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Antenatal screening

The first and second trimester

This article forms part of our 'Tests and results' series for 2011 which aims to provide information about common tests that general practitioners order regularly. It considers areas such as indications, what to tell the patient, what the test can and cannot tell you, and interpretation of results.

Antenatal screening is performed in the first or second trimester to determine whether a pregnant woman's baby has an increased risk of having Down syndrome (a chromosomal abnormality affecting one in 500 pregnancies), Edward syndrome (one in 3000) or open neural tube defects (one in 750). First trimester screening combines results from a blood test with a nuchal translucency and nasal bone obstetric scan during the first trimester of pregnancy. Second trimester screening requires only a blood test. The screening approach varies across Australia; this article primarily describes the Victorian protocol.

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Who should have antenatal screening?

Antenatal screening should be discussed with all pregnant women so that they can make an informed decision whether to proceed with testing. In Victoria, 80% of pregnant women have an antenatal screening test. There are no specific contraindications or precautions.

Women must understand that the test is a risk assessment and places their pregnancy in an increased or decreased risk category. Women must also understand that if the test suggests a high risk they will be offered a diagnostic test that carries a small risk of miscarriage. Some women (eg. those who have had a previous pregnancy with Down syndrome, women with a family history of neural tube defects and women over 35 years of age) may choose to proceed directly to a definitive diagnostic test. Women carrying twins can still have screening, but women carrying higher order multiples cannot be offered antenatal screening.

What does screening involve?

First trimester screening

This involves a nonfasting blood test at the woman's tenth week of pregnancy (range 9 weeks to 13 weeks and 6 days) and an obstetric ultrasound at the woman's twelfth week (range 11 weeks and 1 day to 13 weeks and 6 days). The ultrasound should be completed at an accredited centre by a clinician with specific training.

Second trimester screening

This involves a blood test between 14 weeks and 20 weeks and 6 days. For either blood test, a 7 mL of blood is required in a plain vial with no anticoagulant. The blood can be drawn at any major pathology blood collection centre and is then delivered to the appropriate laboratory with an accompanying specific request form.

How do I arrange antenatal screening?

For first trimester screening, women require two separate forms – one for the ultrasound and one for the blood test. For second trimester screening they only require a blood test form. Although the blood sample can be taken at the same time, the blood tests should not be ordered on the standard blood test pathology slip as very specific information is required. Check with your local providers and ensure you have the correct forms. Ensure you complete all the information as many of these variables are used to calculate the pregnancy specific risk. Key information for the 10 week blood specimen includes: the patient's date of birth, her weight, her ethnicity, if she has diabetes, the date of her last normal menstrual period, her estimated date of delivery, and if any previous pregnancies have been affected by Down syndrome. Also indicate if this is a twin pregnancy, if the pregnancy was achieved via IVF and, if an egg donor was used,

the age of the donor (if known.) The patient then needs to attend for the blood test within the 10 week 'window' and book for the obstetric ultrasound within the 12 week 'window'. If there is uncertainty about the last normal period, a dating ultrasound scan is required to allow accurate planning.

What do I tell the patient?

Detailed explanation of antenatal screening is required so that women understand that screening only tests for certain chromosomal abnormalities and does not guarantee them a 'normal' child. They must also understand that screening will provide them with an estimated risk that this pregnancy is affected by these abnormalities; it will not tell her that her pregnancy is or is not affected by Down syndrome. It may be useful to discuss with women what they would do in different scenarios and for them to consider if or when they would proceed to diagnostic testing.

Antenatal screening tests are considered a private opt-in test and therefore out-of-pocket costs will be incurred. Check with your local laboratory and ultrasound provider. If the woman chooses to go ahead, timing is critical, hence the need to book an ultrasound and attend for blood tests at the correct times. The majority of ultrasounds can be performed transabdominally but occasionally a transvaginal scan will be recommended and women should be forewarned about this.

How are the risks calculated?

For first trimester screening, the blood is analysed for two biochemical markers (fbhCG and PAPP-A) for Down syndrome. The 12 week ultrasound allows measurement of the nuchal translucency – the thickness of the fluid-filled region at the fetus' neck. Increased thickness (more than 2.5 mm) may be suggestive of chromosomal abnormalities. The presence of an ossified nasal bone conveys lower risk for Down syndrome. The Victorian Maternal Serum Screening laboratory has incorporated the identification of a fetal nasal bone into the Down syndrome risk assessment protocol from mid 2011 where the pregnancy risk falls between one in 150 and one in 1000.

Information from the ultrasound scan is reported to the pathology laboratory to allow the

calculation of the pregnancy specific risk factor. This risk factor takes into account the woman's age, weight, pregnancy gestation, serum markers and the ultrasound scan markers. Reports generally include the women's age related risk

(the pre-test probability) and the calculated pregnancy specific risk factor. Many laboratories will graph this information to facilitate a visual explanation. Reports often classify the risk as 'increased' or 'decreased' using a cut-off value

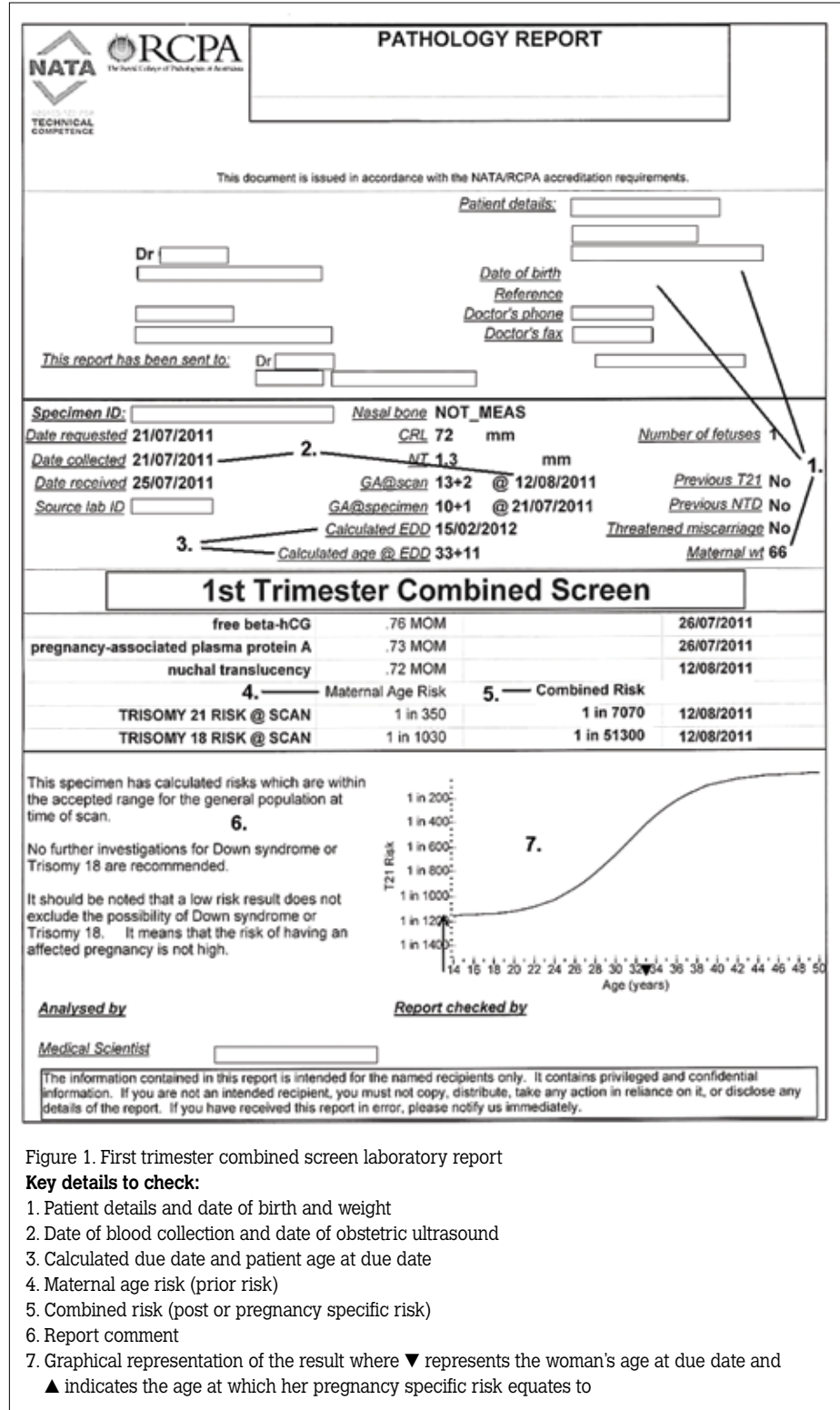


Figure 1. First trimester combined screen laboratory report

Key details to check:

1. Patient details and date of birth and weight
2. Date of blood collection and date of obstetric ultrasound
3. Calculated due date and patient age at due date
4. Maternal age risk (prior risk)
5. Combined risk (post or pregnancy specific risk)
6. Report comment
7. Graphical representation of the result where ▼ represents the woman's age at due date and ▲ indicates the age at which her pregnancy specific risk equates to

for Down syndrome of one in 300. Risk values equal to or greater than this are classified as increased risk and further diagnostic testing is recommended. Risk values less than 1 in 300 are considered decreased risk and no further testing is required. A first trimester combined screening laboratory report is illustrated in *Figure 1*.

However, women have different risk thresholds and may choose to act on this information differently. For example, a woman 20 years of age with a pregnancy-specific risk factor of one in 400 may opt for diagnostic testing. A woman 40 years of age with an IVF pregnancy may choose not to have diagnostic testing with a pregnancy specific risk factor of one in 200. A woman who is strongly opposed to termination of pregnancy may choose to have screening but may elect not to have diagnostic testing despite a pregnancy specific risk factor of one in 3. General practitioners are well placed to explain the screening results and support women and their partners in their decision making.

The second trimester 'quadruple test' involves a different formula based on demographic information and the maternal serum levels of four markers; alpha-feto protein, human chorionic gonadotrophin, unconjugated estriol and inhibin A. The information is reported in a similar way to first trimester screening, providing a pregnancy specific risk for Down syndrome, Edward syndrome and open neural tube defects.

When are the results available?

When ordering screening it is important to make a follow up plan to ensure the woman has the opportunity to discuss the results. The formal report will often be faxed to the general practitioner within 1–2 days after both tests are complete and the risk calculated. However, some ultrasound providers liaise with the serum laboratory and inform women directly of their pregnancy-specific risk immediately after their scan. In addition, some ultrasound providers provide an ultrasound-only based risk assessment, which may cause confusion.

How accurate is screening?

The detection rate and screen positive rate are commonly used to assess the accuracy of

screening tests. Using the protocol described here, first trimester screening has a detection rate of 95% and a screen positive rate of 2.5%. This means that of 10 000 women tested, about 250 will have an increased risk for Down syndrome, 19 have an affected pregnancy and one affected pregnancy will be missed.

Next steps

Some women choose to progress to diagnostic testing. This involves chorionic villus sampling at 12–14 weeks gestation or amniocentesis after 15 weeks. These tests are performed on an outpatient basis with local anaesthetic, but carry a miscarriage risk of 1–2% and 0.5–1.0% respectively.

Resources

- Patient information sheets in six languages are available on the VCGS pathology website along with detailed provider information: www.vcgspathology.com.au
- Similar resources are available from the different state based laboratories – check with your local provider
- Genetics in Family Medicine: The Australian Handbook for General Practitioners, provides detailed information on several genetic conditions and diagnostic tests. It is available at www.nhmrc.gov.au/your_health/egenetics/practitioners/gems.htm
- C-Obs 4 Prenatal screening tests for trisomy 21 (Down syndrome), trisomy 18 (Edward syndrome) and neural tube defects. A guideline developed by the Human Genetic Society of Australasia (HGSA) and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists available at www.ranzcog.edu.au/statements/C-obs4.pdf.

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