Whole Exome Sequencing (WES) under Medicare

This resource has been developed to help guide clinicians requesting whole exome sequencing (WES) for patients who meet criteria under the new Medicare item number.

Key Points

- Whole exome sequencing (WES) is a **diagnostic test** used to identify the genetic cause of an individual's health condition.
- WES can be performed for an individual (**singleton testing**) or in combination with both biological parents (**trio testing**).
- To be eligible for the Medicare rebate, the child must be aged 10 years or younger and have had a non-informative chromosome microarray (CMA) test using Medicare item number 73292.
- Negative Fragile X testing and urine metabolic screening is also desirable.
- Samples (**2–5 ml EDTA blood***) are ideally required from both parents and child. Stored DNA from previous diagnostic tests can also be used.

*Saliva samples are accepted by some labs

Medicare Criteria for item numbers 73358–73363

Global developmental delay OR intellectual disability of at least moderate severity

AND/OR

Dysmorphic facial features AND the presence of at least one major structural congenital anomaly

Reanalysis of genomic data at least 18 months after the initial Medicare rebated test can be requested under Medicare twice for an individual up to 16 years old. This is to capture any new information or gene discoveries that may not have been detected in the initial analysis.

The genome is comprised of both exons (regions coding proteins ~2%) and introns (non-coding regions ~98%). Genomic sequencing can detect up to 40% of causal gene variants to account for selected single gene disorders.

Eligibility for Medicare funded WES

- If the child is strongly suspected of having a single gene disorder and is aged 10 years or younger.
- The child has a non-informative chromosome microarray (CMA) test. Negative Fragile X testing and urine metabolic screening is also desirable.
- A clinical geneticist has been consulted about the test indications.
- The family has given informed consent using the appropriate consent forms.
- Whenever possible trio testing including child and parents is recommended.

Analysis of genomic data can include:

1) The whole genome (introns and exons)
2) The whole exome (exons only)
3) A gene panel (genes of interest only)

WES does not detect all genetic changes – it cannot detect DNA changes in the mitochondria or introns, variations in copy number, aneuploidy, polyploidy or chromosome translocations

Consulting with clinical genetics

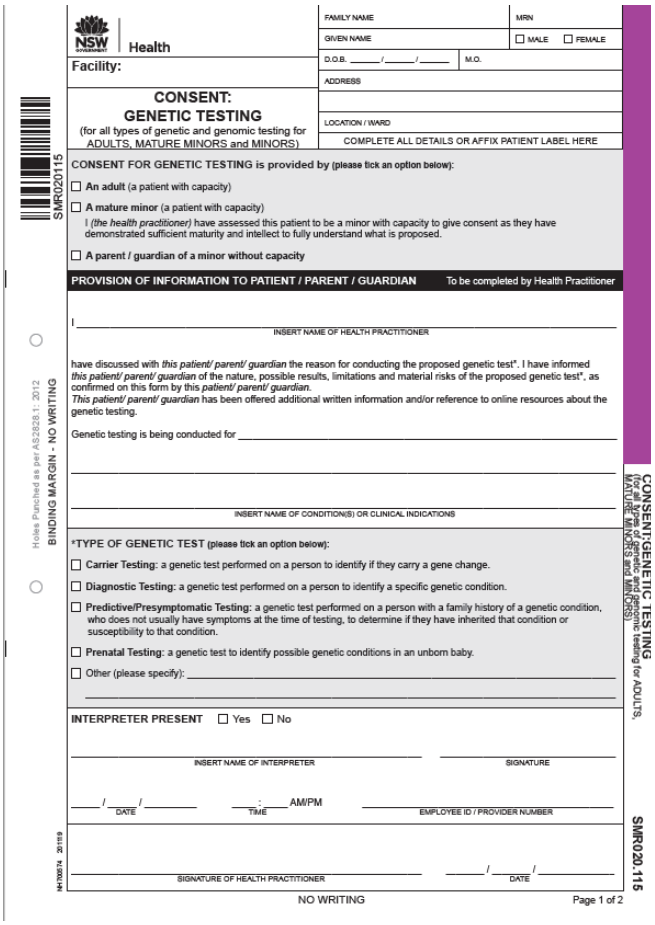
Clinical genetics services in each local health district will have different ways of facilitating the consultation process. Genetic counsellor support may be available for the family and requesting doctor depending on staffing resources.

Contact details for NSW metropolitan and regional genetics services can be found here: https://www.genetics.edu.au/SitePages/Genetic-Services.aspx.

A clinical geneticist can also be consulted via the state-wide Genetics of Learning Disability (GOLD) Service (HNELHD-GOLD@health.nsw.gov.au).

Consent

NSW has a standard consent form for parents and their child, with separate consent being required from each participant i.e. three consent forms when ordering a trio exome. Copies can be obtained from the Agency for Clinical Innovation website: (https://www.aci.health.nsw.gov.au/networks/clinical-genetics/genetic-and-genomic-testing-consent-forms).



Health

Facility:

FAMILY NAME | MRN

GIVEN NAME | ☐ MALE ☐ FEMALE

D.O.B. ____/____/____ | M.O.

ADDRESS

LOCATION / WARD

COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE

CONSENT: GENETIC TESTING
(for all types of genetic and genomic testing for ADULTS, MATURE MINORS and MINORS)

SMR020115

CONSENT FOR GENETIC TESTING is provided by (please tick an option below):

☐ **An adult** (a patient with capacity)

☐ **A mature minor** (a patient with capacity)
I *(the health practitioner)* have assessed this patient to be a minor with capacity to give consent as they have demonstrated sufficient maturity and intellect to fully understand what is proposed.

☐ **A parent / guardian of a minor without capacity**

PROVISION OF INFORMATION TO PATIENT / PARENT / GUARDIAN To be completed by Health Practitioner

I _____
INSERT NAME OF HEALTH PRACTITIONER

have discussed with *this patient/ parent/ guardian* the reason for conducting the proposed genetic test*. I have informed *this patient/ parent/ guardian* of the nature, possible results, limitations and material risks of the proposed genetic test*, as confirmed on this form by this *patient/ parent/ guardian*.
This patient/ parent/ guardian has been offered additional written information and/or reference to online resources about the genetic testing.

Genetic testing is being conducted for _____

_____

_____
INSERT NAME OF CONDITION(S) OR CLINICAL INDICATIONS

***TYPE OF GENETIC TEST (please tick an option below):**

☐ **Carrier Testing:** a genetic test performed on a person to identify if they carry a gene change.

☐ **Diagnostic Testing:** a genetic test performed on a person to identify a specific genetic condition.

☐ **Predictive/Presymptomatic Testing:** a genetic test performed on a person with a family history of a genetic condition, who does not usually have symptoms at the time of testing, to determine if they have inherited that condition or susceptibility to that condition.

☐ **Prenatal Testing:** a genetic test to identify possible genetic conditions in an unborn baby.

☐ Other (please specify): _____

INTERPRETER PRESENT ☐ Yes ☐ No

_____ _____
INSERT NAME OF INTERPRETER | SIGNATURE

____/____/____ ____:____ AM/PM _____
DATE | TIME | EMPLOYEE ID / PROVIDER NUMBER

_____ _____/_____/_____
SIGNATURE OF HEALTH PRACTITIONER | DATE

NO WRITING Page 1 of 2

CONSENT: GENETIC TESTING (for all types of genetic and genomic testing for ADULTS, MATURE MINORS and MINORS)

SMR020.115

Holes Punched as per AS2828.1: 2012 BINDING MARGIN - NO WRITING

- To order WES, tick the 'Diagnostic Testing' box in the 'Type of Genetic Test' section on the consent form.
- For more information about the other types of tests listed on the consent form, see MedlinePlus (https://medlineplus.gov/genetics/understanding/testing/uses/).
- Further information about consent can be found at the Centre for Genetics Education website (consent for WES: https://www.genetics.edu.au/SitePages/Paediatric-Genetics-Video-3.aspx; general consent resources: https://www.genetics.edu.au/SitePages/Genomic-Testing-Consent.aspx).

Consent should include the possible outcomes of testing

1) **Genetic cause identified** – Pathogenic/likely pathogenic variant in a known gene.
2) **Uninformative result** – a genetic cause is not identified.
   This does not exclude a genetic diagnosis. This may be because –
   a. the test did not examine the gene causing the condition OR
   b. the gene causing the condition is not yet known OR
   c. the gene variant causing the condition cannot be found by the test.

   Future re-analysis is possible.
3) **Gene variant of uncertain significance (VUS)** – unclear result, may require testing in other family members, and/or may require review in the future
4) **Incidental finding** – in rare cases (<1% of reports) a gene change is found that is not related to the patient's clinical features but may have implications for the child or relative's current or future health

Other points to consider	
Impact on clinical care	• Onward referrals may be made for screening or management based on results.
Implications for insurance	• An incidental finding in an adult relative based on this testing may affect applications for life/income protection insurance, but not medical/private health insurance.
Impact on relatives	• Sometimes a genomic test result in one person has implications for another persons' health care. NSW Health provides guidance on this (see last page).
Unexpected family relationships	• Trio testing could reveal non-paternity, non-maternity or unexpected family relations.
Data	• Data will be stored securely in databases according to Australian standards.
Limitations of testing	• This is not a general health test and will not identify all gene changes that could contribute to health problems
Change of mind	• No report will be generated if consent is withdrawn before the test is completed. If the patient withdraws consent after the test is run, the result may be captured in their health record.
Sample sharing	• Additional testing of the sample for further research may be requested, with consent.

Where to order WES?

For Medicare eligibility, WES must be performed in an Australian NATA accredited lab. Labs require consent, and a request form detailing clinical information.

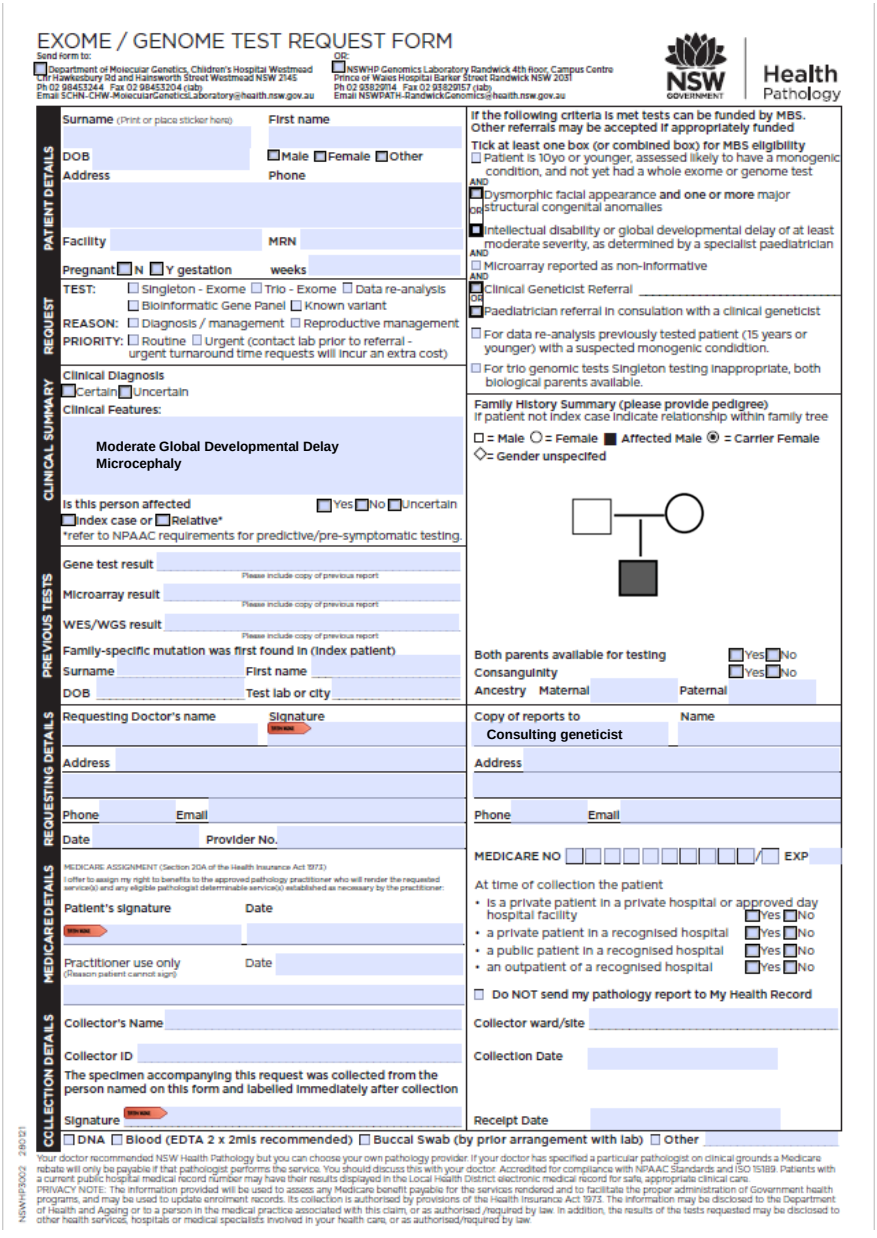
In NSW testing is offered at:

SEALS **Fax 02 93829157 (lab) Phone 02 9382 9114**

Email NSWPATH-RandwickGenomics@health.nsw.gov.au

Requirements for testing:

- Completed consent forms (x3 if trio)
- SEALS request form: see below (x3 if trio)
- Sample: 2–5 ml EDTA blood
- ***It is essential that accurate and detailed clinical phenotype information is provided on the request form, to assist the laboratory with interpreting results***



EXOME / GENOME TEST REQUEST FORM

Send form to:

☐ Department of Molecular Genetics, Children's Hospital Westmead
Cnr Hawkesbury Rd and Hainsworth Street Westmead NSW 2145
Ph 02 98453244 Fax 02 98453204 (lab)
Email SCHN-CHW-MolecularGeneticsLaboratory@health.nsw.gov.au

OR:

☐ NSWHP Genomics Laboratory Randwick 4th Floor, Campus Centre
Prince of Wales Hospital Barker Street Randwick NSW 2031
Ph 02 93829114 Fax 02 93829157 (lab)
Email NSWPATH-RandwickGenomics@health.nsw.gov.au

NSW GOVERNMENT Health Pathology

PATIENT DETAILS

Surname (Print or place sticker here) First name
DOB ☐ Male ☐ Female ☐ Other
Address Phone
Facility MRN
Pregnant ☐ N ☐ Y gestation weeks

REQUEST

TEST: ☐ Singleton - Exome ☐ Trio - Exome ☐ Data re-analysis ☐ Bioinformatic Gene Panel ☐ Known variant
REASON: ☐ Diagnosis / management ☐ Reproductive management
PRIORITY: ☐ Routine ☐ Urgent (contact lab prior to referral - urgent turnaround time requests will incur an extra cost)

CLINICAL SUMMARY

Clinical Diagnosis
☐ Certain ☐ Uncertain
Clinical Features:

Moderate Global Developmental Delay
Microcephaly

Is this person affected ☐ Yes ☐ No ☐ Uncertain
☐ Index case or ☐ Relative*
*refer to NPAAC requirements for predictive/pre-symptomatic testing.

PREVIOUS TESTS

Gene test result
Please include copy of previous report
Microarray result
Please include copy of previous report
WES/WGS result
Please include copy of previous report
Family-specific mutation was first found in (Index patient)
Surname First name
DOB Test lab or city

REQUESTING DETAILS

Requesting Doctor's name Signature
Address
Phone Email
Date Provider No.

MEDICARE DETAILS

MEDICARE ASSIGNMENT (Section 20A of the Health Insurance Act 1973)
I offer to assign my right to benefits to the approved pathology practitioner who will render the requested service(s) and any eligible pathologist determinable service(s) established as necessary by the practitioner.
Patient's signature Date
Practitioner use only Date
(Reason patient cannot sign)

COLLECTION DETAILS

Collector's Name
Collector ID
The specimen accompanying this request was collected from the person named on this form and labelled immediately after collection
Signature

If the following criteria is met tests can be funded by MBS. Other referrals may be accepted if appropriately funded
Tick at least one box (or combined box) for MBS eligibility
☐ Patient is 10yo or younger, assessed likely to have a monogenic condition, and not yet had a whole exome or genome test
AND
☐ Dysmorphic facial appearance and one or more major structural congenital anomalies
OR
☐ Intellectual disability or global developmental delay of at least moderate severity, as determined by a specialist paediatrician
AND
☐ Microarray reported as non-informative
AND
☐ Clinical Geneticist Referral
OR
☐ Paediatrician referral in consulation with a clinical geneticist
☐ For data re-analysis previously tested patient (15 years or younger) with a suspected monogenic condidtion.
☐ For trio genomic tests Singleton testing inappropriate, both biological parents available.

Family History Summary (please provide pedigree)
If patient not index case indicate relationship within family tree
☐ = Male ○ = Female ■ Affected Male ◉ = Carrier Female
◇ = Gender unspecified

Both parents available for testing ☐ Yes ☐ No
Consanguinity ☐ Yes ☐ No
Ancestry Maternal Paternal

Copy of reports to Name
Consulting geneticist
Address
Phone Email

MEDICARE NO ☐☐☐☐☐☐☐☐☐☐/☐ EXP

At time of collection the patient
- Is a private patient in a private hospital or approved day hospital facility ☐ Yes ☐ No
- a private patient in a recognised hospital ☐ Yes ☐ No
- a public patient in a recognised hospital ☐ Yes ☐ No
- an outpatient of a recognised hospital ☐ Yes ☐ No

☐ Do NOT send my pathology report to My Health Record

Collector ward/site
Collection Date
Receipt Date

☐ DNA ☐ Blood (EDTA 2 x 2mls recommended) ☐ Buccal Swab (by prior arrangement with lab) ☐ Other

Your doctor recommended NSW Health Pathology but you can choose your own pathology provider. If your doctor has specified a particular pathologist on clinical grounds a Medicare rebate will only be payable if that pathologist performs the service. You should discuss this with your doctor. Accredited for compliance with NPAAC Standards and ISO 15189. Patients with a current public hospital medical record number may have their results displayed in the Local Health District electronic medical record for safe, appropriate clinical care.
PRIVACY NOTE: The information provided will be used to assess any Medicare benefit payable for the services rendered and to facilitate the proper administration of Government health programs, and may be used to update enrolment records. Its collection is authorised by provisions of the Health Insurance Act 1973. The information may be disclosed to the Department of Health and Ageing or to a person in the medical practice associated with this claim, or as authorised /required by law. In addition, the results of the tests requested may be disclosed to other health services, hospitals or medical specialists involved in your health care, or as authorised/required by law.

NSWHP3002 28/5/21

Result disclosure and the role of genetic services

Generic- and disease-specific resources are available at the Centre for Genetics Education (www.genetics.edu.au) to help clinicians inform families with new diagnoses as well as those who remain undiagnosed. Contact your local genetics service for assistance.

Links and resources

Website	Address
Medicare Benefits Scheme	http://mbsonline.gov.au/
Exome sequencing education for paediatricians / RACP module	https://www.genetics.edu.au/SitePages/Genomic-testing-Intellectual-disability-childhood-syndromes.aspx https://elearning.racp.edu.au/ (Search 'genomics') https://dontforgetthebubbles.com/?s=genomic+testing
Genomic testing consent resources for Medical Specialists	https://www.genetics.edu.au/SitePages/Genomic-Testing-Consent.aspx
NSW genomic consent	https://www.aci.health.nsw.gov.au/networks/clinical_genetics/genetic-and-genomic-testing-consent-forms
Consent video for patients	http://learn-genomics.org.au/animation-genomic-testing/
Insurance implications	https://www.genetics.edu.au/SitePages/Life-insurance-products-and-genetic-testing-in-Australia.aspx
NSW Health guidelines on the disclosure of genetic information to a patient's relatives	https://www.ipc.nsw.gov.au/sites/default/files/file_manager/NSWUse_and_Disclosure_of_Genetic_Information_Guidelines_October_2014_ACC.pdf
Australian Genomics patient education	https://www.genomicsinfo.org.au
Genomics fact sheet for patients	https://www.genomicsinfo.org.au/wp-content/uploads/2019/03/FACTSHEET-2-V1.pdf
RACP Webinar: How genomics is changing clinical practice	https://www.genetics.edu.au/SitePages/Webinar-genomics-clinical-practice.aspx

For more information about genetic conditions and Clinical Genetics services, visit the Centre for Genetics Education - www.genetics.edu.au

If your patient does not meet Medicare criteria, testing may still be appropriate. Please refer to your local genetics service

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This resource is available at:
https://www.genetics.edu.au/SitePages/Intellectual-disability-childhood-syndromes-WES-ordering-guide.aspx