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# Evaluation of Autofluorescence Technology in the Identification of Tissue Types in Anterior Neck Surgery

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## Introduction

### Background

- Iatrogenic parathyroidectomy and hypocalcemia are potential risks of central neck surgery [1]
- Resected parathyroid tissue may be reimplanted if identified quickly, mitigating risk of hypocalcemia [2]
- Current practices of identifying and preserving parathyroids, such as frozen specimens, may incur significant costs in time and expense
- Autofluorescence (AF) technology takes baseline AF readings from healthy thyroid tissue and compares to other tissues in the neck
- There is limited data on AF profiles of all tissue types in the central neck (thyroid, thymus, benign vs. malignant lymph nodes, adipose tissue)

### Preliminary Outcomes

(1) Investigate the impact of AF on iatrogenic hypoparathyroidism
(2) Assess new AF profiles for different tissue types in the anterior neck

## Methods

### Patient Selection & Autofluorescence Probe

- Pilot single-institution, single-surgeon, prospective cohort study between April 2022 and January 2023
- *Inclusion criteria*: Adult patients undergoing total or sub-total thyroidectomy or parathyroidectomy, with or without central neck dissection (CND)
- All patients received standard of care surgery with the addition of FDA-approved PTeye™ Parathyroid Detection System (Medtronic)
- Demographic and postoperative laboratory data were collected
- Descriptive statistics were calculated for autofluorescence profiles of tissue types

## Results

- Total of 10 patients recruited to date:
  - 3 patients undergoing subtotal/total thyroidectomy
  - 5 patients undergoing CND
  - 2 patients undergoing parathyroidectomy

### Table 1: Cohort Characteristics

| Mean Age ± SD | Race/Ethnicity | % Female |
|---|---|---|
| 45.5 ± 15.9 | 80% Caucasian 20% Asian | 80% |

### Table 2: Preliminary Autofluorescence Profiles

| Tissue Type | Signal (relative to baseline*) |
|---|---|
| Lymph Node | 2.7 ±3.6 |
| Parathyroid | 8.8 ± 6.2 |
| Adipose | 1.0 ± 0.28 |
| Thymus | 2.0 ± 0.0 |

*\* Baseline signal captured from five points on healthy thyroid tissue*



*PTeye™ Parathyroid Detection System*

## Discussion

- Current "gold standard" frozen specimen assessment incurs considerable time and cost, and accuracy is not 100% [3, 4]
- Compared to pathology consultation for frozen specimen assessment, which take on average 20-40 minutes per specimen at our institution, the AF probe provides immediate and reliable results
- In one case, AF technology aided clinical decision to send patient home same-day after a completion lobectomy
- In high-risk cases for postoperative hypoparathyroidism, AF identified resected parathyroid tissue and allowed for successful re-implantation

## Conclusion

- Autofluorescence technology may be a helpful adjunct in reducing incidence of transient hypocalcemia and aiding in clinical decision-making
- Ongoing investigation aims to evaluate the cost-effectiveness of this technology perioperatively compared to standard measures of tissue differentiation
- Data collection is ongoing to increase the power of the study

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