



**CHEO Genetics Diagnostic Laboratory**  
 Room w3401  
 401 Smyth Road Ottawa, ON  
 Tel: (613) 738-3230  
 Fax: (613) 738-4814  
 gsontario.ca | gso@cheo.on.ca

Patient name: \_\_\_\_\_

Date of Birth (DD-MM-YYYY): \_\_\_\_\_

Gender:  Male  Female

MRN: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone #: \_\_\_\_\_

Ontario health card #: \_\_\_\_\_

Version: \_\_\_\_\_

## GENOME-WIDE SEQUENCING: PROBAND

### Ordering physician:

Name: \_\_\_\_\_

Institution: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Email address: \_\_\_\_\_

### Copy report to:

Name: \_\_\_\_\_

Institution: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

### Sample information:

Date obtained (DD-MM-YYYY): \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Your referring laboratory reference #: \_\_\_\_\_

- Blood in EDTA (purple top tube): min. 2 x 4 mL (0.5-3 mL for newborns)
- DNA: min.5 ug in low TE buffer (Source: \_\_\_\_\_)
- Tissue\* (Source: \_\_\_\_\_)
- \*Please contact the laboratory directly to discuss prior to sample submission

### Bone marrow transplant / Transfusion

Has the patient undergone bone marrow transplant?  Yes  No  
 Date of bone marrow transplant (DD-MM-YYYY): \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_  
*Testing for patients who have received an allogenic bone marrow transplant must be completed on a pre-transplant sample or a non-hematologic sample.*

Has the patient received a blood transfusion?  Yes  No  
 Date of last transfusion (DD-MM-YYYY): \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_  
*Blood obtained for genetic testing should ideally be collected at least 2-4 weeks after the date of the last transfusion*

### For laboratory use only:

Date (DD-MM-YYYY) | Time Received: \_\_\_\_\_ | \_\_\_\_\_ h

Order #: \_\_\_\_\_

Specimen type, amt & # of tubes: \_\_\_\_\_

Comments: \_\_\_\_\_

### Requested Genome-Wide Sequencing (GWS)

- Singleton
- Duo
- Trio
- Quad

### Biological parent/family member information

A separate family member requisition **must** be completed for each individual.

**Mother**  Not available

First name		Last name	
MRN	DOB (DD-MM-YYYY)	Ethnicity	Clinical status: <input type="checkbox"/> Asymptomatic <input type="checkbox"/> Symptomatic
Comments			

**Father**  Not available

First name		Last name	
MRN	DOB (DD-MM-YYYY)	Ethnicity	Clinical status: <input type="checkbox"/> Asymptomatic <input type="checkbox"/> Symptomatic
Comments			

**Other**

First name		Last name	
MRN	DOB (DD-MM-YYYY)	Ethnicity	Clinical status: <input type="checkbox"/> Asymptomatic <input type="checkbox"/> Symptomatic
Relationship to the proband			
Comments			

### GWS submission requirements:

- Consent:**  
 The test has been discussed with the patient, the consent form has been completed, and decisions have been documented on page 5.
- Clinical information:**  
 The following information has been provided for the proband and family:
- Previous testing history
  - Phenotypic information  
 Clinical data sheet or  PhenoTips if available
  - Family history (pedigree)
  - Relevant clinic note(s) and/or letter(s)
- Eligibility:**  
 The eligibility criteria for GWS have been met and have been documented on page 4

Proband name: \_\_\_\_\_ MRN: \_\_\_\_\_ DOB: \_\_\_\_\_

### CLINICAL DATA SHEET

#### Previous genetic testing:

Single gene/Gene panel (1): \_\_\_\_\_

Result: \_\_\_\_\_

Single gene/Gene panel (2): \_\_\_\_\_

Result: \_\_\_\_\_

Microarray: \_\_\_\_\_

Other: \_\_\_\_\_

Result: \_\_\_\_\_

#### Pre/Perinatal History

- Cystic hygroma
- Increased nuchal translucency
- Intrauterine growth retardation
- Nonimmune hydrops fetalis
- Oligohydramnios
- Polyhydramnios
- Prematurity GA: \_\_\_\_\_
- Other: \_\_\_\_\_

#### Growth:

- Growth delay
- Overgrowth
- Failure to thrive
- Hemihypertrophy
- Short stature
- Tall stature

#### Structural Brain Abnormalities

- Abnormal myelination
- Abnormality of basal ganglia
- Abnormality of brainstem
- Abnormality of periventricular white matter
- Abnormality of the corpus callosum
- Aplasia/hypoplasia of cerebellar vermis
- Aplasia/hypoplasia of cerebellum
- Cerebellar atrophy
- Chiari malformation
- Cortical dysplasia
- Encephalocele
- Heterotopia
- Hemimegalencephaly
- Holoprosencephaly
- Hydrocephalus
- Leukodystrophy
- Lissencephaly
- Pachygyria
- Polymicrogyria
- Ventriculomegaly
- Other: \_\_\_\_\_

#### Developmental/Behavioral

- Aggressive behavior
- ADHD
- Anxiety
- Autistic Behavior
- Autism spectrum disorder
- Cognitive impairment
- Delayed speech & language development
- Developmental regression
- Fine motor delay
- Gross motor delay
- Speech delay
- Gait disturbance
- Global developmental delay
- Hyperactivity
- Incoordination
- Intellectual disability
  - Mild
  - Moderate
  - Profound
  - Severe
- Learning disability
- Memory impairment
- Obsessive-compulsive disorder
- Sleep disturbance
- Stereotypy

#### Neurological

- Ataxia
- Chorea
- Cortical Visual Impairment
- Dementia
- Dysarthria
- Dyskinesia
- Dysphasia
- Dystonia
- Encephalopathy
- Headaches
- Hemiplegia
- Infantile Spasms
- Migraines
- Myoclonus
- Myopathic facies
- Myopathy
- Muscle weakness
- Muscle dystrophy
- Neuropathy
  - Motor
  - Sensory
  - Sensorimotor
- Parkinsonism
- Seizures
- Spasticity
- Tremors

#### Craniofacial dysmorphic features

- Craniosynostosis  
Specify: \_\_\_\_\_
- Macrocephaly
- Microcephaly
- Head shape Specify: \_\_\_\_\_
- Facies Specify: \_\_\_\_\_
- Forehead Specify: \_\_\_\_\_
- Ears Specify: \_\_\_\_\_
- Eyes Specify: \_\_\_\_\_
- Nose Specify: \_\_\_\_\_
- Cleft lip and/or palate
- Coarse facial features
- Short neck
- Synophrys
- Other: \_\_\_\_\_

#### Ophthalmological

- Anophthalmia
- Cataracts
- Coloboma
- Corneal opacity
- Ectopia lentis
- External ophthalmoplegia
- Microphthalmia
- Myopia
- Nystagmus
- Optic atrophy
- Ptosis
- Retinal detachment
- Retinitis pigmentosa
- Strabismus
- Other: \_\_\_\_\_

#### Hearing Impairment

- Abnormal Newborn Screen: \_\_\_\_\_
- Conductive hearing impairment
- Sensorineural hearing impairment

#### Haematological or Immunologic

- Anemia
- Coagulation disorder
- Immunodeficiency
- Neutropenia
- Pancytopenia
- Recurrent infections
- Thrombocytopenia
- Other: \_\_\_\_\_

#### Integumental

##### Skin

- Abnormal blistering of the skin
- Anhidrosis
- Café-Au-Lait macules
- Cutis laxa
- Hemangiomas
- Hyperpigmentation of the skin
- Hypopigmentation of the skin
- Ichthyosis
- Skin rash
- Telangiectasia
- Vascular skin abnormality
- Other: \_\_\_\_\_

##### Hair

- Abnormal texture, distribution, colour, whorls  
Specify: \_\_\_\_\_
- Alopecia
- Coarse hair
- Sparse hair
- Other: \_\_\_\_\_

##### Dental

- Specify: \_\_\_\_\_

##### Nails

- Specify: \_\_\_\_\_

Proband name: \_\_\_\_\_ MRN: \_\_\_\_\_ DOB: \_\_\_\_\_

### CLINICAL DATA SHEET

#### Cardiac

- Aortic root dilation
- Arrhythmia / Conduction defect
  - Bradycardia
  - Prolonged QTc interval
  - Ventricular tachycardia
- Cardiomyopathy
  - Dilated
  - Hypertrophic
  - Noncompaction
- Congenital heart defect
  - Atrial septal defect
  - Bicuspid aortic valve
  - Coarctation of aorta
  - Hypoplastic left heart
  - Patent ductus arteriosus
  - Patent foramen ovale
  - Tetralogy of Fallot
  - Ventricular septal defect
- Heterotaxy
- Mitral valve prolapse
- Sudden death
- Syncope
- Other: \_\_\_\_\_

#### Endocrine

- Early puberty
- Delayed puberty
- Diabetes Insipidus
- Diabetes mellitus
- Hyperparathyroidism
- Hypoparathyroidism
- Hyperthyroidism
- Hypothyroidism
- Hypogonadism
- Hypophosphatemia
- Rickets
- Other: \_\_\_\_\_

#### Gastrointestinal

- Chronic intestinal pseudo-obstruction
- Duodenal stenosis/atresia
- Diaphragmatic hernia
- Elevated transaminases
- Exocrine pancreatic insufficiency
- Feeding difficulties
- Gastroesophageal reflux
- Hepatomegaly
- Hepatic failure
- Hirschsprung disease
- Inflammatory bowel disease
- Intrahepatic biliary atresia
- Laryngomalacia
- Omphalocele
- Pyloric stenosis
- Splenomegaly
- Tracheoesophageal fistula
- Other: \_\_\_\_\_

#### Genitourinary

- Ambiguous genitalia
- Cryptorchidism (undescended testes)
- Cystic renal dysplasia
- Horseshoe kidney
- Hydronephrosis
- Hypospadias
- Inguinal hernia
- Infertility
- Micropenis
- Nephrolithiasis
- Polycystic kidney disease
- Renal agenesis or dysgenesis
- Renal tubulopathy
- Other: \_\_\_\_\_

#### Musculoskeletal

- Abnormal connective tissue
- Abnormal form of the vertebral bodies
- Abnormality of the digits
  - Arachnodactyly
  - Clinodactyly
  - Ectrodactyly
- Abnormality of the limb(s)  
Specify: \_\_\_\_\_
- Abnormality of the ribs
- Arthralgia
- Arthrogryposis
- Contractures
- Decreased muscle mass
- Exercise intolerance
- Hypertonia
- Hypotonia
- Joint hypermobility
- Myalgia
- Osteoarthritis
- Osteopenia
- Pectus carinatum
- Pectus excavatum
- Recurrent fractures
- Scoliosis
- Skeletal dysplasia
- Other: \_\_\_\_\_

#### Respiratory

- Bronchiectasis
- Pneumothorax
- Pulmonary fibrosis
- Respiratory insufficiency
- Other: \_\_\_\_\_

#### Tumour / Malignancy

Type: \_\_\_\_\_  
Location: \_\_\_\_\_  
Age of onset: \_\_\_\_\_

#### Vascular System

- Angioedema
- Aneurysm
- Arterial calcification
- Arterial dissection
- Arterial tortuosity
- Arteriovenous malformation
- Bruising susceptibility
- Epistaxis
- Lymphedema
- Pulmonary hypertension
- Stroke

#### Metabolic

- Abnormal activity of mitochondrial respiratory chain
- Abnormal Newborn Screen: \_\_\_\_\_
- Elevated CPK
- Elevated hepatic transaminase
- Hypoammonemia
- Hyperammonemia
- Hypoglycemia
- Hyperglycemia
- Increased serum pyruvate
- Ketosis
- Lactic acidosis
- Rhabdomyolysis
- Plasma AA: \_\_\_\_\_
- Urine OA: \_\_\_\_\_
- Other: \_\_\_\_\_

#### Other investigations

(Please provide copy or report if possible)

Echo: \_\_\_\_\_  
EEG: \_\_\_\_\_  
EMG: \_\_\_\_\_  
MRI: \_\_\_\_\_  
Muscle biopsy: \_\_\_\_\_  
Ultrasound: \_\_\_\_\_  
X-ray: \_\_\_\_\_

#### Additional clinical findings:

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### FAMILY HISTORY

Please draw or attach pedigree

- Consanguinity

Proband name: \_\_\_\_\_ MRN: \_\_\_\_\_ DOB: \_\_\_\_\_

**PATIENT SUMMARY** (all sections must be completed)

<u>Phenotypic category</u>	<u>Age of onset</u>	<u>Ethnicity (all applicable)</u>	<u>Previous test history (all applicable)</u>
<input type="checkbox"/> Syndromic developmental delay (DD) or intellectual disability (ID)	<input type="checkbox"/> Prenatal	<input type="checkbox"/> Black, African-American, African	<input type="checkbox"/> No previous genetic testing
<input type="checkbox"/> Moderate-severe isolated DD or ID	<input type="checkbox"/> At birth (<12mo)	<input type="checkbox"/> East Asian <input type="checkbox"/> South Asian	<input type="checkbox"/> Chromosome microarray
<input type="checkbox"/> Single system disorder without DD or ID	<input type="checkbox"/> Childhood (1-10yrs)	<input type="checkbox"/> White <input type="checkbox"/> Indigenous	<input type="checkbox"/> Single gene test
<input type="checkbox"/> Multisystem disorder without DD or ID	<input type="checkbox"/> Adolescence (11-17yrs)	<input type="checkbox"/> French-Canadian	<input type="checkbox"/> Gene panel (<100 genes)
<input type="checkbox"/> Multiple congenital anomalies without DD or ID	<input type="checkbox"/> Adulthood (>18)	<input type="checkbox"/> Middle Eastern, North African	<input type="checkbox"/> Gene panel (≥100 genes)
		<input type="checkbox"/> Latino, Hispanic, Spanish	<input type="checkbox"/> Targeted testing (e.g. Prader-Willi)
		<input type="checkbox"/> Unknown <input type="checkbox"/> Other: _____	<input type="checkbox"/> Unknown

**CLINICAL GWS TESTING CRITERIA** (as defined by the Ontario Ministry of Health)

**Clinical Presentation (must meet ≥ 2 items):**

YES NO

- Moderate to severe developmental or functional impairment
- Multisystem involvement
- Progressive clinical course
- Differential diagnosis includes ≥ 2 well defined conditions requiring evaluation by multiple targeted gene panels
- Suspected severe genetic syndrome NYD for which multiple family members are also affected, or where parents are consanguineous

**Management Impact (must meet ≥ 1 item):**

YES NO

- Will limit further invasive diagnostic investigations
- Results allow for specific and informed reproductive decision making (for patient or parents)
- Will enable identification of at-risk family members and facilitate early intervention

**Attestation (must meet all items):**

YES NO

- I **confirm** that all the following conditions have been met:
- Detailed phenotypic characterization (physical examination, investigations) has been documented
  - Pretest genetic counseling and consent has been completed
  - Chromosomal microarray has been completed and does NOT explain the patient's phenotype (applicable to patients with developmental delay, intellectual disability, multiple congenital anomalies, and dysmorphic features)
  - Other causative circumstances (e.g. environmental exposures, injury, and infection) do NOT explain the patient's clinical presentation, based on the most complete clinical history
  - Previous targeted testing was unrevealing where appropriate (e.g. specific monogenetic disorder suspected)
  - Previous comprehensive panel testing has NOT been completed in the last 3 years (the panel contained virtually all known genes for the clinical indication)
  - Previous whole exome sequencing has NOT been performed

YES NO

- I **confirm** that the patient does NOT have:
- Isolated mild intellectual disability or learning disabilities
  - Isolated non-syndromic autism
  - Isolated neurobehavioural disabilities (e.g. attention deficit disorder)
  - A phenotype highly specific to a known genetic condition for which an optimized genetic panel exists, or for which all known gene-disease associations could be assessed. If so, then the targeted gene panel should be given priority assuming it is more sensitive (e.g. Noonan spectrum disorders)

YES NO

- I **confirm** that I:
- Practice in the area of genetics (as a geneticist/genetics consultant or in a clinic where a genetic counsellor has been integral to the care of the patient)
  - Have expertise in performing a clinical genetics evaluation including family history, genetic-focused medical history and physical examination, and have a critical understanding of the prior genetic evaluations undertaken in the patient
  - Have expertise in determining whether clinical GWS is the test of choice for the specific clinical indication, prioritizing other available tests as appropriate
  - Have expertise in providing adequate pre-test counseling, including informed consent for primary and incidental findings
  - Have the ability to interpret the results of the clinical GWS and provide adequate post-test counseling

**GENOME-WIDE SEQUENCING OUTCOMES STUDY**

YES NO

- I confirm that I have offered enrollment to the Care4Rare-SOLVE Phase 1 study.

**PATIENT CONSENT CHOICES** (must check 1 item in each row)

YES NO

- The patient has consented to participate in the Care4Rare-SOLVE Phase 1 study.

**PROVIDER ATTESTATION**

By signing here I attest that the above the information is an accurate and comprehensive summary of this patient's clinical history.

Ordering physician signature: \_\_\_\_\_ Date: \_\_\_\_\_

# Genome-wide Sequencing Ontario: Acknowledgement and Consent Form

## ACKNOWLEDGEMENT

- I understand that I will be undergoing genome-wide sequencing to possibly identify the cause(s) and genetic variant(s) responsible for myself/my family member's condition. I am aware of the benefits, limitations, and risks of genome-wide sequencing (GWS).
- I understand how my de-identified genomic and health data will be managed and shared now and in the future as outlined on the GSO Information Sheet.

## CONSENT FOR CLINICAL DATA SHARING

- It is critically important that laboratories share data to improve test performance and ensure that we are providing the best possible test for your family and for other patients. With your consent, we will share your/your child's GWS coded (information that can identify you will be replaced by a code) data and clinical features (details available on GSO Information Sheet) as a part of Ontario's Clinical Genomic Knowledge Base, and similar institutionally-approved Knowledge Bases in Canada, as described on the GSO Information Sheet. You will be asked to indicate your choice below.

## CONSENT TO CONTACT FOR RESEARCH

- GSO can also support direct contact with you regarding approved research studies to better understand rare diseases and test new treatments. If there are opportunities to participate in research or share your data, do you wish to be contacted?

I **consent** to be contacted by the CHEO Department of Genetics for future research opportunities

E-mail address: \_\_\_\_\_ Phone number: \_\_\_\_\_

How often may we contact you about research opportunities (check one):  Once per year  Up to twice per year  No preference

I do **not consent** to be contacted by the CHEO Department of Genetics for future research opportunities

## DECISIONS AND SIGNATURES

Proband	Family Member 1
<p>By signing below I consent to undergo GWS and I have indicated my decisions as follows:</p> <p><input type="checkbox"/> I <b>consent</b> to share my coded data in Clinical Genomics Knowledge Network(s) approved by CHEO</p> <p><input type="checkbox"/> I <b>do not consent</b> to share my coded data in Clinical Genomics Knowledge Network(s) approved by CHEO</p> <p>I have reviewed the information on secondary findings on the GWS information sheet and have outlined my choices below:</p> <p><input type="checkbox"/> Patients under 18: I <b>decline</b> the reporting of <u>adult-onset medically actionable</u> secondary findings</p> <p><input type="checkbox"/> Patients 18 and over: I <b>decline</b> the reporting of <u>all medically actionable</u> secondary findings</p> <p>Signature: _____</p> <p>Name: _____</p> <p>Relationship of signee: _____</p> <p>Date (DD-MM-YYYY): _____</p>	<p>By signing below I consent to undergo GWS and I have indicated my decisions as follows:</p> <p><input type="checkbox"/> I <b>consent</b> to share my coded data in Clinical Genomics Knowledge Network(s) approved by CHEO</p> <p><input type="checkbox"/> I <b>do not consent</b> to share my coded data in Clinical Genomics Knowledge Network(s) approved by CHEO</p> <p>I have reviewed the information on secondary findings on the GWS information sheet and have outlined my choices below:</p> <p><input type="checkbox"/> I <b>decline</b> having the inheritance of shared secondary findings reported by the laboratory</p> <p><input type="checkbox"/> <b>Not applicable</b> as proband has not chosen secondary findings reporting</p> <p>Name: _____</p> <p>Relationship to proband: _____</p> <p>Signature of individual/guardian: _____</p> <p>Date (DD-MM-YYYY): _____</p>
Family Member 2	Family Member 3
<p>By signing below I consent to undergo GWS and I have indicated my decisions as follows:</p> <p><input type="checkbox"/> I <b>consent</b> to share my coded data in Clinical Genomics Knowledge Network(s) approved by CHEO</p> <p><input type="checkbox"/> I <b>do not consent</b> to share my coded data in Clinical Genomics Knowledge Network(s) approved by CHEO</p> <p>I have reviewed the information on secondary findings on the GWS information sheet and have outlined my choices below:</p> <p><input type="checkbox"/> I <b>decline</b> having the inheritance of shared secondary findings reported by the laboratory</p> <p><input type="checkbox"/> <b>Not applicable</b> as proband has not chosen secondary findings reporting</p> <p>Name: _____</p> <p>Relationship to proband: _____</p> <p>Signature of individual/guardian: _____</p> <p>Date (DD-MM-YYYY): _____</p>	<p>By signing below I consent to undergo GWS and I have indicated my decisions as follows:</p> <p><input type="checkbox"/> I <b>consent</b> to share my coded data in Clinical Genomics Knowledge Network(s) approved by CHEO</p> <p><input type="checkbox"/> I <b>do not consent</b> to share my coded data in Clinical Genomics Knowledge Network(s) approved by CHEO</p> <p>I have reviewed the information on secondary findings on the GWS information sheet and have outlined my choices below:</p> <p><input type="checkbox"/> I <b>decline</b> having the inheritance of shared secondary findings reported by the laboratory</p> <p><input type="checkbox"/> <b>Not applicable</b> as proband has not chosen secondary findings reporting</p> <p>Name: _____</p> <p>Relationship to proband: _____</p> <p>Signature of individual/guardian: _____</p> <p>Date (DD-MM-YYYY): _____</p>

# GENOME-WIDE SEQUENCING ONTARIO: INFORMATION SHEET

Your physician has offered you/your child a diagnostic test, known as genome-wide sequencing (GWS), to try to identify the cause(s) and genetic variant(s) responsible for your/your child's condition. This test is performed by the CHEO Genetics Diagnostic Lab and SickKids Genome Diagnostics Lab as a part of an Ontario-wide clinical collaboration, also known as "Genome-Wide Sequencing Ontario: An implementation Pilot for Rare Disease Diagnostics" (GSO). The purpose of this information sheet is to supplement the pre-test counselling discussion. This test is voluntary; it is your choice to have this test or not. Please discuss any questions about this test and options for alternative testing with your doctor or genetic counsellor. You/your child will be referred to as "the patient" in each section below.

## PURPOSE OF GENOME-WIDE SEQUENCING (GWS)

- This genetic test allows us to look broadly at the patient's DNA, to identify potential genetic cause(s) of their medical condition.

## HOW GWS IS PERFORMED

- GWS is performed on DNA that, typically, has been extracted from blood. The sequence of DNA between people is very similar (>99%), but there are still millions of differences in a person's DNA that can be detected with GWS. Some of these differences, also known as genetic variants, can cause medical conditions.
- In order to guide the analysis of these differences, it is beneficial to compare the patient's genetic variants to variants identified in family members who are either healthy or who have the same or similar medical condition.
- The laboratory will use the patient's clinical information, family information and the current medical knowledge to evaluate which of the identified genetic variants might be responsible for their medical condition.
- The laboratory will report the genetic variants likely to be associated with the patient's medical condition to the doctor who ordered this test. The patient will be informed of all test results, and these results will be put in the patient's medical record.

## WHAT IS REPORTED

- Genetic variants which are identified in the individuals submitted for testing and are related to the patient's symptoms will be included in the report. Family members who do not have the medical condition will not receive a separate written report related to the primary findings in the patient.
- **Primary findings:** The laboratory will report variants in genes that may explain the patient's medical condition.
  - Different categories of changes in these genes will be reported: variants that are known to cause the medical condition (pathogenic), variants that are highly likely to cause the medical condition (*likely pathogenic*), and variants for which the impact cannot be determined at this time (called *variants of uncertain significance*).
  - It is possible that the classification of a genetic variant or gene will change over time, as we learn more about the causes of different medical conditions. The interpretation of the patient's GWS results may also change over time due to new scientific knowledge.
  - Please keep in touch with your doctor to learn of any changes in the classification or interpretation of your results.
- Variants associated with unrelated adult-onset conditions for which there is no prevention, early detection, or treatment, as well as carrier status for recessive genetic disorders unrelated to the disorder for which testing has been offered, will not be reported.
- **Secondary Findings:** As GWS can look at all of a person's genes; this test can identify disease-causing variants in genes that are not related to the primary medical conditions for which the test has been offered, but which may cause other medical conditions during childhood and/or later in life. These variants are known as *medically actionable secondary findings* because there are clear medical recommendations that can be made to reduce the risk that they will impact a person's health in the future. The laboratory will search for variants in specific disease genes, as defined by the American College of Medical Genetics and Genomics (ACMG) guidelines (detailed list available at [gsontario.ca](http://gsontario.ca)).
  - In children, secondary findings that reveal a risk for a condition that is *medically actionable during childhood* will be reported to the parents/caregivers. Parents/caregivers can choose to receive, or not, the analysis of variants in genes that are associated with adult-onset medically actionable conditions for their children. Mature minors, may choose for themselves to receive, or not, the analysis of variants in genes that are associated with adult-onset medically actionable conditions.
  - In incompetent adults, secondary findings will be reported to the legal representative, unless the patient expressed wishes to the contrary while still competent.
  - **In competent adults**, reporting of secondary findings is optional.
  - The patient's choice regarding secondary findings will not impact the results of their test.
  - Family members participating in GWS may choose whether they wish to have the inheritance of secondary findings identified in the patient reported for themselves.

# GENOME-WIDE SEQUENCING ONTARIO: INFORMATION SHEET

## POTENTIAL RISKS OF GWS

- Because GWS is performed as a family analysis, the same genetic variants that are identified in the patient may also be found in the other family members that have given a sample for testing.
- GWS results may reveal that biological relationships in a family are not as they were reported to the healthcare provider. This includes non-paternity and non-maternity (the stated father/mother of an individual is not the biological parent) and consanguinity (the parents of an individual are related by blood). As incorrect information about biological relationships and health status may prevent the accurate interpretation of GWS results, it may be necessary to report these findings to the health care provider who ordered your test.

## LIMITATIONS OF GWS TECHNOLOGY

- GWS does not always lead to a definitive explanation for a person's medical condition. This is due to current limitations in medical knowledge and/or testing technologies.
- GWS does not detect all types of genetic variants. When GWS does not identify a causative variant, it does not rule out the possibility that a genetic variant may be causing your medical condition.
- As with all laboratory tests, there is a small possibility of error or sample failure.

## CONFIDENTIALITY

- Results of GWS will only be reported to the health care provider(s) who ordered the test. The laboratory will not give test results to other individuals without the patient's written permission, or unless required by law. The written report will become part of the patient's **permanent** medical record.
- Analysis of the patient's GWS data will be completed using a secure external IT platform. The external IT platform provider will have access to a limited set of anonymized data for the purpose of quality assurance and improvement of the platform as a whole. The external IT platform has been reviewed and approved for use by CHEO and SickKids Legal and Privacy.
- To help healthcare providers and laboratories deliver better care to patients, laboratories share their interpretation of genetic results. De-identified (i.e., information that can identify the patient has been permanently removed) genetic results and diagnoses may be shared with healthcare providers, genetic testing laboratories, and/or submitted to public databases, including those outside of Canada, for these purposes.
- With consent, coded (i.e., information that can identify the patient will be replaced by a code) GWS data and clinical features will be shared through Ontario's Clinical Knowledge Base to ensure that GSO is providing the best possible test for all patients. This data may also be shared with institutionally approved Clinical Knowledge Bases within Canada. Coded data shared in Clinical Knowledge Base(s) can include: demographic information (sex, age, and ethnicity), details of the patient's clinical presentation, diagnoses, and genetic variants. This data will only be accessible to professionals working in diagnostic laboratories in Canada.
- Only the laboratory where the patient's test is performed will have access to an individual patient's full dataset.
- The patient's coded or anonymous results and data may also be used for education, publication and metric reporting with appropriate approval.
- Please speak with your genetic counsellor, clinician, or reach out [gso@cheo.on.ca](mailto:gso@cheo.on.ca) if you have questions about how your genomic data will be shared.

## SAMPLE STORAGE/FUTURE USES

- After GWS has been completed, the sample(s) from the GWS analysis will be stored at the CHEO and/or SickKids laboratories for a limited time (2 years, unless an ethics committee determines otherwise).
- The remaining sample may be used for additional clinical genetic testing that the patient consents to, as offered by your healthcare provider(s). It may also be used for test development/validation and quality assurance procedures in the laboratory, after it has been de-identified.
- The patient may request that their complete GWS data be shared with their health care provider or a research program with Research Ethics Board approval.

## CONSENT FOR CONTACT FOR RESEARCH

- GWS is a test that was developed to try to diagnose patients with very rare genetic conditions. Enabling research helps improve our understanding and treatment of such rare conditions.
- GSO can support direct contact with you regarding approved research studies to better understand rare diseases and test new treatments. Examples of such research include sharing of GWS data with researchers to identify the cause of a rare disease, understanding current management of a rare disease, gaining insight into the natural history of a rare disease, and participating in clinical trials.
- You will be given the option to provide your contact information on the requisition if you are interested in being contacted by the Department of Genetics at CHEO to hear about future research opportunities.

## GENETIC COUNSELLING

All patients and family members should receive genetic counselling before proceeding with testing, and once final results are available.