

# GENETIC TESTING: EXOME AND GENOME SEQUENCING FOR DIAGNOSIS OF GENETIC DISORDERS (PREAUTHORIZATION REQUIRED)

V.36

V.36 GENETIC TESTING: EXOME AND GENOME SEQUENCING FOR DIAGNOSIS OF GENETIC DISORDERS (PREAUTHORIZATION REQUIRED)

# DESCRIPTION

Exome sequencing (ES) (also known as 'whole exome sequencing (WES)') involves sequencing and copy number variant (CNV) analysis of the portion of the genome that contains protein-coding DNA, which are termed exons. Together, all of the exons in a genome are known as the exome, which constitutes approximately 1% of the genome and is currently estimated to contain about 85% of heritable disease-causing variants.

Genome sequencing (GS) (also known as 'whole genome sequencing (WGS)') is a comprehensive method that sequences both coding and noncoding regions of the genome. GS has a greater ability to detect large deletions or duplications in protein-coding regions compared with ES, as well as the ability to detect variants that may be missed by ES, such as copy-number variants (CNV), mid-size insertions and deletions (ca. 10-500 bp), nucleotide repeat expansion mutations, deeper intronic mutations, structural variants(e.g., translocations, inversions), and variants that result in methylation defects and uniparental disomy. GS requires greater data analysis but less DNA preparation prior to sequencing.

ES and GS have been proposed for use in patients presenting with disorders and anomalies not immediately explained by standard clinical workup. Potential candidates for ES and GS include patients who present with a broad spectrum of suspected genetic conditions. GS has been shown to have a higher diagnostic yield compared to ES when used as a first line test.



an uninformative ES.

Trio testing is preferred whenever possible. Testing of one available parent is a valid alternative if both are not immediately available and one or both parents can be done later if needed. Exome sequencing or genome sequencing can reveal incidental findings or secondary findings. These findings are defined as results that are not related to the indication for undergoing the sequencing, but may be of medical value or utility. Disclosure of these findings has been a topic of intense debate within the medical genetics community. In 2013, ACMG published recommendations for reporting secondary findings that included a list of conditions to be included. The list currently includes 59 genes that confer highly-penetrant and medically actionable conditions.

Pre-test and post-test genetic counseling that facilitates informed decision-making, the possibility to identify secondary finding with the option to 'opt out' of receiving these results, elicits patient preferences regarding secondary and/or incidental findings if possible, and formulates a plan for returning such results before testing occurs is strongly advised.

If a genetic diagnosis is not found by ES or GS, periodic reanalysis of the previously obtained genomic sequence is recommended.

Reevaluation can occur on the variant-level or case-level. Any variants identified and reported prior to the current ACMG variant classification standards should be reevaluated using the current ACMG standards.

### **Dates**

Original Effective

12-01-2016

Last Review

08-07-2024

Next Review

08-11-2025

## REFERENCE TABLE

The tests, associated laboratories, CPT codes, and ICD codes contained within this document serve only as examples to help users navigate claims and corresponding coverage criteria; as such, they are not comprehensive and are not a guarantee of coverage or non-coverage. Please see the <a href="Concert Platform">Concert Platform</a> for a comprehensive list of registered tests.



Standard Exome Sequencing	Genomic Unity Exome Analysis - Proband (Variantyx)	81415	F70-F79, F80.0-F89, Q00.0- Q99.9, R56.9, R62.0, R62.50, R62.51, G40.909
	Genomic Unity Exome Analysis - Comparator (Duo or Trio) (Variantyx Inc.)	81416	
	XomeDx - Proband (GeneDx)	81415	
	Exome - Proband Only (Invitae)		
	XomeDx - Duo (GeneDx)	81415, 81416	
	XomeDX - Trio (GeneDx)		
	Exome - Duo (Invitae)		
	Exome - Trio (Invitae)		
Reanalysis of Exome or Genome Sequencing Data	Exome Reanalysis (Ambry)	81417	F70-F79, F80-F89, Q00.0- Q99.9, R56.9, R62.0, R62.50, R62.51, G40.909
	Whole Genome Reanalysis (ARUP)	81427	
Rapid Exome	XomeDxXpress (GeneDx)	81415, 81416	F70-F79, F80-F89, Q00.0- Q99.9, R56.9, R62.0, R62.50, R62.51, G40.909
Sequencing	ExomeNext-Rapid (Ambry)		
	PGxome RAPID Exome Test (PreventionGenetics, part of Exact Sciences)		
	STAT Whole Exome Sequencing (PerkinElmer Genomics)		
Standard Genome Sequencing	Genomic Unity Whole Genome Analysis - Proband (Variantyx Inc.)	0212U	F70-F79, F80-F89, Q00.0- Q99.9, R56.9, R62.0,
	Genomic Unity® Whole Genome Analysis - Comparator (Variantyx Inc.)	0213U	
	GenomeSeqDx (GeneDx)	81425, 81426	
	TruGenome Trio (Illumina, Inc)		R62.50,
	Whole Genome Sequencing (PerkinElmer Genomics)		R62.51, G40.909
	MNGenome (MNG Laboratories)		



Rapid Genome Sequencing	Rapid Whole Genome Sequencing (Rady Children's Institute for Genomic Medicine)	0094U	F70-F79, F80-F89, Q00.0-
	Rapid Whole Genome Sequencing, Comparator Genome (Rady Children's Institute for Genomic Medicine)	0425U	Q99.9, R56.9, R62.0, R62.50,
	Ultra-Rapid Whole Genome Sequencing (Rady Children's Institute for Genomic Medicine)	0426U	R62.51, G40.909
	STAT Whole Genome Sequencing (PerkinElmer Genomics)	81425, 81426	
	MNGenome STAT (Labcorp/MNG Laboratories)		
	Rapid Genome Sequencing (Genomic Medicine Lab)	0532U	

# **RELATED POLICIES**

This policy document provides coverage criteria for exome and genome sequencing for the diagnosis of genetic disorders in patients with suspected genetic disorders and for population-based screening. Please refer to:

- V.60 Oncology: Molecular Analysis of Solid Tumors and Hematologic Malignancies for coverage criteria related to exome and genome sequencing of solid tumors and hematologic malignancies.
- V.62 Genetic Testing: Multisystem Inherited Disorders, Intellectual Disability, and Developmental Delay for coverage criteria related to diagnostic genetic testing performed after a child has been born.
- *V.31 Genetic Testing : Prenatal and Preconception Carrier Screening* for coverage criteria related to prenatal carrier screening, preimplantation genetic testing, or preconception carrier screening.
- V.17 Genetic Testing: Prenatal Diagnosis (via Amniocentesis, PUBS) and Pregnancy Loss for coverage criteria related to prenatal exome sequencing.



in this or another non-general policy, including known familial variant testing.

# **POLICY**

#### STANDARD EXOME SEQUENCING

- I. Standard exome sequencing (81415, 81416, 0214U, 0215U), with <u>trio testing</u> when possible, is considered **medically necessary** when:
  - A. The member has not previously had genome sequencing, **AND**
  - B. Alternate etiologies have been considered and ruled out when possible (e.g., environmental exposure, injury, infection, isolated prematurity), **AND**
  - C. Clinical presentation does not fit a well-described syndrome for which single-gene or targeted multi-gene panel testing is available, **AND**
  - D. The member's personal and family histories have been evaluated by a Medical Geneticist, Genetic Counselor or an Advanced Practice Nurse in Genetics (APGN), **AND**
  - E. The member meets at least one of the following clinical findings:
    - 1. The member has unexplained epilepsy diagnosed at any age, **OR**
    - 2. The member has <u>global developmental delay</u> or <u>intellectual disability</u> with onset prior to age 18 years, **OR**
    - 3. The member was diagnosed with at least one <a href="congenital anomaly">congenital anomaly</a> (functional and/or structural), **OR**
    - 4. The member has at least **TWO** of the following:
      - a. Bilateral sensorineural hearing loss of unknown etiology, **OR**
      - b. Symptoms of a complex neurological disorder (e.g., dystonia, hemiplegia, spasticity, epilepsy, myopathy, muscular dystrophy), **OR**



- an inborn error of metabolism, **OR**
- e. Autism, OR
- f. Severe neuropsychiatric condition (e.g., schizophrenia, bipolar disorder, Tourette syndrome, self-injurious behavior, reverse sleep-wake cycles), **OR**
- g. Period of unexplained developmental regression (unrelated to epilepsy or autism).
- II. Repeat standard exome sequencing (81415, 81416, 0214U, 0215U) is considered **investigational**.
- III. Standard exome sequencing (81415, 81416, 0214U, 0215U) is considered **investigational** for all other indications, including screening asymptomatic/healthy individuals for genetic disorders.

#### REANALYSIS OF EXOME SEQUENCING DATA

- I. <u>Reanalysis of exome</u> or genome sequencing data (81417, 81427) is considered **medically necessary** when\*:
  - A. The member had exome sequencing at least 18 months ago, **OR**
  - B. The member's phenotype has expanded to include clinical findings\*\* that were not present at the time of the initial exome sequencing analysis, **AND** 
    - 1. Results of prior exome sequencing do not explain these new clinical findings.
- II. Reanalysis of exome sequencing data (81417, 81427) is considered **investigational** for all other indications.
- \*\*See Standard Exome Sequencing criteria for qualifying clinical findings.

#### RAPID EXOME SEQUENCING

- I. Rapid exome sequencing (Res) (81415, 81416), with <u>trio testing</u> when possible, is considered **medically necessary** when:
  - A. The member is an acutely-ill infant (12 months of age or younger), **AND**
  - B. The member has not previously had genome sequencing, **AND**



- D. Clinical presentation does not fit a well-described syndrome for which rapid single-gene or targeted multi-gene panel testing is available, **AND**
- E. The member's personal and family histories have been evaluated by a Medical Geneticist, Genetic Counselor or an Advanced Practice Nurse in Genetics (APGN), **AND**
- F. The member meets at least one of the following clinical findings:
  - 1. The member has unexplained epilepsy, OR
  - 2. The member has global developmental delay, OR
  - 3. The member was diagnosed with at least one congenital anomaly (functional and/or structural), **OR**
  - 4. The member has at least **TWO** of the following:
    - a. Bilateral sensorineural hearing loss of unknown etiology, **OR**
    - b. Symptoms of a complex neurological disorder (e.g., dystonia, hemiplegia, spasticity, myopathy, muscular dystrophy), **OR**
    - c. Family history suggestive of a genetic etiology, including consanguinity, **OR**
    - d. Clinical or laboratory findings suggestive of an inborn error of metabolism, **OR**
    - e. Severe neuropsychiatric condition (e.g., schizophrenia, bipolar disorder, Tourette syndrome, self-injurious behavior, reverse sleep-wake cycles), **OR**
    - f. Period of unexplained developmental regression (unrelated to epilepsy or autism).
- II. Rapid exome sequencing (rES) (81415, 81416) is considered **investigational** for all other indications, including screening asymptomatic/healthy individuals for genetic disorders.

#### STANDARD GENOME SEQUENCING

I. Standard genome sequencing (81425, 81426, 0212U, 0213U, 0265U) is considered **investigational**.



indications.

# **DEFINITIONS**

**Exome Sequencing (ES)** is a genomic technique for sequencing all of the protein-coding regions of genes in the genome (also known as the exome).

**Genome Sequencing (GS)** is a genomic technique for sequencing the complete DNA sequence, which includes protein coding as well as non-coding DNA elements.

**Trio Testing** includes testing of the child and both biological/genetic parents and increases the chances of finding a definitive diagnosis, while reducing false-positive findings.

**Congenital anomalies** according to ACMG are multiple anomalies not specific to a well-delineated genetic syndrome. These anomalies are structural or functional abnormalities usually evident at birth, or shortly thereafter, and can be consequential to an individual's life expectancy, health status, physical or social functioning, and typically require medical intervention.

Global Developmental delay: An individual that is a slow-to-meet or not reaching milestones in the expected way for a child's age in at least two of the areas of development (communication, gross/fine motor, cognition, social-emotional, or adaptive skills).d's age

**Intellectual disability** (ID) is defined by the DSM-V as an individual who meets all of the following:

- a. Deficits in intellectual functions, such as reasoning, problem solving, planning, abstract thinking, judgment, academic learning, and learning from experience, confirmed by both clinical assessment and individualized, standardized intelligence testing.
- b. Deficits in adaptive functioning that result in failure to meet developmental and sociocultural standards for personal independence and social responsibility.
   Without ongoing support, the adaptive deficits limit functioning in one or more activities of daily life, such as communication, social participation, and independent living, across multiple environments, such as home, school, work, and community.



some situations. Sequencing platforms may have changed substantially enough that the performing lab can no longer use the data from the original ES in their pipeline. Specifically, ES reanalysis may not be possible if there have been improvements in technology/chemistry (e.f., new methods for DNA capture and/or sequencing), bioinformatics advancements, or there is new information regarding the genetic etiology of a condition that could explain the patient's clinical features and would not have been able to be detected by the previous exome sequencing.

## BACKGROUND

#### Standard Exome Sequencing

American College of Medical Genetics and Genomics (ACMG)

In 2021, ACMG (Manickam, 2021) published an evidence-based clinical practice guideline on exome and genome sequencing for pediatric patients with congenital anomalies or intellectual disability, which included the following:

- -"We strongly recommend ES and GS as a first- or second-tier test... for patients with one or more congenital anomalies prior to one year of age, or for patients with intellectual disability/developmental delay with onset prior to 18 years of age. (p. 2031)
- -"Isolated autism without ID or congenital malformation is formally out of scope for this recommendation but evaluation of exome/genome studies is ongoing." (p. 2034)

In 2020, ACMG (Malinowski, et al) released a systematic evidencebased review), which "provide[d] indirect evidence of the clinical and personal utility of ES/GS for patients with CA/DD/ID and their family members, noting that a "change in clinical management" resulted in over half of the patients examined as a result of their ES/GS results. (p. 1001)

In 2022, ACMG (Li, et al) released a clinical practice resource for the clinical evaluation of hearing loss published, which states that first-line genetic testing for individuals with exam findings that suggest a syndromic hearing loss etiology may include a variety of tests, including genome sequencing, depending on clinical presentation. For individuals without physical findings that suggest a syndromic hearing loss etiology, they recommend a tiered approach, starting with comprehensive hearing loss gene panel testing unless a more specific genetic etiology is evident for which targeted testing is appropriate. (p. 1400)



regard to secondary and incidental findings in genetic testing:

"The National Society of Genetic Counselors strongly advises pre-test counseling that facilitates informed decision-making, elicits patient preferences regarding secondary and/or incidental findings if possible, and formulates a plan for returning such results before testing occurs"

The National Society of Genetic Counselors (NSGC) published evidencebased practice guidelines for individuals with unexplained epilepsy (Smith et al, 2022). The NSGC recommendations are as follows (p. 4):

- -Individuals with unexplained epilepsy should be offered genetic testing, without limitation of age.
- -Multi-gene, comprehensive testing, such as exome sequencing, genome sequencing or a multigene panel as a first-tier test is strongly recommended.

Patient-Centered Laboratory Utilization Guidance Services

In the PLUGS July 2023 guidelines entitled "Genomic Sequencing for Rare Disease," the following clinical criteria are recommended for exome sequencing and genome sequencing.

"Exome sequencing or genome sequencing (ES/GS) is considered medically necessary when ALL of the following criteria are met: ...

- 1. The etiology of the patient's features is not known, and a genetic etiology is considered a likely explanation for the phenotype, based on one of the following...
  - a. Epilepsy of unexplained etiology with onset at any age, OR
  - b. Confirmed bilateral sensorineural hearing loss of unknown etiology and panel testing is unrevealing, OR
  - c. Intellectual disability, following formal assessment by a developmental pediatrician or neurologist, defined as moderate/severe/profound by Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria, diagnosed by 18 years of age, OR
  - d. Global developmental delay, following formal assessment by a developmental pediatrician or neurologist, defined as significant delay in younger children, under age five years, in at least two of the major developmental domains: gross or fine motor; speech and language; cognition; social and personal development; and activities of daily living, OR
  - e. Multiple congenital anomalies affecting unrelated organ systems, OR



- iii. Severe neuropsychiatric condition (e.g., schizophrenia, bipolar disorder, Tourette syndrome, self-injurious behavior, reverse sleep-wake cycles)
- iv. Symptoms of a complex neurological condition (e.g., dystonia, hemiplegia, spasticity, hypotonia, myopathy, muscular dystrophy)
- v. Family history strongly suggestive of a genetic etiology, including consanguinity
- vi. Period of unexplained developmental regression (unrelated to epilepsy or autism)
- vii. Laboratory findings suggestive of an inherited metabolic disorder
- Alternate etiologies have been considered and ruled out, when possible (e.g., MRI abnormalities/brain malformations, environmental exposure, injury, infection, isolated prematurity), AND
- Clinical presentation does not fit a well-described syndrome for which more targeted testing is available." (p. 7)

#### Belanger, et al

A review of the evaluation of children with global developmental delay and intellectual disability by Belanger et al (2018) defines global developmental delay (GDD) as the following:

-Significant delay (at least 2 standard deviations below the mean) in at least two developmental domains (gross or fine motor, speech/language, cognition, social/personal or activities of daily living. (p. 404)

# Reanalysis of Exome or Genome Sequencing Data

#### Tan. et al

A study from 2020 examined data from 58 unsolved cases referred for any indication to evaluate the systematic reanalysis of singleton exome sequencing (ES). The authors performed a reanalysis at multiple timepoints following initial testing, and ultimately suggest that an interval of greater than 18 months from the original report may be optimal for reanalysis. (p. 1)

#### Alfares, et al

This study from 2018 compared the detection rates of whole-exome sequencing (WES) and whole-genome sequencing (WGS) in a clinical setting. The study included 108 patients with negative array CGH and negative or inconclusive WES results. WGS was performed on all patients, and the results of the study showed that 30% of the positive



in this study, "we showed that WGS has additional, but limited, clinical utility compared with reanalyzing WES data, and until the cost of WGS approximates that of WES, reanalyzing WES raw data is recommended before performing WGS." (p. 1333)

#### American College of Medical Genetics

A statement from ACMG (Deignan, 2019) included considerations for case-level exome re-analysis, which include the following:

- -Significant improvements have been made to bioinformatics handling of the data (alignment/variant calling and/or the automated filtering processes)
- -Updated clinical and family history information, which may result in the identification of additional variants that are associated with the indication(s) for testing. (p. 1269)

Patient-Centered Laboratory Utilization Guidance Services

The PLUGS July 2023 guidelines entitled "Genomic Sequencing for Rare Disease" state the following regarding reanalysis of exome or genome sequencing data:

"Periodic reanalysis of previously obtained exome or genome sequence has the potential for additional diagnostic yield because of expanding variant databases, as well as periodic novel gene discovery and publication. A review of twenty-seven peer-reviewed articles revealed a median new diagnosis rate via reanalysis of 15% and median reanalysis timeframe of 22 months. The authors suggest that an interval of greater than 18 months from the original report may be optimal for reanalysis." (p. 3)

The guidelines also state: "Re-analysis of previously obtained exome or genome sequence has the potential for additional diagnostic yield because of expanding variant databases, as well as periodic novel gene discovery and publication. Re-analysis could be considered prior to additional genomic sequencing, particularly if there has been onset or identification of additional symptoms that broadens the clinical phenotype assessed during the original ES/GS analysis..." (p. 8)

#### Rapid Exome Sequencing

American College of Medical Genetics and Genomics (ACMG)

In 2021, ACMG (Manickam, et al) published an evidence-based clinical practice guideline on exome and genome sequencing for pediatric



for patients with one or more congenital anomalies prior to one year of age, or for patients with intellectual disability/developmental delay with onset prior to 18 years of age. (p. 2031).

-"Isolated autism without ID or congenital malformation is formally out of scope for this recommendation but evaluation of exome/genome studies is ongoing." (p. 2034)

In 2020, ACMG (Malinowski, et al) released a systematic evidence-based review, which "provide[d] indirect evidence of the clinical and personal utility of ES/GS for patients with CA/DD/ID and their family members, noting that a "change in clinical management" resulted in over half of the patients examined as a result of their ES/GS results. (p. 1001)

In 2022, ACMG (Li, et al) released a clinical practice resource for the clinical evaluation of hearing loss published, which states that first-line genetic testing for individuals with exam findings that suggest a syndromic hearing loss etiology may include a variety of tests, including genome sequencing, depending on clinical presentation. For individuals without physical findings that suggest a syndromic hearing loss etiology, they recommend a tiered approach, starting with comprehensive hearing loss gene panel testing unless a more specific genetic etiology is evident for which targeted testing is appropriate. (p. 1400)

#### National Society for Genetic Counselors

The National Society for Genetic Counselors (NSGC) released a position statement (2013, updated 2020, reaffirmed 2023) stating the following in regard to secondary and incidental findings in genetic testing:

"The National Society of Genetic Counselors strongly advises pre-test counseling that facilitates informed decision-making, elicits patient preferences regarding secondary and/or incidental findings if possible, and formulates a plan for returning such results before testing occurs."

The National Society of Genetic Counselors (NSGC) published evidencebased practice guidelines for individuals with unexplained epilepsy (Smith et al, 2022). The NSGC recommendations are as follows (p. 4):

- -Individuals with unexplained epilepsy should be offered genetic testing, without limitation of age.
- -Multi-gene, comprehensive testing, such as exome sequencing, genome sequencing or a multigene panel as a first-tier test is strongly recommended.

Patient-Centered Laboratory Utilization Guidance Services



"Exome sequencing or genome sequencing (ES/GS) is considered medically necessary when ALL of the following criteria are met: ...

- The etiology of the patient's features is not known, and a genetic etiology is considered a likely explanation for the phenotype, based on one of the following...
  - a. Epilepsy of unexplained etiology with onset at any age, OR
  - b. Confirmed bilateral sensorineural hearing loss of unknown etiology and panel testing is unrevealing, OR
  - c. Intellectual disability, following formal assessment by a developmental pediatrician or neurologist, defined as moderate/severe/profound by Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria, diagnosed by 18 years of age, OR
  - d. Global developmental delay, following formal assessment by a developmental pediatrician or neurologist, defined as significant delay in younger children, under age five years, in at least two of the major developmental domains: gross or fine motor; speech and language; cognition; social and personal development; and activities of daily living, OR
  - e. Multiple congenital anomalies affecting unrelated organ systems, OR
  - f. At least TWO of the following criteria are met:
    - i. Abnormality affecting at minimum a single organ system
    - ii. Autism
    - iii. Severe neuropsychiatric condition (e.g., schizophrenia, bipolar disorder, Tourette syndrome, self-injurious behavior, reverse sleep-wake cycles)
    - iv. Symptoms of a complex neurological condition (e.g., dystonia, hemiplegia, spasticity, hypotonia, myopathy, muscular dystrophy)
    - v. Family history strongly suggestive of a genetic etiology, including consanguinity
    - vi. Period of unexplained developmental regression (unrelated to epilepsy or autism)
    - vii. Laboratory findings suggestive of an inherited metabolic disorder
- Alternate etiologies have been considered and ruled out, when possible (e.g., MRI abnormalities/brain malformations, environmental exposure, injury, infection, isolated prematurity), AND
- Clinical presentation does not fit a well-described syndrome for which more targeted testing is available." (p. 7)

Rehm et al (2023)



Kingsmore SF, Cakici JA, Clark MM et al. 2019

The NSIGHT2 study, a prospective randomized, controlled, blinded trial (RCT) in acutely ill infants, found that 24% of infants undergoing rapid exome sequencing had genetic disease. They conclude that diagnostic testing in infants with diseases of unknown etiology, rapid genomic sequencing, including rapid exome sequencing can be performed as a first tier test in infants with diseases of unknown etiology at time of admission to ICUs. In unstable infants and in those whom a genetic diagnosis was likely to impact immediate management, rapid genomic sequencing had optimal analytic and diagnostic performance by virtue of shortest time to results. (p. 725)

Belanger, et al

A review of the evaluation of children with global developmental delay and intellectual disability by Belanger et al (2018) defines global developmental delay (GDD) as the following:

-Significant delay (at least 2 standard deviations below the mean) in at least two developmental domains (gross or fine motor, speech/language, cognition, social/personal or activities of daily living. (p. 404).

# **Quick Code Search**

Use this feature to find out if a procedure and diagnosis code pair will be approved, denied or held for review. Simply put in the procedure code, then the diagnosis code, then click "Add Code Pair". If the codes are listed in this policy, we will help you by showing a dropdown to help you.

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Please type a procedure code

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# Diagnosis

Please type a diagnosis code

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# **REFERENCES**



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"Rapid Genome Sequencing". Seattle Children's Hospital Patientcentered Laboratory Utilization Guidance Services.

https://www.schplugs.org/wp-content/uploads/Rapid-Genome-Sequencing-Policy June-2022-FINAL.pdf June 2022

#### 2023

"Secondary and Incidental Findings in Genetic Testing". Position Statement from National Society of Genetic Counselors.

https://www.nsgc.org/Policy-Research-and-Publications/Position-Statements/Position-Statements/Post/secondary-and-incidental-findings-in-genetic-testing-1. Released September 27, 2013. Updated March 23, 2020. Reaffirmed 2023.

#### 2019

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#### 2021

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#### 2019

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Tan NB, Stapleton R, Stark Z, et al. Evaluating systematic reanalysis of clinical genomic data in rare disease from single center experience and literature review. *Mol Genet Genomic Med.* 2020;8(11):e1508. doi:10.1002/mgg3.1508

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Rehm HL, Alaimo JT, Aradhya S, et al. The landscape of reported VUS in multi-gene panel and genomic testing: Time for a change. Genet Med. Published online July 30, 2023:100947.

#### 2023

"Genomic Sequencing for Rare Disease". Seattle Children's Hospital Patient-centered Laboratory Utilization Guidance Services. <a href="https://www.schplugs.org/wp-content/uploads/Genomic-Sequencing-in-Rare-Disease\_2023\_FINAL.pdf">https://www.schplugs.org/wp-content/uploads/Genomic-Sequencing-in-Rare-Disease\_2023\_FINAL.pdf</a>. July 2023

#### 2018

Bélanger SA, Caron J. Evaluation of the child with global developmental delay and intellectual disability. Paediatr Child Health. 2018;23(6):403-419. doi:10.1093/pch/pxy093

# **REVISIONS**



#### 01-01-2025

Updated Overview, Background & references. Minor policy updates.

#### 01-01-2024

Added 81417 & 0094U. Updated criteria for standard exome sequencing, added reanalysis of whole exome sequencing data criteria.

Updated background and references.

#### 12-19-2023

Adding new codes for 01/01/2024: 0425U, 0426U

#### 09-27-2023

Changed "may be considered medically necessary" to "may be considered scientifically validated"

Added: "investigational when the above criteria is not met and for all other indications"

#### 06-21-2023

Updated formatting for 07/01/2023

#### 07-01-2022

Updated Notes and Definitions, Practice Guidelines and references

#### 01-15-2022

Updated codes, references, policy and background

#### 09-02-2021

Added new CPT PLA codes for 10/01/2021: 0265U 0267U

#### 10-25-2020

Added new codes for 10/01/2020: 0214U 0215U

#### 10-05-2020

Added new 10/01/2020 PLA codes: 0124U, 0125U, 0212U, 0213U

#### 08-20-2020

Adding criteria for rapid exome testing and updating codes.

#### 04-03-2018

Added new code 0036U



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