
- Pros:
  - Faster cut → less patient discomfort
  - Consistent sample size
  - Similar features to current devices
- Cons:
  - Ensuring adequate force to make cut



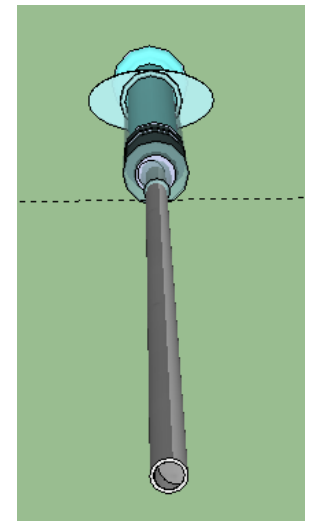
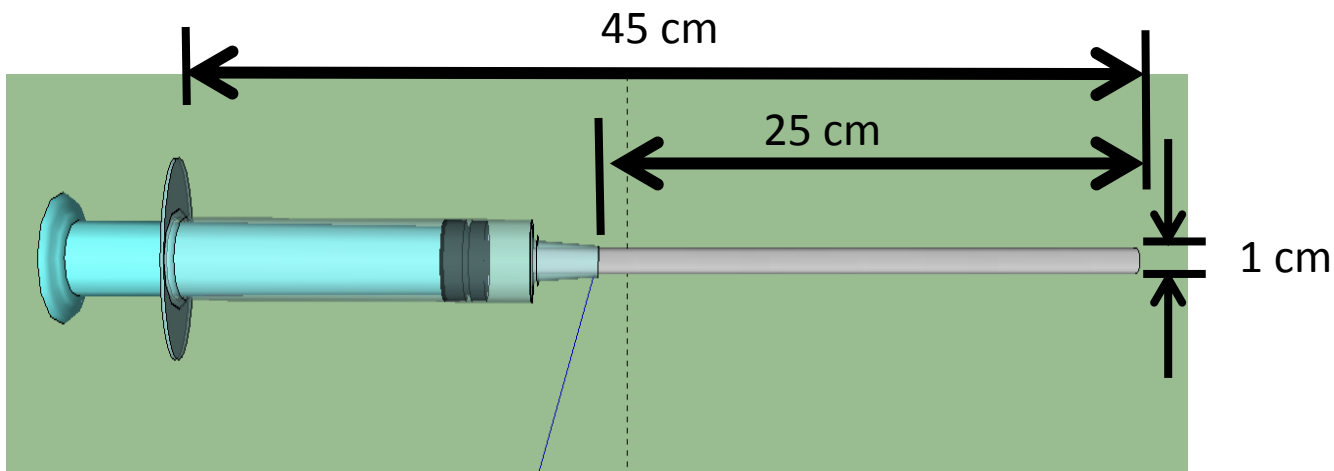
# Design Alternatives: Syringe Design

## Pros:

- Creates suction with surface
- Simple construction
- Cuts instead of pinching off tissue

## Cons:

- Method is not proven
- Need to determine amount of suction necessary to function properly



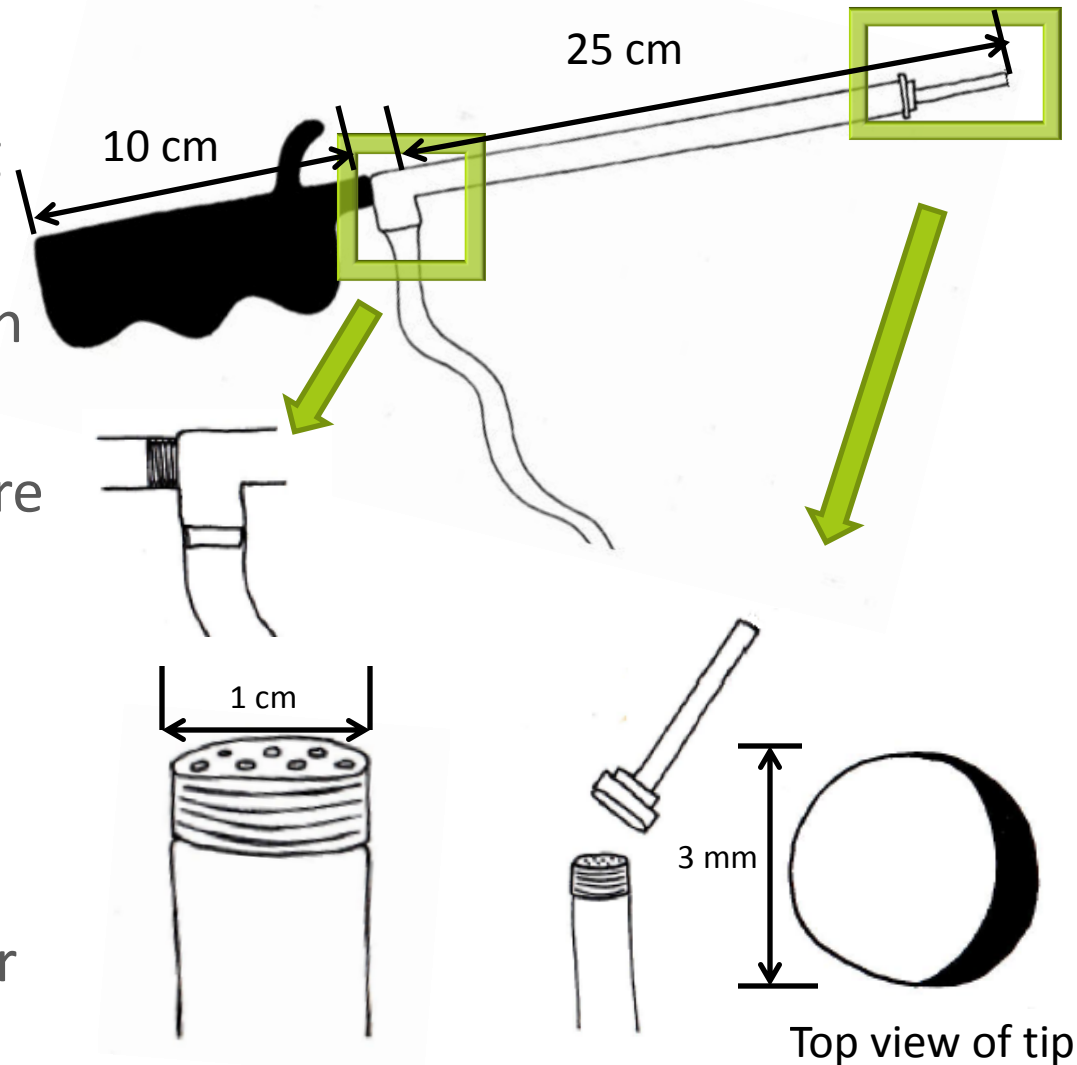
# Design Alternatives: External Suction

## Pros:

- Cuts instead of pinching off tissue
- External suction that can be adjusted
- Suction produced is more consistent than syringe design

## Cons:

- Unproven method
- Suction tube may hinder maneuvering

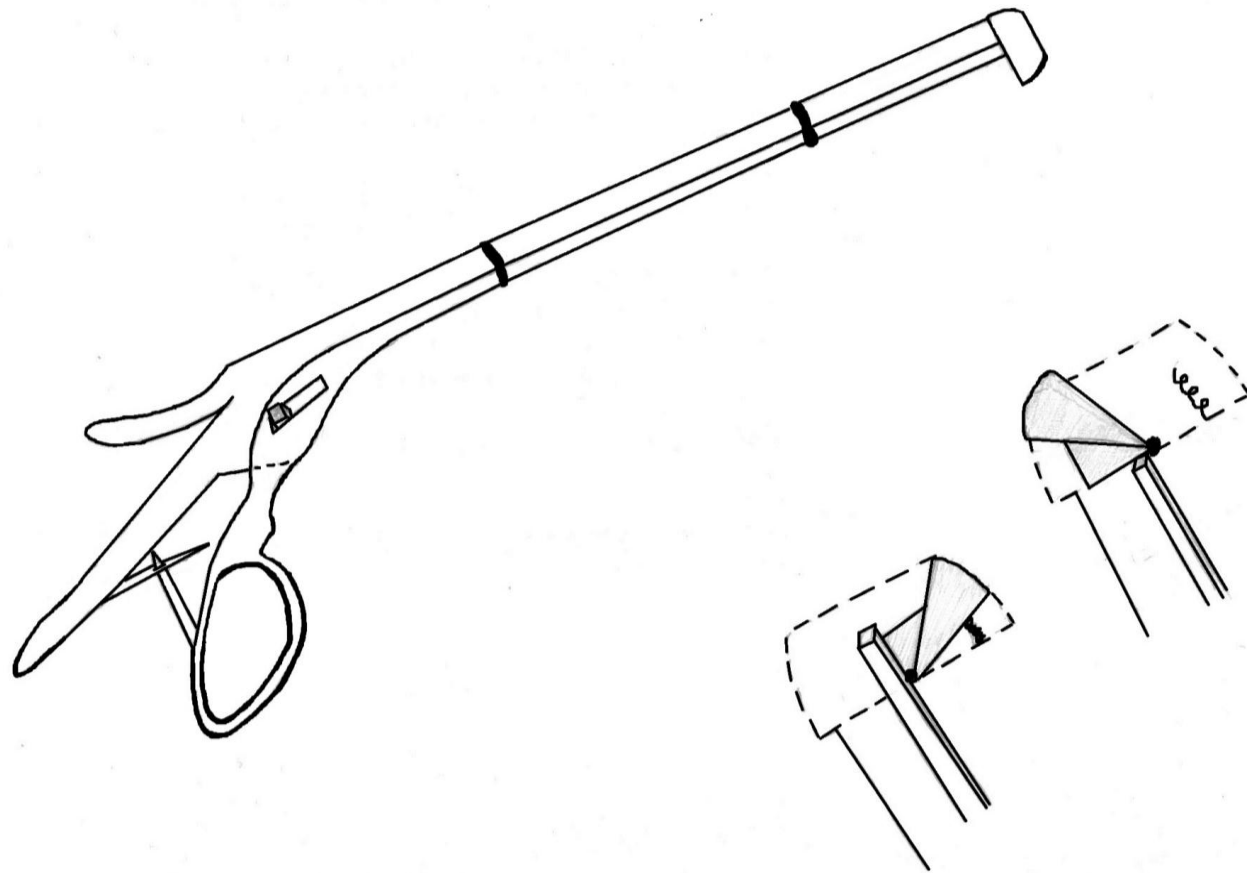


# Design Matrix

Categories	Scoop Design	External Suction	Syringe Design
Reliability	4	3	2
Manufacturability	2	3	4
Patient Comfort	5	3	3
Ease of Use	5	4	3
Relative Cost	4	3	3
<b>Weighed Total</b>	<b>3.9</b>	<b>3.15</b>	<b>2.85</b>

# Final Design

## Scoop Design



# Future Work

## □ Construction

- Rapid prototyping
- Consult with client about funding
- Purchase testing materials

## □ Testing

- Build simulated surgical environment
- Determine consistency of sample sizes

# References

## Background Information

- ❑ “Cervical Biopsy.” *Brigham and Women’s Hospital- A Teaching Affiliate of Harvard Medical School*, n.d. Web. 4 Oct. 2011.
- ❑ A.D.A.M. “Cervical Biopsy.” *The New York Times: Health Guide*. 19 Feb. 2008. 20 Oct. 2011.
- ❑ Endometrial Biopsy Devices - [http://www.medindia.net/patients/patientinfo/Endometrialbiopsy\\_devices.htm](http://www.medindia.net/patients/patientinfo/Endometrialbiopsy_devices.htm)
- ❑ Further information provided by the client, Dr. Lisa Sullivan-Vedder

## Images

- ❑ <http://www.hnmmedical.com/ob-gyn-instruments-1/tischler-kevorkian-biopsy-forceps.html>
- ❑ [http://screening.iarc.fr/atlasoral\\_detail.php?flag=1&lang=1&Id=H3000009&cat=H3a](http://screening.iarc.fr/atlasoral_detail.php?flag=1&lang=1&Id=H3000009&cat=H3a)
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