

# Reusable RF Electrodes

Virtual Design Review 1  
Team 314  
Abbott  
10/15/21

# Team Members



Brooke  
Bielski  
(BME)  
*Financial  
Advisor*



Adam  
Chebali  
(CpE)  
*Computer  
Engineer*



Carolina  
Hau Loo  
(EE & CpE)  
*Design  
Engineer*



Tariq  
Hopkins  
(EE)  
*Lead  
Electrical  
Engineer*



Shannon  
Kelley  
(BME)  
*Lead  
Biomedical  
Engineer*



Joshua  
Mechler  
(EE)  
*Project  
Manager*

# Sponsor & Advisor



- Sponsor: Abbott Laboratories
- Medical Device Company
- Contact: Bryan Burnett



- Advisor: Dr. Rajendra Arora
- Professor: ECE Department
- Specialty: RF and Electromagnetic Fields

# Outline

- Project Background (5)
- Project Scope (7)
- Customer Needs (9)
- Functional Decomposition (10)
- Motivations and Benefits (11)
- Future Plans (12)
- Summary (13)

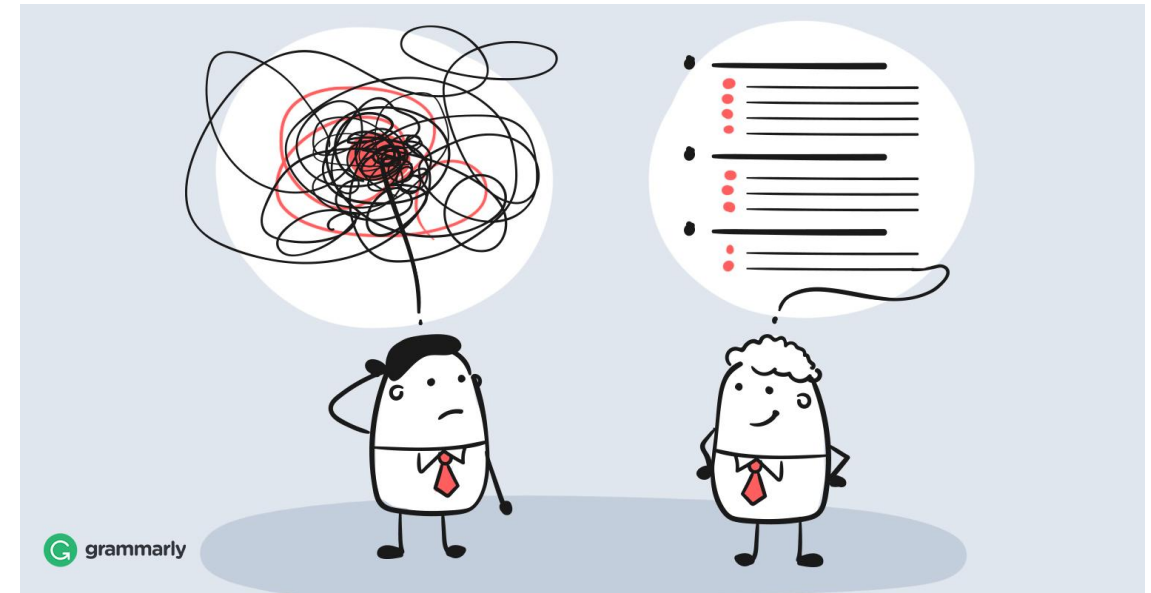


Figure 1. How to write an outline [1]

# Project Background

## What is RF ablation?

- Radiofrequency ablation is a common procedure for relieving pain.
- It greatly benefits people suffering from chronic pain.

## How it works:

- Electric current heats up nerve tissue and stops it from sending pain signals.

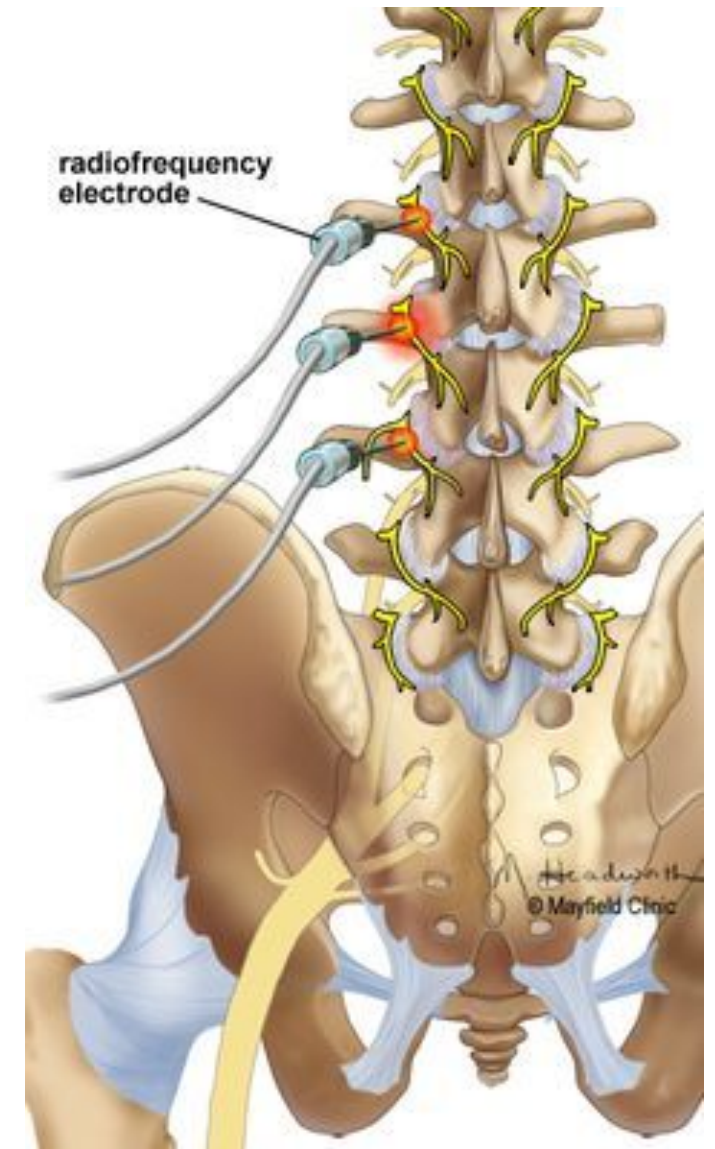
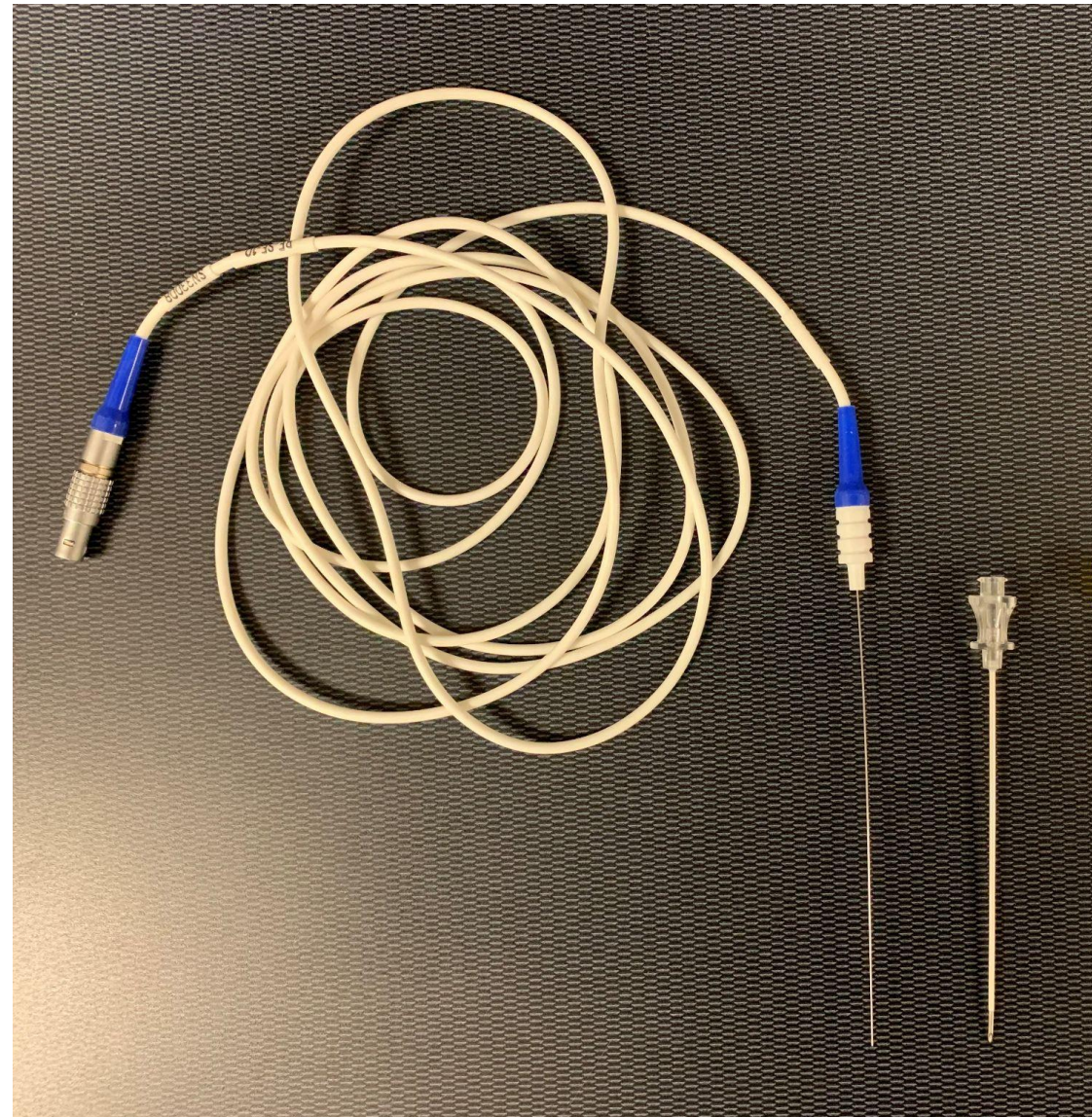


Figure 2. RF Ablation Therapy [2]

# RF Ablation Electrode

- RF Electrode
  - Hub
  - Shaft
- Cannula
  - Length: 5cm - 20cm
  - Inner diameter: 0.45mm
- RF Transmission Cable



# Project Scope

## Key Goal:

- Improve Reusability
  - PET (Polyethylene Terephthalate) Hub
  - 304/316 Stainless Steel Shaft
  - Cost  $\leq$  \$200 Per Unit



\*Displayed with the optional printer

Figure 3. AutoClave Sterilizer (121° C) [3]

# Project Scope

## Market:

- Primary: Hospitals in the United States
- Secondary: Research Centers, Private Clinics, and National Labs

## Stakeholders:

- Primary: Abbott
- Secondary: Patients, Physicians, Device Companies



Figure 4. Elderly People [4]

## Assumptions:

- The probe will propagate RF signals between 2Hz and 460 kHz.
- The customer will utilize an Autoclave for the sterilization procedure.



# Customer Needs

1. Biocompatible Materials
2. Withstand at least 100 uses
3. Propagate RF signals ranging from 2 Hz - 460 kHz
4. Measures temperature
5. Repeated sterilization
6. Repeated procedure stress
7. Production cost less than \$200
8. Pass FDA approval

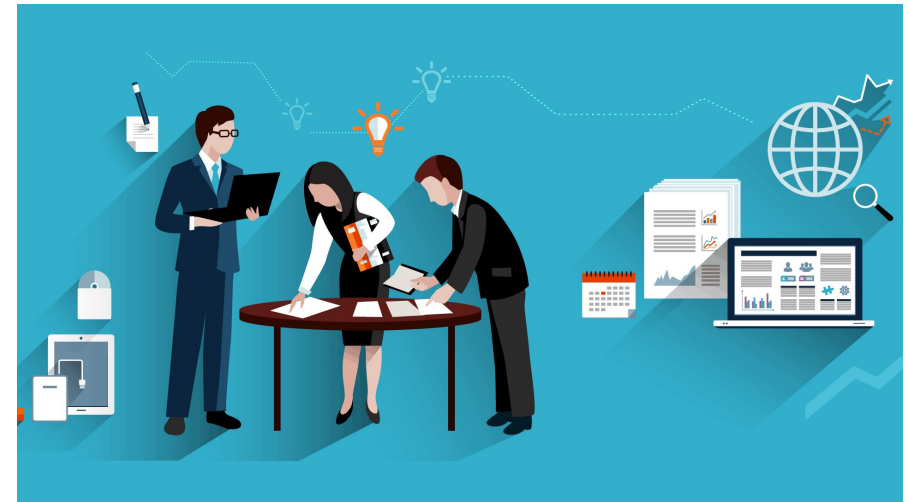
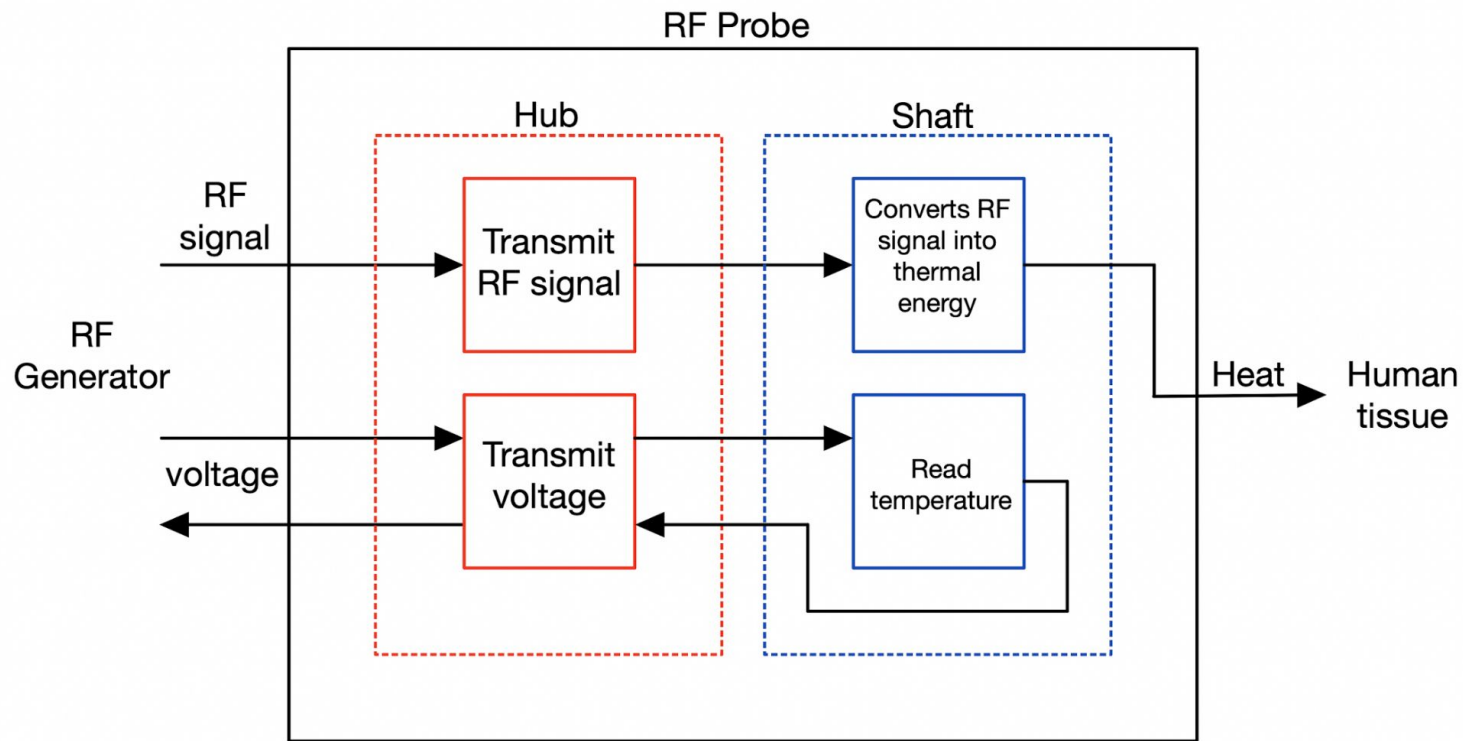


Figure 5. Identify global customer needs [5]



Figure 6. Customer expectations [6]

# Functional Decomposition



## Major Functions:

- Measure temperature
  - Transmit Voltage
  - Read Temperature
- Heat Nerve Tissue
  - Transmit RF Signal
  - Convert RF Signal into Thermal Energy

# Motivations and Benefits

- Environmental Impact
  - Reduce medical waste
  - Reduce carbon emissions of transportation
- Decreased Cost

 <b>MEDICAL WASTE SEGREGATION CHART 2015</b>		
<b>SHARPS</b> Red Sharps Container	<b>BIOHAZARD</b> Red Container or Red Liner in Container	<b>TRACE CHEMO</b> Yellow Container
✓ Needles ✓ Ampules ✓ Broken Glass ✓ Blades ✓ Razors ✓ Staples ✓ Trocars ✓ Guide Wires ✓ Other Sharps	✓ Infectious Waste ✓ Blood Products (albumin etc) ✓ Contaminated Personal Protective Equipment (PPE) ✓ IV Tubing ✓ Cultures, Stacks	✓ Empty vials, ampules ✓ Empty Syringes, Needles ✓ Empty IVs ✓ Gowns ✓ Gloves ✓ Tubing ✓ Aprons ✓ Wipes ✓ Packaging
		
<b>RCRA HAZARD</b> Black Container	<b>PHARMACEUTICAL</b> Blue Container	<b>RADIOACTIVE</b> Shielded Containers with Radioactive Symbol
✓ Hazardous meds (RCRA) ✓ Half/Partial doses (RCRA) ✓ Hazardous bulk meds ✓ P-listed drugs, packaging ✓ Bulk chemo ✓ Pathological Waste (Incineration Only)	✓ Pills ✓ Injectables ✓ Antibiotics	✓ Fluorine-18 (F-18), 110 minutes half-life. ✓ Technetium-99 (T-99m), 6 hours half-life. ✓ Iodine-131 (I-131), 8 days half-life. ✓ Strontium-89 (Sr-89), 52 days half-life. ✓ Iridium-192 (Ir-192), 74 days half-life. ✓ Cobalt-60 (Co-60), 53 years half-life.
		
 <span style="float: right;">Download this Printable Chart At  <a href="http://www.BioMedicalWasteSolutions.com/Medical-Waste-Disposal/">www.BioMedicalWasteSolutions.com/Medical-Waste-Disposal/</a> </span>		

Figure 7. Classification of Medical Waste [7]

# Future Plans

- Receive project schematics following approval of NDA
- Confirm essential targets
- Continue concept generation and focus direction of project
- Discuss and select concept to begin prototyping and testing in the spring



Figure 8. Problem solving techniques [8]

# Summary

- Sponsor: Abbott Laboratories
- Product: RF Electrode
- Use: RF ablation for chronic pain
- Goal: Reusable for at least 100 uses
- Market: Elderly, diabetics and everyone else who may suffer from nerve pain.

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- Bryan Burnett (Abbott)
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- Dr. Chuy
- Dr. Hooker
- Dr. Naroozi
- Hebert Lopez



Figure 9. Problem solving techniques [9]

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# Questions?



Figure 10. Customer Insight [10]