IDENTIFICATION OF PARATHYROID GLANDS DURING THYROIDECTOMY USING REFLECTANCE CONFOCAL MICROSCOPY: A FEASIBILITY STUDY

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Background/Purpose: Preservation of parathyroid glands (PG) during thyroidectomy is standard practice to minimize the risk of postoperative hypocalcemia. Visual distinction of PG can be challenging and surgeons sometimes rely on immediate histopathological frozen section analysis to confirm the diagnosis of a suspected PG. Nevertheless, it is not uncommon for even an experienced thyroid surgeon to inadvertently remove one or more PGs. Reflectance confocal microscopy (RCM) is a well established technology that uses the backscatter of laser light to visualize cellular detail of tissue. We designed a prospective *ex vivo* feasibility study to test the accuracy of RCM in PG identification and to assess the utility of *in vivo* RCM during thyroidectomy.

Methods: Patients undergoing thyroidectomy or parathyroidectomy at Memorial Sloan-Kettering Cancer Center between October 2009 and 2012 were consented to an IRB approved biospecimen protocol. RCM images were collected *ex vivo* immediately following surgery and matched to traditional H&E-stained histopathology.

Results: Sixteen thyroid, five lymph node, and three PG specimens were analyzed. Thyroid histology included papillary carcinoma, follicular and hurthle cell adenoma, and nodular hyperplasia. Lymph node histology included metastatic papillary carcinoma and benign lymph node. PG histology was adenoma. RCM correlated well with histopathology, allowing consistent differentiation between thyroid tissue, PG, lymph node, and perithyroidal adipose tissue with 100% accuracy.

Discussion & Conclusion: RCM used *ex vivo*, is reliably able to differentiate between thyroid gland, PG, lymph node, and perithyroidal adipose tissue. Our data demonstrates feasibility of using a handheld RCM for *in vivo* tissue identification of PGs during thyroid surgery.