GPSA
GENERAL PRACTICE SUPERVISION AUSTRALIA

FAQ

FREQUENTLY ASKED QUESTIONS

PODCAST WEBINAR

What To Teach Your Registrar About Prenatal Screening

Prenatal screening is now regarded as best practice with wider applications of genetic testing constantly being explored.

This is an emerging field of medicine and one with which supervisors can expect their registrars to have some familiarity and high levels of interest. This opens up opportunities to turn the student into the teacher and the teacher into a study partner as supervisor and registrar investigate the implications of genomic advances to general practice together. A list of helpful resources is provided below.

Definitions

Genetics is the study of heredity (or the study of genes and their role in inheritance).

Genomics usually relates to large scale studies. A genomic study may be undertaken in order to find a single variant (or two in the case autosomal recessive conditions).

Genetic Screening in General Practice - targets

- Preconception / reproductive carrier screening (RCS)
- Testing during pregnancy – Down syndrome, T13, T18 / NIPS / CFTS/ RCS
- Neonates (newborn screening)
- During childhood
- Adult-onset familial diseases (eg cancer, cardiac and neurodegenerative diseases).
- Red book sections on Cystic Fibrosis, Down Syndrome, Fragile X, Thalassaemia / Haemoglobinopathy, Breast and Ovarian Cancer, Colon Cancer, Familial Hypercholesterolaemia, Hereditary Haemochromatosis.

Reproductive Carrier Screening

Reproductive Carrier Screening (RCS) is a key area of genomics on which the supervisor should direct their registrar's focus. While individually rare, collectively genetic conditions occur with relative frequency: ~1-2 % of couples have increased chance of producing a child with a serious genetic condition. Research shows there is interest in and support for carrier screening, provided it is optional.

- RCS does not replace other pregnancy genetic screening such as NIPT

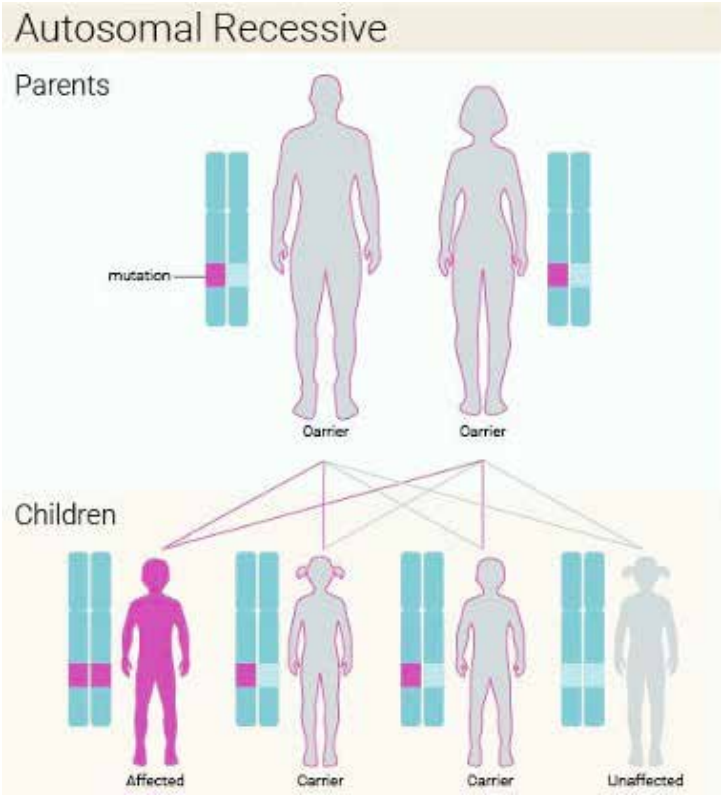


Image courtesy of U.S. National Library of Medicine

GPSA
GENERAL PRACTICE SUPERVISION AUSTRALIA

FAQ

FREQUENTLY ASKED QUESTIONS

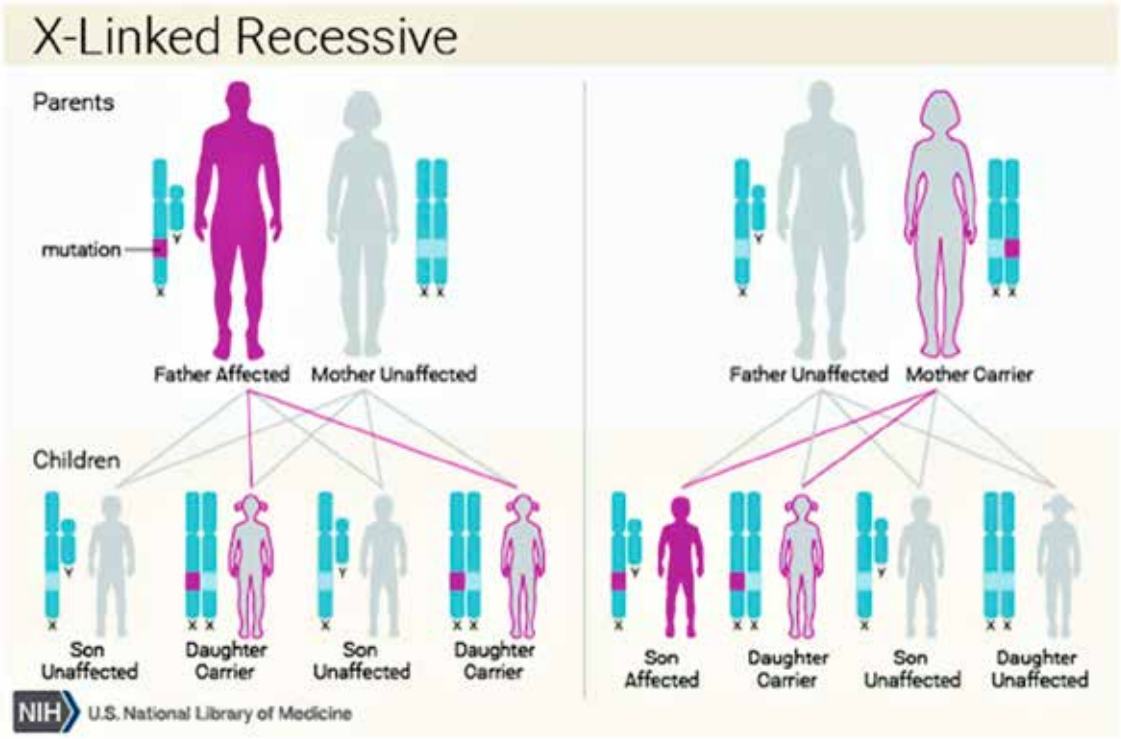


Image courtesy of U.S. National Library of Medicine

- RCS tests for severe childhood onset conditions (Autosomal Recessive and X-linked conditions)
- RCS is ideally done BEFORE a pregnancy, but can be carried out during a pregnancy (the earlier the better so that couples have options)
- RCS provides prospective parents with information about their chance of having a child with an inherited genetic condition
- RCS is a screening test therefore there are limitations, and it cannot provide a guarantee that a child will be born without a genetic condition

RCS is relevant to all prospective parents regardless of family history. Awareness of this, coupled with the fact RCS is best carried out pre-pregnancy unlike screening tests undertaken during the pregnancy (such as those assessing the likelihood of Downs syndrome or other chromosomal conditions), make it necessary to present options regarding RCS without the patient's prompting

Teaching prompt

Do you know your patient well enough to recommend RCS?

- Have you asked if he / she is planning to have a child in the near future?
- Does the patient record include enough information to assess whether they are at risk of a genetic condition?
- Do your patient records provide a comprehensive family history including:
  - first-degree and second-degree relatives on both sides of the family;
  - their ethnic backgrounds;
  - age of onset of disease; and
  - age at death?

GPSA
GENERAL PRACTICE SUPERVISION AUSTRALIA

FAQ

FREQUENTLY ASKED QUESTIONS

Ethical Considerations

Genetics has long been a controversial topic, and RCS poses its own ethical dilemma for many members of our community. It is important to remind your registrar that a recommendation of RCS is just that, facilitating the patient's reproductive autonomy through autonomous choice to undertake (or not) the screening:

- fully informed;
- free of coercion; and
- reflective of their own personal values.

Patients at Risk of a Genetic Condition

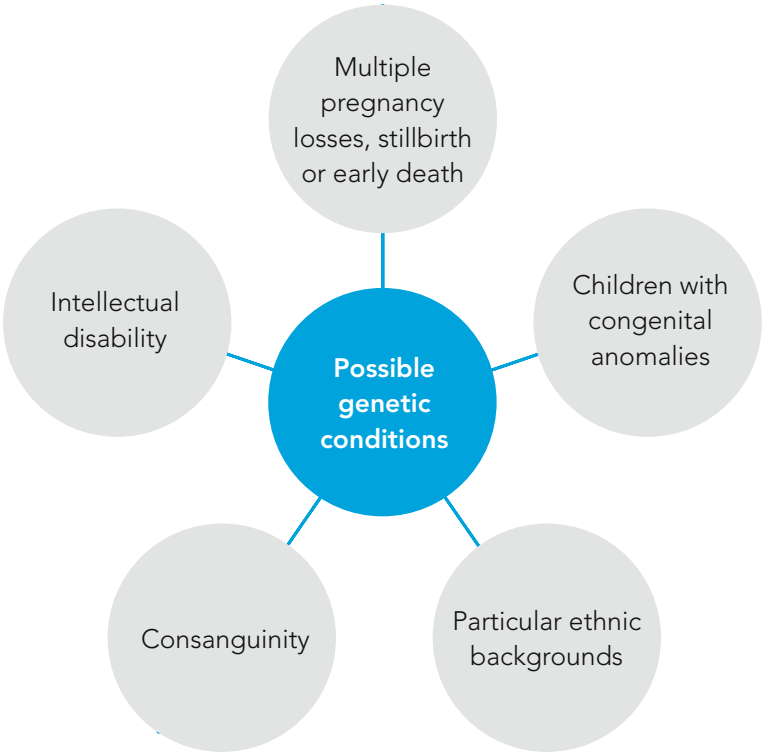
A genetic diagnosis may be suspected based on:

- signs or symptoms that suggest a genetic condition;
- interpretation of family history[1];
- results of screening programmes or investigations.

Teaching prompt

What are the limitations of a family history in assessing potential genetic conditions?

- Most children born with a genetic condition have no family history;
- Carriers are typically healthy;
- Family history approach relies on birth & diagnosis of the affected child;
- Society is increasingly multicultural; and
- Few patients would know if there was – or the extent of – consanguinity "…Is there any chance that a relative of yours might be related to someone in your partner's family?"



The RACGP Red Book (9th edition) states that GPs must "provide opportunity for carrier screening for genetic conditions (e.g. cystic fibrosis, haemoglobinopathies) and referral for genetic counselling based upon risk factors" such as those outlined above. It is, however, crucial to remind your registrar that **ANY** couple is at risk of having a child with a genetic condition irrespective of their family history or (lack of) visible symptoms.

1 The RACGP recommends that the collection of comprehensive family histories should be updated every 3 years, referring to the questionnaire provided in the Red Book 9th edition.

GPSA
GENERAL PRACTICE SUPERVISION AUSTRALIA

FREQUENTLY ASKED QUESTIONS

What is Genetic Counselling?

Genetics counselling is a communication process which aims to help individuals, couples and families understand and adapt to the medical, psychological, familial and reproductive implications of the genetic contribution to specific health conditions. This has clear overlaps with general practice.

Reproductive options that would most likely be discussed in this process include:

- IVF + Pre implantation genetic testing (PGT)
- Conceive naturally - Prenatal diagnosis via CVS or amniocentesis;
- If positive couple may consider TOP, or may continue the pregnancy – support either way;
- Conceive naturally - choose not to test, may choose to test baby at birth;
- Donor egg, sperm, embryo;
- Adoption;
- May choose not to have children.

Commercial RCS Providers

A number of commercial providers carry out Reproductive Carrier Screening, with each covering a different range of conditions at differing price-points. Typically, the higher number of conditions screened for, the higher the cost to the patient.

The additional cost of the wider screening is the inevitable anxiety that comes with the results. Essentially, the more things the patient is tested for, the more likely they will learn they are a carrier of one or more serious genetic conditions. This is an unnecessary burden of knowledge for the patient, however, as the most common form of commercial screening looks only at individuals rather than collectively at both partners (which is the information needed to ascertain risk of producing a child with a genetic condition).

Bear in mind also that, for some patients, the cost of this testing – anywhere from $385 to >$1000 – will prohibit their access to RCS in its current form.

This is a non-exhaustive list of commercial RCS providers:

- Australian Clinical Labs
  - Gene access carrier screen
  - Comprehensive carrier screeingin
- Eugene
  - Expanded carrier screening
- Genomic Diagnostics

Basic carrier screening

  - Myriad (Counsyl) foresight carrier screen
- Sonic Genetics
  - 3-Gene carrier scren

Beacon explaned carrier screen

- Victorian Clinical Genetics Services
  - Prepair genetic carrier screening
  - Expanded arrier screening
- Virtus Diagnostics
  - Genetic Carrier scren
  - Extended genetic carrier screen

This information is a guide only, and does not endores any particular company.

GPSA
GENERAL PRACTICE SUPERVISION AUSTRALIA

FREQUENTLY ASKED QUESTIONS

Mackenzie's Mission

In 2017, despite the fact they had done what they thought was all the testing possible prior to and during their pregnancy, Rachael and Johnny Casella's beautiful 10 week-old girl was diagnosed with Spinal Muscular Atrophy (SMA). Sadly, Mackenzie Casella died from this condition at just 7 months of age, leaving her parents asking why they hadn't known they were at increased chance of having a child with a genetic condition.

The current challenges	Mackensie's Mission
ACCESS INEQUITY • Commercial providers • Awareness (public and professional) • Geographic location	**ADDRESSING ACCESS INEQUITY** • Free testing throughstudy • Education and engagement • Targeted recruitment across Australia
RESOURCE BURDEN • Everyone is a carrier for something	**ADDRESSING RESOURCE BURDEN** • Couple-based results • Evaluation of processes
CLINICAL UTILITY • Varied number of genetic conditions • Testing for condtions that are mild, variable, adult onset, etc. • Complicated decision making/unnecessary anxiety	**ADDRESSING CLINICAL UTILITY** • Gene selection committee • Ongoing review of genes included

Through their persistent lobbying of government, on 1st March 2018 the Australian Minister of Health, the Hon Greg Hunt MP, announced that millions of taxpayer dollars was to be committed to increasing access to genetic testing, stating that he "would like to see pre-conception testing become routine (and free) for everyone thinking about starting a family". And so Mackenzie's Mission was launched.

Initially a program of the Australian Genomics Health Alliance, Mackenzie's Mission is now embedded in the Australian Genomics Health Futures Mission (GHFM) which has access to $500m over 10 years. Mackenzie's Mission is the first project of the GHFM, funded as health services research from the Medical Research Future Fund.

The project is screening for approximately 1300 genes associated with about 750 conditions using a couple screening approach that provides information about the couple's chance of having a child with a serious childhood genetic condition:

- onset in childhood;
- significant impact on lifespan and/or quality of life;
- frequent and/or burdensome medical treatment;
- may be completely treatable after birth (not on newborn screening);
- Includes the most common conditions currently screened - cystic fibrosis (CF), Spinal Muscular Atrophy (SMA) and Fragile X syndrome (FXS);
- Autosomal recessive and X-linked conditions.

GPSA
GENERAL PRACTICE SUPERVISION AUSTRALIA

FREQUENTLY ASKED QUESTIONS

It is worth noting that Mackenzie's Mission does not screen for non-syndromic hearing loss and that there are distinct testing limitations, namely:

This test does **NOT** report:

- Individual carrier status (relevant only for couple being tested);
- Mild or adult onset conditions;
- All variants associated with a genetic condition;
- Chromosomal conditions;
- Patients should still be offered NIPT/combined first trimester screening and thalassaemia screening;
- Cannot test for all genetic conditions (dominant, de novo conditions);
- In rare situations people may find out information about their own health.

10,000 couples representing a broad range of geographic regions and demographics are being recruited for Mackenzie's Mission from across Australia, using selected healthcare providers. GPs who would like to be involved in the study should start by emailing the Mackenzie's Mission Team at studyteam@mackenziesmission.org.au

MCKENZIE'S MISSION SURVEY

Access survey via link: https://redcap.mcri.edu.au/surveys/?s=C79D8XR7YM

or scan QR Code:

Access Code: NSW092020

Resources

- RACGP Red Book
- RACGP: Beware the Rare
- RACGP: Genomics in General Practice
- NSW Health: Centre for Genetics Education (Education available for GPs)
  - https://www.genetics.edu.au/SitePages/Online-learning.aspx
  - https://www.genetics.edu.au/publications-and-resources/facts-sheets/FS65REPRODUCTIVECARRIERSCREENING.pdf/view?searchterm=reproductive
- Australian Genomics Health Alliance
  - https://www.australiangenomics.org.au/tools-and-resources/
  - https://www.australiangenomics.org.au/research/mackenzies-mission/
- MedLine Plus
- Mackenzie's Mission video presentation

Does this resource need to be updated? Contact GPSA: P: 03 9607 8590, E: admin@gpsa.org.au, W: gpsa.org.au
GPSA is supported by funding from the Australian Government under the Australian General Practice Training Program 22/01/23