CLINICAL CURRICULUM:

1. Describe the normal anatomy, histology, and physiology of each of the following endocrine glands, and explain the secretion and homeostasis of the pertinent hormones in both the normal and pathologic disease states:
    a. Thyroid gland
        - Thyroxine (T4 and T3)
        - Effects of thyroid stimulating hormone (TSH)
    b. Parathyroid gland
        - Parathyroid hormone (PTH)
        - Calcium / Phosphate / Vitamin D homeostasis
        - Bone and renal effects of hyperparathyroidism and hypoparathyroidism
        - The calcium sensing receptor (CaSR)
    c. Endocrine pancreas
        - Insulin / Gastrin / Glucagon / Vasoactive Intestinal Peptide (VIP) / Pancreatic Polypeptide (PP) / Somatostatin
    d. Adrenal glands
        - Aldosterone / Renin / Angiotensin cascade
        - Cortisol
        - DHEA-S
        - Catecholamines
    e. Gastrointestinal tract
        - Serotonin / Chromogranin A
    f. Pituitary gland
        - Neurohypophysis (posterior pituitary)
            - Oxytocin
            - Vasopressin
        - Adenohypophysis (anterior pituitary)
            - Growth hormone
            - Prolactin
            - Adrenocorticotropic hormone (ACTH)
            - TSH

2. Discuss Endocrine Cytopathology and Histopathology:
    a. Thyroid
        - Classification of thyroid malignancies
        - Fine-needle aspiration biopsy (FNA);its indications and limitations
        - Bethesda thyroid FNA classification
        - The uses and limitations of molecular markers/profiles with FNA
        - The limitations of frozen section
    b. Parathyroid
        - Definitions of hyperplasia vs. adenoma
        - Criteria for parathyroid carcinoma
            - Adrenal
                - Classification and diagnosis of adrenal lesions
            - Neuroendocrine Tumors (NET) of the GI tract
                - WHO/NANETS classification of NET
                - Diagnostic criteria of malignancy in NET

CLINICAL CURRICULUM:

3. Describe the hereditary endocrine syndromes
    a. Define oncogene and tumor suppressor gene
    b. Describe the phenotype and genotype and management of multiple endocrine neoplasia
        - MEN I
        - MEN 2a
        - Familial medullary thyroid cancer (FMTC)
        - MEN 2b
    c. Describe the endocrine pathology and management of familial non-MEN syndromes including;
        - von Hippel Lindau (VHL)
        - Neurofibromatosis
        - Pheo- Paraganglioma syndromes (SDH and HIF-alpha)
        - Familial isolated HPT
        - Hyperparathyroidism Jaw-Tumor Syndrome
        - Familial non-medullary thyroid cancer
        - Familial hypocalciuric hypercalcemia (FHH)
    d. Discuss the role and timing of genetic screening

4. Discuss the pathophysiology, clinical presentation, diagnosis, work up, and treatment (include both surgical and medical options) of the following diseases. Describe the surgical indications, natural history, and prognostic factors associated with the disease:
    a. Thyroid
        - Thyroid nodule
        - Multinodular goiter
        - Substernal goiter
        - Hypothyroidism
        - Hyperthyroidism / Thyrotoxicosis
            - Graves' disease
            - Toxic MNG
            - Toxic adenoma
            - Thyroiditis (e.g. Hashitoxicosis)
        - Well-differentiated thyroid cancer of follicular cell origin
            - Extent of surgery
                a. Thyroid
                b. Central compartment
                c. Lateral compartment
                d. Radioiodine ablation
                e. TSH Suppression
                f. Surveillance and staging
                g.
        - Medullary thyroid cancer
            - Preoperative workup
            - Sporadic vs inherited
            - Timing of prophylactic surgery in RET mutation positive
            - Extent of surgery
            - Staging

        - Surveillance
            - Calcitonin and CEA
            - Imaging
    - Anaplastic thyroid cancer
        - Surgical indications
        - Treatment options
        - Staging
    - Thyroid lymphoma
    - Metastases to the thyroid
5. Parathyroid
    - Primary hyperparathyroidism (including normocalcemic and normohormonal forms)
    - Secondary and tertiary hyperparathyroidism (renal)
    - Parathyroid carcinoma
6. Endocrine pancreas
    - Insulinoma
    - Gastrinoma
    - Glucagonoma
    - VIPoma
    - Somatostatinoma
    - Non-functioning (PPoma)
    - MEN-1 pancreas
7. GI Neuroendocrine Tumors
    - Foregut and gastric carcinoids -including atypical carcinoid syndrome
    - Mid-gut carcinoid tumors – including diagnosis and treatment of carcinoid syndrome
8. Adrenal
    - The incidentally discovered adrenal mass
    - Primary hyperaldosteronism
    - Endogenous hypercortisolism (Cushing's syndrome vs. Cushing's disease)
    - Pheochromocytoma / Paraganglioma syndromes
    - Virilizing and feminizing adrenal tumors
    - Adrenal cortical carcinoma

- Describe the peri-operative management of the following:

a. Thyroid
    - Thyroid storm
    - Graves’ disease / hyperthyroidism
    - Hypothyroidism
b. Parathyroid
    - Hypercalcemic crisis
    - Hungry bone syndrome
    - Vitamin D deficiency
    - Permanent hypoparathyroidism
c. Adrenal

- Pheochromocytoma / Paraganglioma syndromes –including blockade
- Hyperaldosteronism workup and localization including selective venous catheterization
- Endogenous hypercortisolism- including steroid management
- Adrenal insufficiency crisis

d. NET
- Functioning pancreatic tumors especially insulinoma, gastrinoma, and glucagonoma
- Carcinoid syndrome and carcinoid crisis

e. Surgical Complications
- Hematoma
- Recurrent laryngeal nerve injury (unilateral and bilateral)
- Hypocalcemia (temporary and permanent)

- Summarize the differential diagnosis of:

a. Thyroid
- Low TSH level
- Elevated serum thyroxine level
- Lateral neck mass
- Airway obstruction
- New onset dysphonia

b. Parathyroid
- Hypercalcemia
- Elevated PTH level
- Recurrent / persistent hypercalcemia following parathyroid surgery

c. NET
- Hypoglycemia
- Hypergastrinemia
- Secretory diarrhea

d. Adrenal
- Elevated cortisol levels
- Secondary hypertension

- Describe the safe performance of the following procedures, and the indications, the potential complications and alternative treatment options of each procedure:

a. Thyroid
- Retrosternal goiter resection – cervical approach
- Thyroid lobectomy
- Total / near-total thyroidectomy
- Compartment oriented lymph node dissections of the neck
  - Central neck dissection
  - Modified radical neck dissection
- Reoperative / completion thyroidectomy
- Resection of locally invasive carcinoma with tracheal/esophageal invasion

CLINICAL CURRICULUM:

b. Parathyroid
    - Finding the inferior parathyroid glands
    - Finding the superior parathyroid glands
    - Finding ectopic and supernumerary parathyroid glands
    - Reoperative parathyroidectomy
    - Parathyroid autotransplantation
    - Resection of the mediastinal parathyroid gland
c. Adrenal
    - Open and minimally-invasive adrenalectomy

- Explain the role and application of the following in the management of endocrine surgical disease:

a. Imaging modalities:
    - Ultrasound (especially surgeon-performed)
    - Cross-sectional imaging (CT, MRI)
    - Scintigraphy including MIBG, sestamibi, octreotide scan, FDG-PET
    - Selective venous sampling (parathyroid and adrenal)
    - Selective arterial calcium infusion for PNET
b. Procedures:
    - Laryngoscopy
    - Recurrent laryngeal nerve monitoring
    - Parathyroid cryopreservation
    - Enucleation vs resection of pancreatic NET
c. Diagnostic assays:
    - TSH, T3, T4,
    - TPO antibodies
    - Thyroid stimulating immunoglobulin (TSI)
    - Calcitonin and CEA
    - PTH / intra-operative PTH assays
    - Chromogranin A
    - Urinary 5-HIAA
    - Metanephrines (plasma and urinary)
    - Urinary free cortisol / Midnight salivary cortisol
    - Dexamethasone suppression testing
    - Plasma Aldosterone / Plasma Renin

- Collaborate with disciplines complementary to endocrine surgery including but not limited to:

a. Endocrinology
b. Oncology
c. Pathology
d. Radiology
e. Genetics

CLINICAL CURRICULUM:

- Conduct research and critically appraise the literature

a. Describe the design of both clinical and basic science research studies
b. Develop an understanding of the statistical methods applied to study designs
c. Critically appraise the medical literature.
d. Develop a research question in endocrine surgical disease and pursue an appropriate research project during the fellowship with the goal toward peer reviewed publication