CLINICAL MEDICAL POLICY	
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Application:	All participating hospitals and providers
Page Number(s):	1 of 30

DISCLAIMER

Highmark Health Options medical policy is intended to serve only as a general reference resource regarding coverage for the services described. This policy does not constitute medical advice and is not intended to govern or otherwise influence medical decisions.

POLICY STATEMENT

Highmark Health Options may provide coverage under the medical-surgical benefits of the Company's Medicaid products for medically necessary oncologic Genetic Testing Panels.

This policy is designed to address medical necessity guidelines that are appropriate for the majority of individuals with a particular disease, illness or condition. Each person's unique clinical circumstances warrant individual consideration, based upon review of applicable medical records.

The qualifications of the policy will meet the standards of the National Committee for Quality Assurance (NCQA) and the Delaware Department of Health and Social Services (DHSS) and all applicable state and federal regulations.

DEFINITIONS

Genetic Testing Panel – a laboratory test that evaluates multiple genes simultaneously compared to sequential testing of individual genes. There are multiple uses of the testing results including but not limited to: to establish a clinical diagnosis, confirmation of a specific clinical diagnosis, the diagnosis of a hereditary disorder, to determine when a known cancer diagnosis is part of a hereditary cancer syndrome or to assist in the identification of a cancer type/subtype and in the selection of the most appropriate treatment of a cancer type/subtype.

Germline Mutation – an alteration in the DNA that is transmissible from parent to offspring.

Panel Testing Technology – a genetic testing method that examines multiple genes or mutations simultaneously. Testing methods can include next-generation sequencing and chromosomal microarray.

Next Generation Sequencing (NGS) – Non-Sanger-based high-throughput DNA sequencing technologies. Millions or billions of DNA strands can be sequenced in parallel, yielding substantially more throughput and minimizing the need for the fragment-cloning methods that are often used in Sanger sequencing of genomes.

Chromosomal Microarray Analysis (CMA) – a technique that identifies chromosomal abnormalities, including submicroscopic abnormalities that are too small to be detected by conventional karyotyping.

Variant of Unknown/Uncertain Significance (VUS) – an allele, or variant form of a gene that has been identified via genetic testing. The significance of the finding is not established and the connection to a human disease has not been identified.

Clinical Utility – how likely the testing is to significantly improve patient outcomes that reflect the balance between health-related benefits and/or harms that can ensue from using the information made available from the testing.

Genetic Counseling – a service that is provided by a Clinical Geneticist, Certified Genetic Counselor, or other approved medical provider who is independent and not employed by any clinical or genetic laboratory, who bears no conflict of interest with the entity performing the testing.

1st, 2nd, and 3rd Degree Relatives:
Blood relatives on the same side of the family (maternal or paternal).

- 1st-degree relatives are parents, siblings, and children.
- 2nd-degree relatives are grandparents, aunts, uncles, nieces, nephews, grandchildren, and half-siblings.
- 3rd-degree relatives are great-grandparents, great-aunts, great-uncles, great-grandchildren, and first cousins.

PROCEDURES

This policy applies only if there is no separate Highmark Health Options medical policy that addresses criteria for specific oncologic genetic testing. Genetic testing panels are defined as any assay that simultaneously tests for more than one gene associated with a condition. The testing may focus on sequence variants and/or deletions/duplications of those genes. Oncologic genetic panels include panels for hereditary conditions, genetic conditions or cancer panels.

The ordering provider must validate the clinical utility by considering:

- Will the panel testing offer significant advantages compared to sequential analysis of individual genes (i.e., a genetic testing panel that addresses the disorder in question, rather than the disorder in question plus other disorders, has been considered and discussed)
- How will the panel testing results be used in patient care decision making
- Will the ancillary findings lead to further testing or management changes
- There is reliable evidence in the peer-reviewed scientific literature that health outcomes will be improved as a result of treatment decisions based on molecular genetic testing findings.

1. Medical Necessity Guidelines

A. All genetic testing panels must be performed in a Clinical Laboratory Improvement Amendment (CLIA) licensed lab; AND

B. Genetic testing panels are to be ordered by or recommended by a physician specialist such as hematology, oncology, a physician with expertise in the treatment of the targeted disease or geneticist; AND

C. The ordering provider must not be employed or contracted by a commercial genetic testing laboratory; AND

D. A recommendation for the genetic testing is confirmed by either:
    - An American Board of Medical Genetics or American Board of Genetic Counselor; or
    - An independent Board Certified or Board eligible medical geneticist

E. All components of the specific genetic testing panel must demonstrate positive clinical utility for the medical condition being evaluated; AND

F. All components of panel testing offers substantial advantages in efficiency compared to sequential analysis of individual genes.

G. Genetic testing panels should be considered when clinical evaluation suggests a particular diagnosis, the disorder cannot be identified through clinical evaluation and/or other testing, and not when the diagnosis is unclear or uncertain; AND

H. The provider has had a discussion with the member regarding the scope of the genetic testing panel being ordered and the impact of variants of unknown significance; AND

I. Documentation Requirements:
    - Brief explanation of how the results of genetic testing are necessary to guide treatment decisions relevant to the member's personal medical history for positive patient outcome(i.e., whether to perform surgery, determine chemotherapy treatment, choose between medication options, etc.);s ; AND
    - Diagnose an illness when signs/symptoms are displayed; OR
    - Rule out a diagnosis when signs/symptoms are displayed; OR
    - Medical records relevant to the testing being performed are to include:
        - A thorough history and physical examinations by the referring physician;
        - Conventional testing and outcomes; AND
        - A three generation pedigree analysis results; AND
        - Conservative treatment provided, if applicable.

J. The following information is required for a genetic or molecular diagnostic test is ordered:
    - The specific name of the test/panel
    - Name of performing CLIA-accredited laboratory
    - The exact gene(s) and/or mutations being testing
    - Correct CPT and/or HCPCS code(s)
    - Estimated cost/quote sheet for the genetic testing panel ordered

K. An informed consent must be signed by the patient prior to testing. The consent must include a statement that the patient agrees to post-test counseling and the consent must be made available upon request.

L. Pre-test genetic counselling has been performed and post-test genetically counselling by an independent genetic professional is planned.

2. When genetic testing panels are not covered
    - Broad-based genetic testing panels are considered not medically necessary when individual components are sufficient for treatment/management of the patient. Testing for multiple genes or multiple conditions, in cases where a tiered approach/method is clinically available, will be covered only for the number of genes or tests that are reasonable to obtain necessary therapeutic decision making and NOT the entire panel.
    - More than one multi-gene panels is considered not medically necessary at the same time.
    - Genetic testing of children to predict adult onset of diseases is considered not medically necessary.
    - In the absence of specific information regarding advances in the knowledge of mutation characteristics for a particular disorder, the current literature indicates that genetic tests for inherited disease need only be conducted once per lifetime of the member.
    - If a genetic testing panel was previously performed for medically necessary indications and a larger panel is developed and requested, only the testing for previously untested genes will be considered medically necessary.

3. Post-payment Audit Statement
   The medical record must include documentation that reflects the medical necessity criteria and is subject to audit by Highmark Health Options at any time pursuant to the terms of your provider agreement.

4. Place of Service
   The place of service for genetic testing panel is outpatient.

5. Genetic Counseling
   Pre- and post-test genetic counseling is required to be performed by an independent (not employed by a genetic testing lab) genetic provider prior to genetic counseling for genetic mutations. This service is necessary in order to inform persons being tested about the benefits and limitations of a specific genetic test for the specific patient. Genetic testing for mutations requires documentation of medical necessity from one of the following providers who has evaluated the member and intends to see the person after testing has been performed for counseling:
    - Board Eligible or Board Certified Genetic Counselor
    - Advanced Genetics Nurse
    - Genetic Clinical Nurse
    - Advanced Practice Nurse in Genetics

- Board Eligible or Board Certified Clinical Geneticist
- A physician with experience in cancer genetics
- A physician with experienced with the suspected medical condition (e.g., neurologist)

GOVERNING BODIES APPROVAL

Three federal agencies play a role in the regulation of genetic tests: CMS, FDA and the Federal Trade Commission (FTC). The Centers for Medicare and Medicaid Services is responsible for regulating all clinical laboratories performing genetic testing, ensuring their compliance with the Clinical Laboratory Improvement Amendments of 1988.

The FDA has the broadest authority in terms of regulating the safety and effectiveness of genetic tests as medical devices under the Federal Food, Drug, and Cosmetic Act.

Compared to the FDA and CMS, the Federal Trade Commission's regulatory authority is rather narrow, and is limited to how tests are advertised. The Commission has the authority to regulate advertising that delivers health-related information to consumers to ensure that it is not false or misleading.

Genetic testing panels are typically laboratory derived tests that are not subject to the United States Food and Drug Administration (FDA) approval. Due to the large numbers of mutations contained in expanded panels, it is not possible to determine clinical validity for the panels as a whole.

*__NOTE__: This policy may not apply to multi-gene panel testing for indications that are addressed in test-specific policies. For genetic test-specific policies, please see the following link: https://highmarkhealthoptions.com/providers/MedicalAndPaymentPolicy

The following is a list of existing genetic testing policies:

- BCR-ABL1 Testing in Chronic Myelogenous Leukemia and Acute Lymphoblastic Leukemia
- BRCA 1 & 2 Genetic Mutation Testing and Related Genetic Counseling
- Chromosomal Microarray Analysis: Comparative Genomic Hybridization (CGH) and Single Nucleotide Polymorphism (SNP)
- Fetal Aneuploidy Testing using Noninvasive Cell-Free Fetal DNA
- Genetic Testing for Colorectal Cancer Susceptibility
- Genetic Testing for Cystic Fibrosis
- Genetic Testing for Warfarin
- Molecular Markers for Fine Needle Aspirates of Thyroid Nodules
- Molecular Tumor Markers for Non-Small Cell Lung Cancer
- Testing for Genetic Disease
- Whole Exome and Whole Genoma Sequencing for Diagnosis of Genetic Disorders

CODING REQUIREMENTS

Procedure Codes

CPT Codes	Description
0023U	LeukoStrat® CDx FLT3 Mutation Assay
0026U	Thyroseq Genomic Classifier
0048U	Oncology (solid organ neoplasia), DNA, targeted sequencing of protein-coding exons of 468 cancer-associated genes, including interrogation for somatic mutations and microsatellite instability, matched with normal specimens, utilizing formalin-fixed paraffin-embedded tumor tissue, report of clinically significant mutation(s)
0050U	Targeted genomic sequence analysis panel, acute myelogenous leukemia, DNA analysis, 194 genes, interrogation for sequence variants, copy number variants or rearrangements
0057U	Oncology (solid organ neoplasia), mRNA, gene expression profiling by massively parallel sequencing for analysis of 51 genes, utilizing formalin-fixed paraffin-embedded tissue, algorithm reported as a normalized percentile rank
0006M	Oncology (hepatic), mRNA expression levels of 161 genes, utilizing fresh hepatocellular carcinoma tumor tissue, with alpha-fetoprotein level, algorithm reported as a risk classifier
0007M	Oncology (gastrointestinal neuroendocrine tumors), real-time PCR expression analysis of 51 genes, utilizing whole peripheral blood, algorithm reported as a nomogram of tumor disease index
81340	TRB@ (T cell antigen receptor, beta) (e.g., leukemia and lymphoma), gene rearrangement analysis to detect abnormal clonal population(s); using amplification methodology (e.g., polymerase chain reaction)
81400	Molecular pathology procedure, Level 1
81401	Molecular pathology procedure, Level 2
81402	Molecular pathology procedure, Level 3
81403	Molecular pathology procedure, Level 4
81404	Molecular pathology procedure, Level 5
81405	Molecular pathology procedure, Level 6
81406	Molecular pathology procedure, Level 7
81407	Molecular pathology procedure, Level 8
81408	Molecular pathology procedure, Level 9
81432	Hereditary breast cancer-related disorders (e.g., hereditary breast cancer, hereditary ovarian cancer, hereditary endometrial cancer); genomic sequence analysis panel, must include sequencing of at least 14 genes, including ATM, BRCA1, BRCA2, BRIP1, CDH1, MLH1, MSH2, MSH6, NBN, PALB2, PTEN, RAD51C, STK11, and TP53
81433	Hereditary breast cancer-related disorders (e.g., hereditary breast cancer, hereditary ovarian cancer, hereditary endometrial cancer); duplication/deletion analysis panel, must include analyses for BRCA1, BRCA2, MLH1, MSH2, and STK11
81435	Hereditary colon cancer disorders (e.g., Lynch syndrome, PTEN Hamartoma syndrome, Cowden syndrome, familial adenomatosis polyposis); genomic sequence analysis panel, must include sequencing of at least 10 genes including, APC, BMPR1A, CDH1, MLH1,MSH2, MSH6, MUTYH, PTEN, SMAD4, and STK11
81436	Hereditary colon cancer disorders (e.g., Lynch syndrome, PTEN Hamartoma syndrome, Cowden syndrome, familial adenomatosis polyposis); duplication/deletion analysis panel,

	must include analysis of at least 5 genes, including MLH1, MSH2, EPCAM, SMAD4, and STK11.
81437	Hereditary neuroendocrine tumor disorders (e.g., medullary thyroid carcinoma, parathyroid carcinoma, malignant pheochromocytoma or paraganglioma); genomic sequence analysis panel, must include sequencing of at least 6 genes, including MAX, SDHB, SDHC, SDHD, TMEM127, and VHL
81438	Hereditary neuroendocrine tumor disorders (e.g., medullary thyroid carcinoma, parathyroid carcinoma, malignant pheochromocytoma or paraganglioma); duplication/deletion analysis panel, must include analyses for SDHB, SDHC, SDHD, and VHL
81445	Targeted genomic sequence analysis panel, solid organ neoplasm, DNA analysis, and RNA analysis when performed, 5-50 genes (e.g., ALK, BRAF, CDKN2A, EGFR, ERBB2, KIT, KRAS, NRAS, MET, PDGFRA, PDGFRB, PGR, PIK3CA, PTEN, RET), interrogation
81450	Targeted genomic sequence analysis panel, hematolymphoid neoplasm or disorder, DNA analysis, and RNA analysis when performed, 5-50 genes (e.g., BRAF, CEBPA, DNMT3A, EZH2, FLT3, IDH1, IDH2, JAK2, KRAS, KIT, MLL, NRAS, NPM1, NOTCH1), interrogation for sequence variants, and copy number variants or rearrangements, or isoform expression or mRNA expression levels, if performed
81455	Targeted genomic sequence analysis panel, solid organ or hematolymphoid neoplasm, DNA analysis, and RNA analysis when performed, 51 or greater genes (e.g., ALK, BRAF, CDKN2A, CEBPA, DNMT3A, EGFR, ERBB2, EZH2, FLT3, IDH1, IDH2, JAK2, KIT, KRAS, MLL, NPM1, NRAS, MET, NOTCH1, PDGFRA, PDGFRB, PGR, PIK3CA, PTEN, RET), interrogation for sequence variants and copy number variants or rearrangements, if performed
81479	Unlisted molecular pathology procedure
81504	Oncology (tissue of origin), microarray gene expression profiling of > 2000 genes, utilizing formalin-fixed paraffin-embedded tissue, algorithm reported as tissue similarity scores
81520	Oncology (breast), mRNA gene expression profiling by hybrid capture of 58 genes (50 content and 8 housekeeping), utilizing formalin-fixed paraffin-embedded tissue, algorithm reported as a recurrence risk score
81521	Oncology (breast), mRNA, microarray gene expression profiling of 70 content genes and 465 housekeeping genes, utilizing fresh frozen or formalin-fixed paraffin-embedded tissue, algorithm reported as index related to risk of distant metastasis
81540	Oncology (tumor of unknown origin), mRNA, gene expression profiling by real-time RT-PCR of 92 genes (87 content and 5 housekeeping) to classify tumor into main cancer type and subtype, utilizing formalin-fixed paraffin-embedded tissue, algorithm reported as a probability of a predicted main cancer type and subtype
81541	Oncology (prostate), mRNA gene expression profiling by real-time RT-PCR of 46 genes (31 content and 15 housekeeping), utilizing formalin-fixed paraffin-embedded tissue, algorithm reported as a disease-specific mortality risk score
88299	Unlisted cytogenetic study
S3854	Gene expression profiling panel for use in the management of breast cancer treatment

***NOTE**: If a procedure code other than those listed above is requested, the request must be sent to a Medical director for individual consideration or the code will be identified on a separate medical policy.*

Diagnosis Codes

All malignancy-related diagnoses, including but not limited to:

ICD-10 Codes	Description
C10.1	Malignant neoplasm of anterior surface of epiglottis
C10.2	Malignant neoplasm of lateral wall of oropharynx
C10.3	Malignant neoplasm of posterior wall of oropharynx
C10.4	Malignant neoplasm of branchial cleft
C10.8	Malignant neoplasm of overlapping sites of oropharynx
C10.9	Malignant neoplasm of oropharynx, unspecified
C11.0	Malignant neoplasm of superior wall of nasopharynx
C11.1	Malignant neoplasm of posterior wall of nasopharynx
C11.2	Malignant neoplasm of lateral wall of nasopharynx
C11.3	Malignant neoplasm of anterior wall of nasopharynx
C11.8	Malignant neoplasm of overlapping sites of nasopharynx
C11.9	Malignant neoplasm of nasopharynx, unspecified
C12	Malignant neoplasm of pyriform sinus
C13.0	Malignant neoplasm of postcricoid region
C13.1	Malignant neoplasm of aryepiglottis fold, hypopharyngeal aspect
C13.2	Malignant neoplasm of posterior wall of hypopharynx
C13.8	Malignant neoplasm of overlapping sites of hypopharynx
C13.9	Malignant neoplasm of hypopharynx, unspecified
C14.0	Malignant neoplasm of pharynx, unspecified
C14.2	Malignant neoplasm of Waldeyer's ring
C14.8	Malignant neoplasm of overlapping sites of lip, oral cavity and pharynx
C15.3	Malignant neoplasm of upper third of esophagus
C15.4	Malignant neoplasm of middle third esophagus
C15.5	Malignant neoplasm of lower third of esophagus
C15.8	Malignant neoplasm of overlapping sites of esophagus
C15.9	Malignant neoplasm of esophagus, unspecified
C17.0	Malignant neoplasm of duodenum
C17.1	Malignant neoplasm of jejunum
C17.2	Malignant neoplasm of ileum
C17.3	Meckel's diverticulum, malignant
C17.8	Malignant neoplasm of overlapping sites of small intestine
C17.9	Malignant neoplasm of small intestine, unspecified
C18.0	Malignant neoplasm of cecum
C18.1	Malignant neoplasm of appendix
C18.2	Malignant neoplasm of ascending colon
C18.3	Malignant neoplasm of hepatic flexure
C18.4	Malignant neoplasm of transverse colon
C18.5	Malignant neoplasm of splenic flexure
C18.6	Malignant neoplasm of descending colon
C18.7	Malignant neoplasm of sigmoid colon
C18.8	Malignant neoplasm of overlapping sites of colon
C18.9	Malignant neoplasm of colon, unspecified
C19	Malignant neoplasm of rectosigmoid junction

C20	Malignant neoplasm of rectum
C21.0	Malignant neoplasm of anus, unspecified
C21.1	Malignant neoplasm of anal canal
C21.2	Malignant neoplasm of cloacogenic zone
C21.8	Malignant neoplasm of overlapping sites of rectum, anus and anal canal
C22.0	Liver cell carcinoma
C22.2	Hepatoblastoma
C22.7	Other specified carcinoma of liver
C22.8	Malignant neoplasm of liver, primary, unspecified as to type
C22.9	Malignant neoplasm of liver, not specified as primary or secondary
C23	Malignant neoplasm of gallbladder
C24.0	Malignant neoplasm of extrahepatic bile duct
C24.1	Malignant neoplasm of ampulla of Vater
C24.8	Malignant neoplasm of overlapping sites of biliary tract
C24.9	Malignant neoplasm of biliary tract, unspecified
C25.0	Malignant neoplasm of head of pancreas
C25.1	Malignant neoplasm of body of pancreas
C25.2	Malignant neoplasm of tail of pancreas
C25.3	Malignant neoplasm of pancreatic duct
C25.4	Malignant neoplasm of endocrine pancreas
C25.7	Malignant neoplasm of other parts of pancreas
C25.8	Malignant neoplasm of overlapping sites of pancreas
C25.9	Malignant neoplasm of pancreas, unspecified
C33	Malignant neoplasm of trachea
C34.00	Malignant neoplasm of unspecified main bronchus
C34.01	Malignant neoplasm of right main bronchus
C34.02	Malignant neoplasm of left main bronchus
C34.10	Malignant neoplasm of upper lobe, unspecified bronchus or lung
C34.11	Malignant neoplasm of upper lobe, right main bronchus or lung
C34.12	Malignant neoplasm of upper lobe, left bronchus or lung
C34.2	Malignant neoplasm of middle lobe, bronchus or lung
C34.30	Malignant neoplasm of lower lobe, unspecified bronchus or lung
C34.31	Malignant neoplasm of lower lobe, right bronchus or lung
C34.32	Malignant neoplasm of lower lobe, left bronchus or lung
C34.80	Malignant neoplasm of overlapping sites of unspecified bronchus and lung
C34.81	Malignant neoplasm of overlapping sites of right bronchus and lung
C34.82	Malignant neoplasm of overlapping sites of left bronchus and lung
C34.90	Malignant neoplasm of unspecified part of unspecified bronchus or lung
C34.91	Malignant neoplasm of unspecified part of right bronchus or lung
C34.92	Malignant neoplasm of unspecified part of left bronchus or lung
C43.0	Malignant melanoma of lip
C43.10	Malignant neoplasm of unspecified eyelid, including canthus
C43.111	Malignant melanoma of right upper eyelid, including canthus
C43.112	Malignant melanoma of right lower eyelid, including canthus
C43.121	Malignant melanoma of left upper eyelid, including canthus
C43.122	Malignant melanoma of left lower eyelid, including canthus
C43.20	Malignant neoplasm of unspecified ear and external auricular canal

C43.21	Malignant neoplasm of right ear and external auricular canal
C43.22	Malignant neoplasm of left ear and external auricular canal
C43.30	Malignant neoplasm of unspecified part of face
C43.31	Malignant neoplasm of nose
C43.39	Malignant neoplasm of other parts of the face
C43.4	Malignant neoplasm of scalp and neck
C43.51	Malignant neoplasm of anal skin
C43.52	Malignant neoplasm of skin of breast
C43.59	Malignant neoplasm of other part of trunk
C43.60	Malignant melanoma of unspecified upper limb, including shoulder
C43.61	Malignant melanoma of right upper limb, including shoulder
C43.62	Malignant melanoma of left upper limb, including shoulder
C43.70	Malignant melanoma of unspecified lower limb, including hip
C43.71	Malignant melanoma of right lower limb, including hip
C43.72	Malignant melanoma of left lower limb, including hip
C43.8	Malignant melanoma of overlapping sites of skin
C43.9	Malignant melanoma of skin, unspecified
C4A111	Merkel cell carcinoma of right upper eyelid, including canthus
C4A112	Merkel cell carcinoma of right lower eyelid, including canthus
C4A121	Merkel cell carcinoma of left upper eyelid, including canthus
C4A122	Merkel cell carcinoma of left lower eyelid, including canthus
C44.1121	Basal cell carcinoma of skin of right upper eyelid, including canthus
C44.1122	Basal cell carcinoma of skin of right lower eyelid, including canthus
C44.1191	Basal cell carcinoma of skin of left upper eyelid, including canthus
C44.1192	Basal cell carcinoma of skin of left lower eyelid, including canthus
C44.1221	Squamous cell carcinoma of skin of right upper eyelid, including canthus
C44.1222	Squamous cell carcinoma of skin of right lower eyelid, including canthus
C44.1291	Squamous cell carcinoma of skin of left upper eyelid, including canthus
C44.1292	Squamous cell carcinoma of skin of left lower eyelid, including canthus
C44.131	Sebaceous cell carcinoma of skin of unspecified eyelid, including canthus
C44.1321	Sebaceous cell carcinoma of skin of right upper eyelid, including canthus
C44.1322	Sebaceous cell carcinoma of skin of right lower eyelid, including canthus
C44.1391	Sebaceous cell carcinoma of skin of left upper eyelid, including canthus
C44.1392	Sebaceous cell carcinoma of skin of left lower eyelid, including canthus
C44.1921	Other specified malignant neoplasm of skin of right upper eyelid, including canthus
C44.1922	Other specified malignant neoplasm of skin of right lower eyelid, including canthus
C44.1991	Other specified malignant neoplasm of skin of left upper eyelid, including canthus
C44.1992	Other specified malignant neoplasm of skin of left lower eyelid, including canthus
C48.1	Malignant neoplasm of specified parts of peritoneum
C48.2	Malignant neoplasm of peritoneum, unspecified
C48.8	Malignant neoplasm of overlapping sites of retroperitoneum and peritoneum
C49.A0	Gastrointestinal stromal tumor, unspecified site
C49.A1	Gastrointestinal stromal tumor of esophagus
C49.A2	Gastrointestinal stromal tumor of stomach
C49.A3	Gastrointestinal stromal tumor of small intestine
C49.A4	Gastrointestinal stromal tumor of large intestine
C49.A5	Gastrointestinal stromal tumor of rectum

C49.A9	Gastrointestinal stromal tumor of other sites
C50.011	Malignant neoplasm of nipple and areola, right female breast
C50.012	Malignant neoplasm of nipple and areola, left female breast
C50.019	Malignant neoplasm of nipple and areola, unspecified female breast
C50.111	Malignant neoplasm of central portion of right female breast
C50.112	Malignant neoplasm of central portion of left female breast
C50.119	Malignant neoplasm of central portion of unspecified female breast
C50.121	Malignant neoplasm of central portion of right male breast
C50.122	Malignant neoplasm of central portion of left male breast
C50.129	Malignant neoplasm of central portion of unspecified male breast
C50.211	Malignant neoplasm of upper-inner quadrant of right female breast
C50.212	Malignant neoplasm of upper-inner quadrant of left female breast
C50.219	Malignant neoplasm of upper-inner quadrant of unspecified female breast
C50.311	Malignant neoplasm of lower-inner quadrant of right female breast
C50.312	Malignant neoplasm of lower-inner quadrant of left female breast
C50.319	Malignant neoplasm of lower-inner quadrant of unspecified female breast
C50.411	Malignant neoplasm of upper-outer quadrant of right female breast
C50.412	Malignant neoplasm of upper-outer quadrant of left female breast
C50.419	Malignant neoplasm of upper-outer quadrant of unspecified female breast
C50.511	Malignant neoplasm of lower-outer quadrant of right female breast
C50.512	Malignant neoplasm of lower-outer quadrant of left female breast
C50.519	Malignant neoplasm of lower-outer quadrant of unspecified female breast
C50.521	Malignant neoplasm of lower-outer quadrant of right male breast
C50.522	Malignant neoplasm of lower-outer quadrant of left male breast
C50.529	Malignant neoplasm of lower-outer quadrant of unspecified male breast
C50.611	Malignant neoplasm of axillary tail of right female breast
C50.612	Malignant neoplasm of axillary tail of left female breast
C50.619	Malignant neoplasm of axillary tail of unspecified female breast
C50.811	Malignant neoplasm of overlapping sites of right female breast
C50.812	Malignant neoplasm of overlapping sites of left female breast
C50.819	Malignant neoplasm of overlapping sites of unspecified female breast
C50.911	Malignant neoplasm of unspecified site of right female breast
C50.912	Malignant neoplasm of unspecified site of left female breast
C50.919	Malignant neoplasm of unspecified site of unspecified female breast
C50.921	Malignant neoplasm of unspecified site of right male breast
C50.922	Malignant neoplasm of unspecified site of left male breast
C50.929	Malignant neoplasm of unspecified site of unspecified male breast
C56.1	Malignant neoplasm of right ovary
C56.2	Malignant neoplasm of left ovary
C56.9	Malignant neoplasm of unspecified ovary
C57.00	Malignant neoplasm of unspecified fallopian tube
C57.01	Malignant neoplasm of right fallopian tube
C57.02	Malignant neoplasm of left fallopian tube
C57.10	Malignant neoplasm of unspecified broad ligament
C57.11	Malignant neoplasm of right broad ligament
C57.12	Malignant neoplasm of left broad ligament
C57.20	Malignant neoplasm of unspecified round ligament

C57.21	Malignant neoplasm of right round ligament
C57.22	Malignant neoplasm of left round ligament
C57.3	Malignant neoplasm of parametrium
C57.4	Malignant neoplasm of uterine adnexa, unspecified
C57.7	Malignant neoplasm of other specified female genital organs
C57.8	Malignant neoplasm of overlapping sites of female genital organs
C57.9	Malignant neoplasm of female genital organ, unspecified
C60.1	Malignant neoplasm of glans penis
C61	Malignant neoplasm of prostate
C64.1	Malignant neoplasm of right kidney, except renal pelvis
C64.2	Malignant neoplasm of left kidney, expect renal pelvis
C64.9	Malignant neoplasm of unspecified kidney, except renal pelvis
C65.1	Malignant neoplasm of unspecified kidney, except renal pelvis
C65.2	Malignant neoplasm of left renal pelvis
C65.9	Malignant neoplasm of unspecified renal pelvis
C66.1	Malignant neoplasm of right ureter
C66.2	Malignant neoplasm of left ureter
C66.9	Malignant neoplasm of unspecified ureter
C67.0	Malignant neoplasm of trigone of bladder
C67.1	Malignant neoplasm of dome of bladder
C67.2	Malignant neoplasm of lateral wall of bladder
C67.3	Malignant neoplasm of anterior wall of bladder
C67.4	Malignant neoplasm of posterior wall of bladder
C67.5	Malignant neoplasm of bladder neck
C67.6	Malignant neoplasm of ureteric orifice
C67.6	Malignant neoplasm of ureteric orifice
C67.7	Malignant neoplasm of urachus
C67.8	Malignant neoplasm of overlapping sites of bladder
C67.9	Malignant neoplasm of bladder, unspecified
C68.0	Malignant neoplasm of urethra
C68.1	Malignant neoplasm of paraurethral glands
C68.8	Malignant neoplasm of overlapping sites of urinary organs
C68.9	Malignant neoplasm of urinary organ, unspecified
C71.0	Malignant neoplasm of cerebrum, except lobes and ventricles
C71.1	Malignant neoplasm of frontal lobe
C71.2	Malignant neoplasm of temporal lobe
C71.3	Malignant neoplasm of parietal lobe
C71.4	Malignant neoplasm of occipital lobe
C71.5	Malignant neoplasm of cerebral ventricle
C71.6	Malignant neoplasm of cerebellum
C71.7	Malignant neoplasm of brain stem
C73	Malignant neoplasm of thyroid gland
C74.10	Malignant neoplasm of medulla of unspecified adrenal gland
C74.11	Malignant neoplasm of medulla of right adrenal gland
C74.12	Malignant neoplasm of medulla of left adrenal gland
C75.0	Malignant neoplasm of parathyroid gland
C76.0	Malignant neoplasm of head, face and neck

C77.0	Secondary and unspecified malignant neoplasm of lymph nodes of head, face and neck
C78.00	Secondary malignant neoplasm of unspecified lung
C78.01	Secondary malignant neoplasm of right lung
C78.02	Secondary malignant neoplasm left lung
C78.1	Secondary malignant neoplasm of mediastinum
C78.2	Secondary malignant neoplasm of pleura
C78.30	Secondary malignant neoplasm of unspecified respiratory organ
C78.39	Secondary malignant neoplasm of other respiratory organs
C78.4	Secondary malignant neoplasm of small intestine
C78.5	Secondary malignant neoplasm of large intestine and rectum
C78.6	Secondary malignant neoplasm of retroperitoneum and peritoneum
C78.7	Secondary malignant neoplasm of liver and intrahepatic bile duct
C78.80	Secondary malignant neoplasm of unspecified digestive organ
C78.89	Secondary malignant neoplasm of other digestive organs
C79.31	Secondary malignant neoplasm of brain
C81.00	Nodular lymphocyte predominate Hodgkin lymphoma, unspecified site
C79.60	Secondary malignant neoplasm of unspecified ovary
C79.61	Secondary malignant neoplasm of right ovary
C79.62	Secondary malignant neoplasm of left ovary
C79.81	Secondary malignant neoplasm of breast
C81.01	Nodular lymphocyte predominate Hodgkin lymphoma, lymph nodes of head, face and neck
C81.02	Nodular lymphocyte predominate Hodgkin lymphoma, intrathoracic lymph nodes
C81.03	Nodular lymphocyte predominate Hodgkin lymphoma, intra-abdominal lymph nodes
C81.04	Nodular lymphocyte predominate Hodgkin lymphoma, lymph nodes of axilla and upper limb
C81.05	Nodular lymphocyte predominate Hodgkin lymphoma, lymph nodes of inguinal region and lower limb
C81.06	Nodular lymphocyte predominate Hodgkin lymphoma, intrapelvic lymph nodes
C81.07	Nodular lymphocyte predominate Hodgkin lymphoma, spleen
C81.08	Nodular lymphocyte predominate Hodgkin lymphoma, lymph nodes of multiple sites
C81.09	Nodular lymphocyte predominate Hodgkin lymphoma, extranodal and solid organ sites
C81.10	Nodular sclerosis classical Hodgkin lymphoma, unspecified site
C81.11	Nodular sclerosis classical Hodgkin lymphoma, lymph nodes of head, face and neck
C81.12	Nodular sclerosis classical Hodgkin lymphoma, intrathoracic lymph nodes
C81.13	Nodular sclerosis classical Hodgkin lymphoma, intra-abdominal lymph nodes
C81.14	Nodular sclerosis classical Hodgkin lymphoma, lymph nodes of axilla and upper limb
C81.15	Nodular sclerosis classical Hodgkin lymphoma, lymph nodes of inguinal region and lower limb
C81.16	Nodular sclerosis classical Hodgkin lymphoma, intrapelvic lymph nodes
C81.17	Nodular sclerosis classical Hodgkin lymphoma, spleen
C81.18	Nodular sclerosis classical Hodgkin lymphoma, lymph nodes of multiple sites
C81.19	Nodular sclerosis classical Hodgkin lymphoma, extranodal and solid organ sites
C81.20	Mixed cellularity classical Hodgkin lymphoma, unspecified site
C81.21	Mixed cellularity classical Hodgkin lymphoma, lymph nodes of head, face and neck
C81.22	Mixed cellularity classical Hodgkin lymphoma, intrathoracic lymph nodes
C81.23	Mixed cellularity classical Hodgkin lymphoma, intra-abdominal lymph nodes

C81.24	Mixed cellularity classical Hodgkin lymphoma, lymph nodes of axilla and upper limb
C81.25	Mixed cellularity classical Hodgkin lymphoma, lymph nodes of inguinal region and lower limb
C81.26	Mixed cellularity classical Hodgkin lymphoma, intrapelvic lymph nodes
C81.27	Mixed cellularity classical Hodgkin lymphoma, spleen
C81.28	Mixed cellularity classical Hodgkin lymphoma, lymph nodes of multiple sites
C81.29	Mixed cellularity classical Hodgkin lymphoma, extranodal and solid organs
C81.30	Lymphocyte depleted classical Hodgkin lymphoma, unspecified site
C81.31	Lymphocyte depleted classical Hodgkin lymphoma, lymph nodes of head, face and neck
C81.32	Lymphocyte depleted classical Hodgkin lymphoma, intrathoracic lymph nodes
C81.33	Lymphocyte depleted classical Hodgkin lymphoma, intra-abdominal lymph nodes
C81.34	Lymphocyte depleted classical Hodgkin lymphoma, lymph nodes of axilla and upper limb
C81.35	Lymphocyte depleted classical Hodgkin lymphoma, lymph nodes of inguinal region and lower limb
C81.36	Lymphocyte depleted classical Hodgkin lymphoma, intrapelvic lymph nodes
C81.37	Lymphocyte depleted classical Hodgkin lymphoma, spleen
C81.38	Lymphocyte depleted classical Hodgkin lymphoma, lymph nodes of multiple sites
C81.39	Lymphocyte depleted classical Hodgkin lymphoma, extranodal and solid organ sites
C81.40	Lymphocyte-rich classical Hodgkin lymphoma, unspecified site
C81.41	Lymphocyte-rich classical Hodgkin lymphoma, lymph nodes of head, face and neck
C81.42	Lymphocyte-rich classical Hodgkin lymphoma, intrathoracic lymph nodes
C81.43	Lymphocyte-rich classical Hodgkin lymphoma, intra-abdominal lymph nodes
C81.44	Lymphocyte-rich classical Hodgkin lymphoma, lymph nodes of axilla and upper limb
C81.45	Lymphocyte-rich classical Hodgkin lymphoma, lymph nodes of inguinal region and lower limb
C81.46	Lymphocyte-rich classical Hodgkin lymphoma, intrapelvic lymph nodes
C81.47	Lymphocyte-rich classical Hodgkin lymphoma, spleen
C81.48	Lymphocyte-rich classical Hodgkin lymphoma, lymph nodes of multiple sites
C81.49	Lymphocyte-rich classical Hodgkin lymphoma, extranodal and solid organ sites
C81.70	Other classical Hodgkin lymphoma, unspecified site
C81.71	Other classical Hodgkin lymphoma, lymph nodes of head, face and neck
C81.72	Other classical Hodgkin lymphoma, intrathoracic lymph nodes
C81.73	Other classical Hodgkin lymphoma, intra-abdominal lymph nodes
C81.74	Other classical Hodgkin lymphoma, lymph nodes of axilla and upper limb
C81.75	Other classical Hodgkin lymphoma, lymph nodes of inguinal region and lower limb
C81.76	Other classical Hodgkin lymphoma, intrapelvic lymph nodes
C81.77	Other classical Hodgkin lymphoma, spleen
C81.78	Other classical Hodgkin lymphoma, lymph nodes of multiple sites
C81.79	Other classical Hodgkin lymphoma, extranodal and solid organ sites
C81.90	Hodgkin lymphoma, unspecified, unspecified site
C81.91	Hodgkin lymphoma, unspecified, lymph nodes of head, face, and neck
C81.92	Hodgkin lymphoma, unspecified, intrathoracic lymph nodes
C81.93	Hodgkin lymphoma, unspecified, intra-abdominal lymph nodes
C81.94	Hodgkin lymphoma, unspecified, lymph nodes of axilla and upper limb
C81.95	Hodgkin lymphoma, unspecified, lymph nodes of inguinal region and lower limb
C81.96	Hodgkin lymphoma, unspecified, intrapelvic lymph nodes
C81.97	Hodgkin lymphoma, unspecified, spleen

C81.98	Hodgkin lymphoma, unspecified, lymph nodes of multiple sites
C81.99	Hodgkin lymphoma, unspecified, extranodal and solid organ sites
C82.00	Follicular lymphoma grade I, unspecified site
C82.01	Follicular lymphoma grade I, lymph nodes of head, face, and neck
C82.02	Follicular lymphoma grade I, intrathoracic lymph nodes
C82.03	Follicular lymphoma grade I, intra-abdominal lymph nodes
C82.04	Follicular lymphoma grade I, lymph nodes of axilla and upper limb
C82.05	Follicular lymphoma grade I, lymph nodes of inguinal region and lower limb
C82.06	Follicular lymphoma grade I, intrapelvic lymph nodes
C82.07	Follicular lymphoma grade I, spleen
C82.08	Follicular lymphoma grade I, lymph nodes of multiple sites
C82.09	Follicular lymphoma grade I, extranodal and solid organ sites
C82.10	Follicular lymphoma grade II, unspecified site
C82.11	Follicular lymphoma grade II, lymph nodes of head, face, and neck
C82.12	Follicular lymphoma grade II, intrathoracic lymph nodes
C82.13	Follicular lymphoma grade II, intra-abdominal lymph nodes
C82.14	Follicular lymphoma grade II, lymph nodes of axilla and upper limb
C82.15	Follicular lymphoma grade II, lymph nodes of inguinal region and lower limb
C82.16	Follicular lymphoma grade II, intrapelvic lymph nodes
C82.17	Follicular lymphoma grade II, spleen
C82.18	Follicular lymphoma grade II, lymph nodes of multiple sites
C82.19	Follicular lymphoma grade II, extranodal and solid organ sites
C82.20	Follicular lymphoma grade III, unspecified, unspecified site
C82.21	Follicular lymphoma grade III, unspecified, lymph nodes of head, face, and neck
C82.22	Follicular lymphoma grade III, unspecified, intrathoracic lymph nodes
C82.23	Follicular lymphoma grade III, unspecified, intra-abdominal lymph nodes
C82.24	Follicular lymphoma grade III, unspecified, lymph nodes of axilla and upper limb
C82.25	Follicular lymphoma grade III, unspecified, lymph nodes of inguinal region and lower limb
C82.26	Follicular lymphoma grade III, unspecified, intrapelvic lymph nodes
C82.27	Follicular lymphoma grade III, unspecified, spleen
C82.28	Follicular lymphoma grade III, unspecified, lymph nodes of multiple sites
C82.29	Follicular lymphoma grade III, unspecified, extranodal and solid organ sites
C82.30	Follicular lymphoma grade IIIa, unspecified site
C82.00	Follicular lymphoma grade I, unspecified site
C82.01	Follicular lymphoma grade I, lymph nodes of head, face, and neck
C82.02	Follicular lymphoma grade I, intrathoracic lymph nodes
C82.03	Follicular lymphoma grade I, intra-abdominal lymph nodes
C82.04	Follicular lymphoma grade I, lymph nodes of axilla and upper limb
C82.05	Follicular lymphoma grade I, lymph nodes of inguinal region and lower limb
C82.06	Follicular lymphoma grade I, intrapelvic lymph nodes
C82.07	Follicular lymphoma grade I, spleen
C82.08	Follicular lymphoma grade I, lymph nodes of multiple sites
C82.09	Follicular lymphoma grade I, extranodal and solid organ sites
C82.10	Follicular lymphoma grade II, unspecified site
C82.31	Follicular lymphoma grade IIIa, lymph nodes of head, face, and neck
C82.32	Follicular lymphoma grade IIIa, intrathoracic lymph nodes

C82.33	Follicular lymphoma grade IIIa, intra-abdominal lymph nodes
C82.34	Follicular lymphoma grade IIIa, lymph nodes of axilla and upper limb
C82.35	Follicular lymphoma grade IIIa, lymph nodes of inguinal region and lower limb
C82.36	Follicular lymphoma grade IIIa, intrapelvic lymph nodes
C82.37	Follicular lymphoma grade IIIa, spleen
C82.38	Follicular lymphoma grade IIIa, lymph nodes of multiple sites
C82.39	Follicular lymphoma grade IIIa, extranodal and solid organ sites
C82.40	Follicular lymphoma grade IIIb, unspecified site
C82.41	Follicular lymphoma grade IIIb, lymph nodes of head, face, and neck
C82.42	Follicular lymphoma grade IIIb, intrathoracic lymph nodes
C82.43	Follicular lymphoma grade IIIb, intra-abdominal lymph nodes
C82.44	Follicular lymphoma grade IIIb, lymph nodes of axilla and upper limb
C82.45	Follicular lymphoma grade IIIb, lymph nodes of inguinal region and lower limb
C82.46	Follicular lymphoma grade IIIb, intrapelvic lymph nodes
C82.47	Follicular lymphoma grade IIIb, spleen
C82.48	Follicular lymphoma grade IIIb, lymph nodes of multiple sites
C82.49	Follicular lymphoma grade IIIb, extranodal and solid organ sites
C82.50	Diffuse follicle center lymphoma, unspecified site
C82.51	Diffuse follicle center lymphoma, lymph nodes of head, face, and neck
C82.52	Diffuse follicle center lymphoma, intrathoracic lymph nodes
C82.53	Diffuse follicle center lymphoma, intra-abdominal lymph nodes
C82.54	Diffuse follicle center lymphoma, lymph nodes of axilla and upper limb
C82.55	Diffuse follicle center lymphoma, lymph nodes of inguinal region and lower limb
C82.56	Diffuse follicle center lymphoma, intrapelvic lymph nodes
C82.57	Diffuse follicle center lymphoma, spleen
C82.58	Diffuse follicle center lymphoma, lymph nodes of multiple sites
C82.59	Diffuse follicle center lymphoma, extranodal and solid organ sites
C82.60	Cutaneous follicle center lymphoma, unspecified site
C82.61	Cutaneous follicle center lymphoma, lymph nodes of head, face, and neck
C82.62	Cutaneous follicle center lymphoma, intrathoracic lymph nodes
C82.63	Cutaneous follicle center lymphoma, intra-abdominal lymph nodes
C82.64	Cutaneous follicle center lymphoma, lymph nodes of axilla and upper limb
C82.65	Cutaneous follicle center lymphoma, lymph nodes of inguinal region and lower limb
C82.66	Cutaneous follicle center lymphoma, intrapelvic lymph nodes
C82.67	Cutaneous follicle center lymphoma, spleen
C82.68	Cutaneous follicle center lymphoma, lymph nodes of multiple sites
C82.69	Cutaneous follicle center lymphoma, extranodal and solid organ sites
C82.80	Other types of follicular lymphoma, unspecified site
C82.81	Other types of follicular lymphoma, lymph nodes of head, face, and neck
C82.82	Other types of follicular lymphoma, intrathoracic lymph nodes
C82.83	Other types of follicular lymphoma, intra-abdominal lymph nodes
C82.84	Other types of follicular lymphoma, lymph nodes of axilla and upper limb
C82.85	Other types of follicular lymphoma, lymph nodes of inguinal region and lower limb
C82.86	Other types of follicular lymphoma, intrapelvic lymph nodes
C82.87	Other types of follicular lymphoma, spleen
C82.88	Other types of follicular lymphoma, lymph nodes of multiple sites
C82.89	Other types of follicular lymphoma, extranodal and solid organ sites

C82.90	Follicular lymphoma, unspecified, unspecified site
C82.91	Follicular lymphoma, unspecified, lymph nodes of head, face, and neck
C82.92	Follicular lymphoma, unspecified, intrathoracic lymph nodes
C82.93	Follicular lymphoma, unspecified, intra-abdominal lymph nodes
C82.94	Follicular lymphoma, unspecified, lymph nodes of axilla and upper limb
C82.95	Follicular lymphoma, unspecified, lymph nodes of inguinal region and lower limb
C82.96	Follicular lymphoma, unspecified, intrapelvic lymph nodes
C82.97	Follicular lymphoma, unspecified, spleen
C83.00	Small cell B-cell lymphoma, unspecified site
C83.01	Small cell B-cell lymphoma, lymph nodes of head, face, and neck
C83.02	Small cell B-cell lymphoma, intrathoracic lymph nodes
C83.03	Small cell B-cell lymphoma, intra-abdominal lymph nodes
C83.04	Small cell B-cell lymphoma, lymph nodes of axilla and upper limb
C83.05	Small cell B-cell lymphoma, lymph nodes of inguinal region and lower limb
C83.06	Small cell B-cell lymphoma, intrapelvic lymph nodes
C83.07	Small cell B-cell lymphoma, spleen
C83.08	Small cell B-cell lymphoma, lymph nodes of multiple sites
C83.09	Small cell B-cell lymphoma, extranodal and solid organ sites
C83.10	Mantle cell lymphoma, unspecified site
C83.11	Mantle cell lymphoma, lymph nodes of head, face, and neck
C83.12	Mantle cell lymphoma, intrathoracic lymph nodes
C83.13	Mantle cell lymphoma, intra-abdominal lymph nodes
C83.14	Mantle cell lymphoma, lymph nodes of axilla and upper limb
C83.15	Mantle cell lymphoma, lymph nodes of inguinal region and lower limb
C83.16	Mantle cell lymphoma, intrapelvic lymph nodes
C83.17	Mantle cell lymphoma, spleen
C83.18	Mantle cell lymphoma, lymph nodes of multiple sites
C83.19	Mantle cell lymphoma, extranodal and solid organ sites
C83.30	Diffuse large B-cell lymphoma, unspecified site
C83.31	Diffuse large B-cell lymphoma, lymph nodes of head, face, and neck
C83.32	Diffuse large B-cell lymphoma, intrathoracic lymph nodes
C83.33	Diffuse large B-cell lymphoma, intra-abdominal lymph nodes
C83.34	Diffuse large B-cell lymphoma, lymph nodes of axilla and upper limb
C83.35	Diffuse large B-cell lymphoma, lymph nodes of inguinal region and lower limb
C83.36	Diffuse large B-cell lymphoma, intrapelvic lymph nodes
C83.37	Diffuse large B-cell lymphoma, spleen
C83.38	Diffuse large B-cell lymphoma, lymph nodes of multiple sites
C83.39	Diffuse large B-cell lymphoma, extranodal and solid organ sites
C83.50	Lymphoblastic (diffuse) lymphoma, unspecified site
C83.51	Lymphoblastic (diffuse) lymphoma, lymph nodes of head, face, and neck
C83.52	Lymphoblastic (diffuse) lymphoma, intrathoracic lymph nodes
C83.53	Lymphoblastic (diffuse) lymphoma, intra-abdominal lymph nodes
C83.54	Lymphoblastic (diffuse) lymphoma, lymph nodes of axilla and upper limb
C83.55	Lymphoblastic (diffuse) lymphoma, lymph nodes of inguinal region and lower limb
C83.56	Lymphoblastic (diffuse) lymphoma, intrapelvic lymph nodes
C83.57	Lymphoblastic (diffuse) lymphoma, spleen
C83.58	Lymphoblastic (diffuse) lymphoma, lymph nodes of multiple sites

C83.59	Lymphoblastic (diffuse) lymphoma, extranodal and solid organ sites
C83.70	Burkitt lymphoma, unspecified site
C83.71	Burkitt lymphoma, lymph nodes of head, face, and neck
C83.72	Burkitt lymphoma, intrathoracic lymph nodes
C83.73	Burkitt lymphoma, intra-abdominal lymph nodes
C83.74	Burkitt lymphoma, lymph nodes of axilla and upper limb
C83.75	Burkitt lymphoma, lymph nodes of inguinal region and lower limb
C83.76	Burkitt lymphoma, intrapelvic lymph nodes
C83.77	Burkitt lymphoma, spleen
C83.78	Burkitt lymphoma, lymph nodes of multiple sites
C83.79	Burkitt lymphoma, extranodal and solid organ sites
C83.80	Other non-follicular lymphoma, unspecified site
C83.81	Other non-follicular lymphoma, lymph nodes of head, face, and neck
C83.82	Other non-follicular lymphoma, intrathoracic lymph nodes
C83.83	Other non-follicular lymphoma, intra-abdominal lymph nodes
C83.84	Other non-follicular lymphoma, lymph nodes of axilla and upper limb
C83.85	Other non-follicular lymphoma, lymph nodes of inguinal region and lower limb
C83.	Other non-follicular lymphoma, intrapelvic lymph nodes
C83.87	Other non-follicular lymphoma, spleen
C83.88	Other non-follicular lymphoma, lymph nodes of multiple sites
C83.	Other non-follicular lymphoma, extranodal and solid organ sites
C83.90	Non-follicular (diffuse) lymphoma, unspecified, unspecified site
C83.91	Non-follicular (diffuse) lymphoma, unspecified, lymph nodes of head, face, and neck
C83.92	Non-follicular (diffuse) lymphoma, unspecified, intrathoracic lymph nodes
C83.93	Non-follicular (diffuse) lymphoma, unspecified, intra-abdominal lymph nodes
C83.94	Non-follicular (diffuse) lymphoma, unspecified, lymph nodes of axilla and upper limb
C83.95	Non-follicular (diffuse) lymphoma, unspecified, lymph nodes of inguinal region and lower limb
C83.96	Non-follicular (diffuse) lymphoma, unspecified, intrapelvic lymph nodes
C83.97	Non-follicular (diffuse) lymphoma, unspecified, spleen
C83.98	Non-follicular (diffuse) lymphoma, unspecified, lymph nodes of multiple sites
C83.99	Non-follicular (diffuse) lymphoma, unspecified, extranodal and solid organ sites
C85.10	Unspecified B-cell lymphoma, unspecified site
C85.11	Unspecified B-cell lymphoma, lymph nodes of head, face, and neck
C85.12	Unspecified B-cell lymphoma, intrathoracic lymph nodes
C85.13	Unspecified B-cell lymphoma, intra-abdominal lymph nodes
C85.14	Unspecified B-cell lymphoma, lymph nodes of axilla and upper limb
C85.15	Unspecified B-cell lymphoma, lymph nodes of inguinal region and lower limb
C85.16	Unspecified B-cell lymphoma, intrapelvic lymph nodes
C85.17	Unspecified B-cell lymphoma, spleen
C85.18	Unspecified B-cell lymphoma, lymph nodes of multiple sites
C85.19	Unspecified B-cell lymphoma, extranodal and solid organ sites
C85.20	Mediastinal (thymic) large B-cell lymphoma, unspecified site
C85.21	Mediastinal (thymic) large B-cell lymphoma, lymph nodes of head, face, and neck
C85.22	Mediastinal (thymic) large B-cell lymphoma, intrathoracic lymph nodes
C85.23	Mediastinal (thymic) large B-cell lymphoma, intra-abdominal lymph nodes
C85.24	Mediastinal (thymic) large B-cell lymphoma, lymph nodes of axilla and upper limb

C85.25	Mediastinal (thymic) large B-cell lymphoma, lymph nodes of inguinal region and lower limb
C85.26	Mediastinal (thymic) large B-cell lymphoma, intrapelvic lymph nodes
C85.27	Mediastinal (thymic) large B-cell lymphoma, spleen
C85.28	Mediastinal (thymic) large B-cell lymphoma, lymph nodes of multiple sites
C85.29	Mediastinal (thymic) large B-cell lymphoma, extranodal and solid organ sites
C85.80	Other specified types of non-Hodgkin lymphoma, unspecified site
C85.81	Other specified types of non-Hodgkin lymphoma, lymph nodes of head, face, and neck
C85.82	Other specified types of non-Hodgkin lymphoma, intrathoracic lymph nodes
C85.83	Other specified types of non-Hodgkin lymphoma, intra-abdominal lymph nodes
C85.84	Other specified types of non-Hodgkin lymphoma, lymph nodes of axilla and upper limb
C85.85	Other specified types of non-Hodgkin lymphoma, lymph nodes of inguinal region and lower limb
C85.86	Other specified types of non-Hodgkin lymphoma, intrapelvic lymph nodes
C85.87	Other specified types of non-Hodgkin lymphoma, spleen
C85.88	Other specified types of non-Hodgkin lymphoma, lymph nodes of multiple sites
C85.89	Other specified types of non-Hodgkin lymphoma, extranodal and solid organ sites
C85.90	Non-Hodgkin lymphoma, unspecified, unspecified site
C85.91	Non-Hodgkin lymphoma, unspecified, lymph nodes of head, face, and neck
C85.92	Non-Hodgkin lymphoma, unspecified, intrathoracic lymph nodes
C85.93	Non-Hodgkin lymphoma, unspecified, intra-abdominal lymph nodes
C85.94	Non-Hodgkin lymphoma, unspecified, lymph nodes of axilla and upper limb
C85.95	Non-Hodgkin lymphoma, unspecified, lymph nodes of inguinal region and lower limb
C85.96	Non-Hodgkin lymphoma, unspecified, intrapelvic lymph nodes
C85.97	Non-Hodgkin lymphoma, unspecified, spleen
C85.98	Non-Hodgkin lymphoma, unspecified, lymph nodes of multiple sites
C85.99	Non-Hodgkin lymphoma, unspecified, extranodal and solid organ sites
C88.8	Other malignant immunoproliferative diseases
C91.00	Acute lymphoblastic leukemia not having achieved remission
C91.01	Acute lymphoblastic leukemia, in remission
C91.02	Acute lymphoblastic leukemia, in relapse
C92.00	Acute myeloblastic leukemia, not having achieved remission
C92.02	Acute myeloblastic leukemia, in relapse
C92.30	Myeloid sarcoma, not having achieved remission
C92.32	Myeloid sarcoma, in relapse
C92.40	Acute promyelocytic leukemia, not having achieved remission
C92.42	Acute promyelocytic leukemia, in relapse
C92.50	Acute myelomonocytic leukemia, not having achieved remission
C92.52	Acute myelomonocytic leukemia, in relapse
C92.60	Acute myeloid leukemia with 11q23-abnormality not having achieved remission
C92.62	Acute myeloid leukemia with 11q23-abnormality in relapse
C92.A0	Acute myeloid leukemia with multilineage dysplasia, not having achieved remission
C92.A2	Acute myeloid leukemia with multilineage dysplasia, in relapse
C92.Z0	Other myeloid leukemia not having achieved remission
C92.Z2	Other myeloid leukemia, in relapse
C93.10	Chronic myelomonocytic leukemia not having achieved remission
C93.11	Chronic myelomonocytic leukemia, in remission

C93.12	Chronic myelomonocytic leukemia, in relapse
C94.00	Acute erythroid leukemia, not having achieved remission
C94.02	Acute erythroid leukemia, in relapse
C94.40	Acute panmyelosis with myelofibrosis not having achieved remission
C94.41	Acute panmyelosis with myelofibrosis, in remission
C94.42	Acute panmyelosis with myelofibrosis, in relapse
C94.6	Myelodysplastic disease, not classified
C95.00	Acute leukemia of unspecified cell type not having achieved remission
C95.01	Acute leukemia of unspecified cell type, in remission
C95.02	Acute leukemia of unspecified cell type, in relapse
C95.10	Chronic leukemia of unspecified cell type not having achieved remission
C95.11	Chronic leukemia of unspecified cell type, in remission
C95.12	Chronic leukemia of unspecified cell type, in relapse
C95.90	Leukemia, unspecified not having achieved remission
C95.91	Leukemia, unspecified, in remission
C95.92	Leukemia, unspecified, in relapse
C96.20	Malignant mast cell neoplasm, unspecified
C96.21	Aggressive systemic mastocytosis
C96.22	Mast cell sarcoma
C96.29	Other malignant mast cell neoplasm
D01.7	Carcinoma in situ of other specified digestive organs
D03.0	Melanoma in situ of lip
D03.10	Melanoma in situ of unspecified eyelid, including canthus
D03.111	Melanoma in situ of right upper eyelid, including canthus
D03.112	Melanoma in situ of right lower eyelid, including canthus
D03.121	Melanoma in situ of left upper eyelid, including canthus
D03.122	Melanoma in situ of left lower eyelid, including canthus
D03.20	Melanoma in situ of unspecified ear and external auricular canal
D03.21	Melanoma in situ of right ear and external auricular canal
D03.22	Melanoma in situ of left ear and external auricular canal
D03.30	Melanoma in situ of unspecified part of face
D03.39	Melanoma in situ of parts of face
D03.4	Melanoma in situ of scalp and neck
D03.51	Melanoma in situ of anal skin
D03.52	Melanoma in situ of breast (skin) (soft tissue)
D03.59	Melanoma in situ of other part of trunk
D03.60	Melanoma in situ of unspecified upper limb, including shoulder
D03.61	Melanoma in situ of right upper limb, including shoulder
D03.62	Melanoma in situ of left upper limb, including shoulder
D03.70	Melanoma in situ of unspecified lower limb, including hip
D03.71	Melanoma in situ of right lower limb, including hip
D03.72	Melanoma in situ of left lower limb, including hip
D03.8	Melanoma in situ of other sites
D03.9	Melanoma in situ, unspecified
D04.111	Carcinoma in situ of skin of right upper eyelid, including canthus
D04.112	Carcinoma in situ of skin of right lower eyelid, including canthus
D04.121	Carcinoma in situ of skin of left upper eyelid, including canthus

D04.122	Carcinoma in situ of skin of left lower eyelid, including canthus
D05.00	Lobular carcinoma in situ of unspecified breast
D05.01	Lobular carcinoma in situ of right breast
D05.02	Lobular carcinoma in situ of left breast
D05.10	Intraductal carcinoma in situ of unspecified breast
D05.11	Intraductal carcinoma in situ of right breast
D05.12	Intraductal carcinoma in situ of left breast
D05.80	Other specified type of carcinoma in situ of unspecified breast
D05.81	Other specified type of carcinoma in situ of right breast
D05.82	Other specified type of carcinoma in situ of left breast
D05.90	Unspecified type of carcinoma in situ of unspecified breast
D05.91	Unspecified type of carcinoma in situ of right breast
D05.92	Unspecified type of carcinoma in situ of left breast
D07.30	Carcinoma in situ of unspecified female genital organs
D07.39	Carcinoma in situ of other female genital organs
D22.111	Melanocytic nevi of right upper eyelid, including canthus
D22.112	Melanocytic nevi of right lower eyelid, including canthus
D22.121	Melanocytic nevi of left upper eyelid, including canthus
D22.122	Melanocytic nevi of left lower eyelid, including canthus
D23.111	Other benign neoplasm of skin of right upper eyelid, including canthus
D23.112	Other benign neoplasm of skin of right lower eyelid, including canthus
D23.121	Other benign neoplasm of skin of left upper eyelid, including canthus
D23.122	Other benign neoplasm of skin of left lower eyelid, including canthus
D34	Benign neoplasm of thyroid gland
D35.1	Benign neoplasm of parathyroid gland
D44.0	Neoplasm of uncertain behavior of thyroid gland
D44.9	Neoplasm of uncertain behavior of unspecified endocrine gland
D47.01	Cutaneous mastocytosis
D47.02	Systemic mastocytosis
D47.09	Other mast cell neoplasms of uncertain behavior
D48.1	Neoplasm of uncertain behavior of connective and other soft tissue
Z15.01	Genetic susceptibility to malignant neoplasm of breast
Z15.02	Genetic susceptibility to malignant neoplasm of ovary
Z17.0	Estrogen receptor positive status [ER+]
Z80.0	Family history of malignant neoplasm of digestive organs
Z80.1	Family history of malignant neoplasm of other respiratory and intrathoracic organs
Z80.2	Family history of malignant neoplasm of trachea, bronchus and lung
Z80.3	Family history of malignant neoplasm of breast
Z80.41	Family history of malignant neoplasm of ovary
Z80.42	Family history of malignant neoplasm of prostate
Z80.43	Family history of malignant neoplasm of testis
Z80.49	Family history of malignant neoplasm of other genital organs
Z80.51	Family history of malignant neoplasm of kidney
Z80.52	Family history of malignant neoplasm of bladder
Z80.59	Family history of malignant neoplasm of other urinary tract organ
Z80.6	Family history of leukemia
Z80.7	Family history of lymphoid, hematopoietic and related tissues

Z80.8	Family history of malignant neoplasm of other organs or systems
Z80.9	Family history of malignant neoplasm, unspecified
Z85.038	Personal history of other malignant neoplasm of large intestine
Z85.048	Personal history of other malignant neoplasm of rectum, rectosigmoid junction, and anus
Z85.07	Personal history of malignant neoplasm of pancreas
Z85.3	Personal history of malignant neoplasm of breast
Z85.43	Personal history of malignant neoplasm of ovary
Z85.44	Personal history of malignant neoplasm of other female genital organs
Z85.45	Personal history of malignant neoplasm of unspecified male genital organ
Z85.46	Personal history of malignant neoplasm of prostate
Z85.49	Personal history of malignant neoplasm of other male genital organs
Z85.820	Personal history of malignant melanoma of skin

REIMBURSEMENT

Participating facilities will be reimbursed per their Highmark Health Options contract.

SUMMARY OF LITERATURE

The role of genetic testing in the medical profession has continued to grow rapidly. With the completion of the Human Genome Project (HGP) and continued advances in the field of genomics, the use of genetic testing has become widespread. The World Health Organization (WHO) has published criteria to be met for any genetic test to be considered valuable: the disease is an important health problem, the risk in mutation carriers is high in the general population (not just in a high-risk group), mutations for the disease can be accurately identified, and effective interventions exist.

Genetic testing was first introduced as a clinical tool in the 1960s with chromosomal karyotyping. (Satya-Murti, et al. 2013) More advanced testing includes: Chromosomal microarray analysis or comparative genomic hybridization (array CDG) testing, fluorescence-in-situ-hybridization (FISH), letter-by-letter sequencing of specific genes (Sanger technology) and the new technology where huge panels of genes as large as the entire exome can be sequenced (NexGen technology).

Genetic testing includes the following:

- Single gene-targeted mutation/sequence analysis, deletion/duplication testing
- Gene Panels
- Whole Exome Sequencing (WES)-sequencing of exome but interpretation focus on genes related to phenotype
- Whole Genome Sequencing (WGS)-sequences all genetic material

Genetic testing uses next-generation sequencing (NGS) technology, massive parallel sequencing, or chromosomal microarray analysis (CMA) testing to perform genetic panels. NGS and CMA are new genetic technologies. The intended use for genetic panels is variable. Existing genetic testing panels are available for the following areas: cancer, cardiovascular disease, neurologic disease, psychiatric conditions and for reproductive testing. As of October 10, 2017, the Genetic Testing Registry listed more than 2,600 diagnostic testing panels representing 3 laboratories.

When scientists test for mutations in large numbers of genes with a single test, known as a gene panel, they are virtually guaranteed to find at least one VUS, says Colleen Caleshu, a genetic counsellor at Stanford University's Center for Inherited Cardiovascular Disease. "The more genes you look at, the more variation you'll find," she adds. "We all have tons of variations in our genes, most of which are extremely rare and, by the very nature of rarity, uninterpretable." In short, there isn't enough data to know what you are seeing. https://arstechnica.com/science/2017/07/the-uncertain-future-of-genetic-testing/

Several methods can be used for genetic testing:

- Molecular genetic tests (or gene tests) study single genes or short lengths of DNA to identify variations or mutations that lead to a genetic disorder.
- Chromosomal genetic tests analyze whole chromosomes or long lengths of DNA to see if there are large genetic changes, such as an extra copy of a chromosome, that cause a genetic condition.
- Biochemical genetic tests study the amount or activity level of proteins; abnormalities in either can indicate changes to the DNA that result in a genetic disorder.

Advantages of genetic testing panels

- The potential for overall greater sensitivity which can provide a comprehensive analysis for multiple diagnoses;
- Enhanced sensitivity over Sanger sequencing

Disadvantages

- There is no standardization in the makeup of genetic panels. The panel compositions are variable with different set of genes for the same condition. This genetic panel composition is determined by the specific lab that developed the test.
- The gene selection of genetic panels is subject to change based on scientific discovery.
- Because of the large number of mutations contained in expanded panels, it is not possible to determine clinical validity for the panels as a whole.
- The risk for uncertain and incidental findings with the large numbers of genes on the panels.
- Large percentage of VUS

An example of the number of genes for the same clinical indications is as follows: There are at least four clinical laboratories offering the epilepsy gene panels. The number of genes being tested range from 70 to 377 (Xue, et al. 2015). It is suggested that the rationale for the obvious difference in the number of genes tested is that some laboratories may prefer to include all possible genes that are even remotely associated with the phenotype being evaluated in order to procure a higher diagnostic yield. Other laboratories elect to take a conservative approach by only including the genes that have support for association with a disorder. However, it is the responsibility of the clinician and the laboratory geneticist to determine the medically appropriate gene selection for the panels. The clinician needs to be able to understand the results in relation to the clinical case at hand.

Per SGO (2014), advantages of cancer gene panels include decreased cost and improved efficiency of cancer genetic testing by decreasing the time involved, number of patient visits, and number of tests sent. A negative genetic test is more reassuring at eliminating the likelihood of inherited risk when all known genes for that phenotype have been assayed.

In addition, SGO (2014) states that the major drawback of cancer gene panels is the increased complexity of results. For many genes, clear risk reduction strategies for mutation carriers are not established. A major concern is the increased likelihood of identifying results of uncertain clinical significance. Uncertain

results occur when a rare variant is identified whose impact on protein function is unknown. Uncertainty can also arise from the identification of a clearly deleterious mutation in a gene of uncertain clinical significance. The more genes that are tested, the greater the chances are of such uncertain results. Clinical management should not be dictated by these uncertain variants; rather, family history should guide recommendations in these cases. However, clinicians may misinterpret uncertain results, treating patients as if a deleterious mutation is present, leading to unnecessary interventions. Given the increased variety of testing options and potential complexity of genetic results with cancer gene panels, genetic counselors or knowledgeable medical professionals should carefully discuss the pros and cons with patients.

Types of Testing

- Testing of affective/symptomatic individual (diagnostic, prognostic and therapeutic)
- Testing asymptomatic individual to determine risk
- Testing individual to benefit family
- Testing of DNA from cancer cells (diagnostic, prognostic, treatment responses)

While cost is not a primary concern—most panel tests are comparable in price to testing for individual genetic tests—some genetics professionals question the inclusion of emerging-risk genes or variants of undetermined significance on panels, and whether collecting that information is clinically beneficial or possibly harmful to patients.

A study published in Genetics in Medicine (LaDuca, et al. 2014) said that multigene panels "play an important role in the diagnosis of hereditary cancer predisposition." However, the authors noted there is a need for careful interpretation of results, particularly for mutations in moderate-risk genes and for patients with negative results.

Oncologists may choose panel testing around hereditary cancer from the following approaches:

- *Syndrome-specific gene panel*: This approach would include BRCA1 and BRCA2 for hereditary breast and ovarian cancer or testing of mismatch repair genes for Lynch syndrome (MLH1, MSH2, MSH6, PMS2 and EPCAM).
- *High-penetrance gene panel*: These types of panels include genes with high penetrance and known to be involved in a specific cancer. One example is high risk breast cancer panel testing for mutations in *BRCA1, BRCA2, TP53, PTEN, CDH1* and *STK11.*
- *Cancer-specific gene panel*: This panel would include testing of between 17-23 genes. Tested genes include both highly and moderately penetrant genes related to a specific cancer type such as breast cancer or ovarian cancer.
- *Comprehensive cancer risk panel*: Several companies offer these panels, which include testing of between 25 and 61 highly and moderately penetrant genes known to be associated with risk for many different cancers.

Although multigene tests are gaining in popularity for patients who may be predisposed to hereditary breast and/or ovarian cancer, concerns remain because most of the genes tested are considered low- or moderate-risk genes for which management guidelines either do not exist or have only been recently introduced. Current research indicates that multigene panel testing can provide information in a small subset of patients, however additional studies are necessary to address if clinical interventions are of any benefit to positive less well studied mutations. In addition, there is paucity in the information in addressing the large numbers of variants of uncertain significance generated by multigene panels.

Multi-gene panels are commonly used when:

- When the family mutation is unknown in a symptomatic patient; OR
- When there are multiple candidate genes and no single gene is significantly more likely than the others; OR
- When personal and family history are suggestive of more than one hereditary syndrome; OR
- When the suspected diagnosis cannot be unequivocally diagnosed otherwise.

Targeted Gene Sequencing

Targeted gene sequencing are focused panels that contain a select number of genes or gene regions that are known or are suspected as associates of the disease or phenotype. These panels can be designed with preselected content or custom designed. Next-generation sequencing also evaluated targeted genes of interest however, multiple genes can be assessed.

Shashi and colleagues (2014) noted that it remains unclear which patients should be analyzed with a specific genetic test and in which stage during the evaluation. In a study to assess the diagnostic yield of the traditional comprehensive clinical evaluation and targeted genetic testing, the authors retrospectively analyzed a cohort of 500 unselected consecutive patients. These patients had received traditional genetic diagnostic evaluations at a tertiary facility. The diagnosis rate, number of visits to diagnosis, genetic tests and the cost of testing was calculate. The authors concluded that nearly half of the patients tested with traditional approaches were diagnosed in the initial visit. It is logical that the remaining patients that were undiagnosed, may benefit from next generation sequencing. The use of next-generation sequencing utilized after the first clinical visit could result in a higher rate of genetic diagnosis and at a considerable cost savings.

The American Academy of Neurology (AAN) has issued recommendations for genetic test that is 'guided by the clinical phenotype, inheritance patter (if available), and electrodiagnostic features. As example the AAN does not support complete panels of all known Charcot-Marie Tooth genes, but rather recommends a stepwise evaluation method to improve genetic screening efficiency.

Multiple research documents report that a thorough clinical evaluation is a major step in choosing the best genetic test for the patient condition.

The National Comprehensive Cancer Network (NCCN, 2017) evidence and consensus-based guidelines recommend the following initial laboratory evaluations for individuals suspected to have MPN:

- "Laboratory evaluations should include complete blood count (CBC), microscopic examination of the peripheral smear, comprehensive metabolic panel with serum uric acid, serum LDH, liver function tests, serum EPO level and serum iron studies."
- Fluorescence in situ hybridization (FISH) or a reverse transcriptase polymerase chain reaction (RT-PCR) on a peripheral blood specimen to detect BCR-ABL1 transcripts and exclude the diagnosis of CML is recommended for all patients, especially those with left-shifted leukocytosis and/or thrombocytosis with basophilia."
- "Molecular testing for JAKV617F mutations should be performed in all patients. If JAKV617F mutation is negative, molecular testing for MPL and CALR mutations should be performed for patients with MF and ET; molecular testing for JAK2 exon 12 mutation should be done for those with PV."
- "In the absence of JAK2, CALR and MPL mutations, the presence of another clonal marker is included as one of the major diagnostic criteria for PMF. Additional mutations in ASXL1, EZH2,

TET2, IDH1, IDH2, SRSF2, and SF3B1 genes are noted to be of help in determining the clonal nature of the disease."

- "Bone marrow aspirate and biopsy with trichrome and reticulin stain and bone marrow cytogenetics (karyotype, with or without FISH) is necessary to accurately distinguish the bone marrow morphological features between the disease subtypes (early/prefibrotic PMF, ET and masked PV)."

The National Comprehensive Cancer Network (NCCN) guidelines do not contain recommendations for the general strategy of testing a tumor for a wide range of mutations. The guidelines do contain recommendations for specific genetic testing for individual cancers, based on situations where there is a known mutation-drug combination that has demonstrated benefits for that specific tumor type.

Examples of Genetic Testing Panels, not all inclusive

Name of Test
ARUP Laboratories
Agammaglobulinemia Panel
Amyotrophic Lateral Sclerosis Pane
Aortopathy Panel
Ashkenazi Jewish Diseases Panel
Autism Panel
Biotinidase Deficiency (BTD) 5 Mutation
Brugada Syndrome Panel
Cardiomyopathy and Arrhythmia Panel
Cystic Fibrosis (CFTR) 32 Mutations Panel
Mitochondrial Disorders Panel
Noonan Spectrum Disorders Panel
Periodic Fever Syndromes Panel
Retinitis Pigmentosa/Leber Congenital Amaurosis Panel
Solid Tumor Mutation Panel Next Generation Sequencing
Vascular Malformation Syndromes
Emory Genetics Laboratories
ACOG/ACMG Carrier Screen Targeted Mutation Panel
Anophthalmia/ Microphthalmia/ Anterior Segment Dysgenesis/ Anomaly: Sequencing Panel
Arrhythmias Deletion/Duplication Panel
Arrhythmias Sequencing Panel
Autism Spectrum Disorders
Cardiomyopathy Panel
Ciliopathies Panel
Congenital Glycosylation Disorders
Early Onset IBD Sequencing and Del/Dup Panels
Epilepsy
Eye Disorders
Expanded Neuromuscular Disorders
Hereditary Hemolytic Anemia Sequencing 28 Genes
Noonan Syndrome and Related Disorders
Osteogenesis Inperfecta and Osteopenia Sequencing Panel
Short Stature Panel
Sudden Cardiac Arrest Panel

X-linked Intellectual Disability
Ambry Genetics
BreastNext™
CancerNext™
ColoNext™
FHNext
HCMNext
Marfan, Aneurysm and Related Disorders Panel
OvaNext™
Pan Cardio Panel
PancNext
RenalNext
TAADNext
X-linked Intellectual Disability
Athena
Alzheimer's Disease
Amyotrophic Lateral Sclerosis Advanced Evaluation Gene Panel
Ataxia, Comprehensive Evaluation
Autosomal Recessive Ataxia Evaluation
Common Mitochondrial Disorder Evaluation
Complete Ataxia Evaluation Panel
Complete Hereditary Spastic Paraplegia Evaluation Panel
Early Infantile Epileptic Encephalopathy
Hemiplegic Migraine Profile
Hereditary Renal Tubular Disorder Panel
Intellectual Disability
Mitochondrial Disease Associated with Mitochondrial Depletion Syndrome
Myotonic Syndrome Advanced Evaluation Panel
Periodic Paralysis Advanced Sequencing Evaluation Panel
Progressive External Ophthalmoplegia Evaluation Panel
Idiopathic Hypogonadotropic Hypogonadism/Kallmann Syndrome
Baylor College of Medicine
Cobalamin Metabolism Comprehensive Panel
CoQ10 Comprehensive Panel
GeneAware
Glycogen Storage Disorders Panel
Low Bone Mass Panel
Mitochondrial Disorders Panel
Myopathy/Rhabdomyolysis Panel
Progressive External Ophthalmoplegia Panel
Pyruvate Dehydrogenase Deficiency and Mitochondrial Respiratory Chain Complex V Deficiency Panel
Retinitis Pigmentosa Panel
Usher Syndrome Panel
GeneDx
Autism/ID Xpanded Panel
Breast/Ovarian Cancer Panel

Cardiomyopathy Panel
Colorectal Cancer Panel
Combined Cardiac Panel
Combined Mito Genome Plus Mito Nuclear Gene Panel
Comprehensive Hereditary Cancer Panel
Comprehensive Arrhythmia Panel
Comprehensive Cancer Panel
Comprehensive Epilepsy Panel
Comprehensive Mitochondrial Nuclear Gene Panel
Congenital Ichthyosis XomeDxSlice Panel
Congenital Myopathy and Congenital Muscular Dystrophy Panel
Dilated Cardiomyopathy (DCM) Left Ventricular Non-Compaction (LVNC)
Endometrial Cancer Panel
EpiXpanded Panel
Heterotaxy Panel
High-Moderate Risk Panel
Hyper-IgE Syndromes Panel
Hypertrophic Cardiomyopathy (HCM) Panel
Marfan Syndrome/TAAD Sequencing Panel
Noonan RASopathies Panel
Noonan Syndrome Panel
Pancreatic Cancer Panel
Prenatal Noonan Spectrum Disorders
Prenatal Skeletal Dysplasia Panel
Progressive External Ophthalmoplegia (PEO)/Optic Atrophy Nuclear Gene Panel
Rett/Angelman Syndrome Panel
Syndromic Macrocephaly Overgrowth Panel
XomeDxPlus (whole exome sequencing [WES] + mtDNA Sequencing and Deletion Testing
Medical Neurogenetics
Leigh Disease Panel
Spastic Paraplegia Next Generation Sequencing
Partners Healthcare
Isolated Non-syndromic Congenital Heart Defects Panel
Noonan Spectrum Panel *Pan Cardiomyopathy Panel*
Usher Syndrome Panel
Mayo Medical Laboratories
Arrhythmogenic Right Ventricular Cardiomyopathy Panel
Bacterial Typing by whole Genome Sequencing
Brugada Syndrome
Comprehensive Cardiomyopathy Multi-Gene Panel
Congenital Disorders Chromosome Analysis (CDCA)
Dilated Cardiomyopathy Panel
Hereditary Colon Cancer Syndromes
Hypertrophic Cardiomyopathy Panel
Long QT Syndrome
Marfan Syndrome Panel

Noonan Syndrome Panel
Signature Genomics
Signature Prenatal Microarray
Counsyl Genomics
Counsyl Panel
GoodStart Genetics
GoodStart Select

POLICY SOURCE(S)

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Policy History

Date	Activity
09/14/2017	Initial policy developed never implemented
12/11/2018	Revision: Removed the word 'Covered' from the procedure and diagnosis code tables in Attachments B & C; Title changed to oncologic Genetic Testing Panels; Added reference to several related medical policies; Added multiple oncologic procedure codes as eligible in Attachment B; Multiple oncologic related procedure codes in Attachment B were deleted and oncologic procedure codes were added.
12/11/2018	QI/UM Committee approval
02/18/2019	Provider effective date