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**Lab Dept:**                    **Anatomic Pathology**

**Test Name:**                **MULTIPLE ENDOCRINE NEOPLASIA TYPE 1  
(MEN1) KNOWN MUTATION**

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***General Information***

**Lab Order Codes:**        MENK

**Synonyms:**                MEN1; Multiple Endocrine adenomatosis; MEA1; Werner syndrome

**CPT Codes:**                81479 – Molecular Pathology Unlisted procedure

**Test Includes:**            Testing of a relative for a specific known mutation (carrier testing) where testing was previously done by GeneDx. Using genomic DNA, the exon or exons of interest are screened by bi-directional sequence analysis and/or by non-sequence methods such as heteroduplex analysis or restriction enzyme digestion. The previously tested proband DNA serves as a positive control.

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***Logistics***

**Test Indications:**        **Multiple endocrine neoplasia type 1 (MEN1)** is characterized by endocrine tumors, particularly in the parathyroid glands, anterior pituitary, and pancreatic islet cells. Primary tumors may be found in more than one endocrine organ and/or multiple tumors may be found in the same organ. The presence of MEN1-associated endocrine tumors causes an array of clinical and biochemical manifestations secondary to hormone hypersecretion: hyperparathyroidism [the most frequent MEN1-symptom with potential central nervous (CNS), hypercalcemia, gastrointestinal, renal cardiovascular, and skeletal involvement), hypercortisolism, gigantism and acromegaly, prolactinoma (with associated oligomenorrhea, amenorrhea, and galactorrhea in females and sexual dysfunction in males), gastrinoma, and insulinoma. Non-endocrine tumors also are common and can include facial angiofibromas and collagenomas of the skin, lipomas, meningioma and ependymoma of the CNS, and skin collagenomas, and leiomyomas. Mutations in the MEN1 gene are highly penetrant; approximately 50% of MEN1 mutation carriers are symptomatic by age 20 and 95% are symptomatic by age 40.

**Familial Isolated Hyperparathyroidism (FIHP)** is characterized by parathyroid adenoma/hyperplasia (and possibly carcinoma) in the absence of other associated endocrinopathies, is also associated with mutations in the MEN1 gene. However, FIHP is genetically heterozygous and can be caused by mutations in other genes, such as CASR and HRPT2.

**Carrier testing reasons for referral:**

1. Testing parents of a child with a specific dominant mutation, in order to determine if the mutation in the child is new or inherited.
2. Carrier testing in parents of a child with apparently homozygous

- recessive mutations, to rule out the possibility that the child has one mutated allele and one allele that is deleted or refractory to amplification.
3. Carrier testing in the parents of a child with recessive mutations, to confirm that all four parental alleles can be detected prior to prenatal diagnosis.
  4. Pre-symptomatic testing in siblings of the index case.
  5. Carrier testing in the extended family.

<b>Lab Testing Sections:</b>	Anatomic Pathology - Sendouts
<b>Referred to:</b>	GeneDx, Inc. (GDX#: 9011, Specify gene/mutation)
<b>Phone Numbers:</b>	MIN Lab: 612-813-6280  STP Lab: 651-220-6550
<b>Test Availability:</b>	Daily, 24 hours (Preferred draws are Sunday - Thursday as specimens can only be received at the reference lab Monday - Friday. Specimens collected Friday or Saturday will be held for shipment on Monday.)
<b>Turnaround Time:</b>	2 - 4 weeks
<b>Special Instructions:</b>	A GeneDx signed <a href="#">request form</a> must be sent with any patient or specimen to the laboratory.

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### ***Specimen***

<b>Specimen Type:</b>	Whole blood
<b>Container:</b>	Lavender top (EDTA) tube
<b>Draw Volume:</b>	1 - 5 mL blood
<b>Processed Volume:</b>	Same as Draw Volume
<b>Collection:</b>	Routine venipuncture for blood specimens, invert gently to mix
<b>Special Processing:</b>	Lab Staff: Send whole blood in original collection container labeled with patient name, date of birth and medical record number, including signed consent form and requisition, with a cool pack during warm temperatures, via overnight or second-day courier so that the sample will arrive at GeneDx, Inc. on a weekday (Monday through Friday). Samples drawn on Friday or Saturday should be held at refrigerated temperatures for shipment on Sunday. <b>Do not</b> freeze. <b>Note:</b> Specimens may be stored at refrigerated temperatures for up to 7 days prior to shipping.
<b>Patient Preparation:</b>	None
<b>Sample Rejection:</b>	Unrefrigerated specimens older than 48 hours; clotted or hemolyzed for blood; frozen specimens; mislabeled or unlabeled specimens

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***Interpretive***

<b>Reference Range:</b>	Interpretive report
<b>Critical Values:</b>	N/A
<b>Limitations:</b>	N/A
<b>Methodology:</b>	Bi-directional sequence analysis or other methods as required
<b>References:</b>	<a href="#">GeneDx, Inc.</a> March 2012 (301) 519-2100 Fax (301) 519-2892
<b>Update:</b>	2/7/2013: CPT update