Ultrasound in Pregnancy

What is ultrasound?

During an ultrasound scan, very high frequency sound waves are produced by a transducer (the part of the machine which is placed on the body). The sound waves are passed into the body where they encounter structures (such as the fetus). When this happens, the waves reflect back, and the sound (or echo) is detected electronically and transmitted onto a screen as a dot. This results in a picture being formed, with strong echoes creating white dots (representative of bone), weaker echoes creating grey dots (tissue) and no reflection creating black dots (fluid).

Can ultrasound confirm that my baby is "normal"?

Ultrasound has been used for many years to gain information about developing babies. Ultrasound in many situations is considered a *screening* test rather than a *diagnostic* test. This means that there may be a small chance of false positives or false negatives when ultrasound is used as a diagnostic tool in pregnancy. However, ultrasound remains the method of choice for confirming the diagnosis of some conditions (i.e. spina bifida), and is considered a valuable tool to gain information about the developing fetus. The accuracy of an ultrasound is directly related to the skill of the technician performing the scan, and the quality of the equipment used.

At what point in pregnancy will I be offered an ultrasound?

- An ultrasound may be offered in the first trimester if there is any difficulty predicting a due date for the pregnancy (see below).
- For women interested in nuchal translucency screening, ultrasound is performed around 11 weeks. (Nuchal translucency is a genetic screening test which may give information about an increased probability of Down syndrome; this test is not covered by MSP for all women---refer to the Genetic Screening handout).
- All women in pregnancy are offered a "screening" or "detailed" scan at 18-21 weeks. At this point, ultrasound aims to verify that the baby is developing and growing normally.
- An ultrasound may be offered at other points in pregnancy for any of the following reasons: concern that the baby is not growing as expected, to investigate the source of vaginal bleeding, to diagnose cervical changes in cases of suspected preterm labour, to verify the position of a suspected breech baby, to follow up previously discovered concerns, to monitor a pregnancy that extends far past the due date, or as a visual aid during invasive procedures such as amniocentesis.

What are the benefits of having an ultrasound in pregnancy?

Dating: When performed in early pregnancy, ultrasound is considered a reliable method of predicting the estimated due date, especially for women who have irregular menstrual cycles, or are uncertain of when their last period was. Dating ultrasounds have been shown to reduce the number of pregnancies considered to be "post-term" and to decrease the rate of inductions for pregnancies extending far past the due date.

Number of Fetuses: Ultrasound can detect multiple (i.e. twin) pregnancies early on, which allows women access to specialized care sooner (multiple pregnancies can be associated with a higher rate of complications). Early detection also allows more time to prepare physically and psychologically for the birth of multiples.

Malformations of the Fetus: Approximately 35--50% of serious defects are diagnosed during a detailed ultrasound at 18-21 weeks. Ultrasound may also detect "soft markers"--- characteristics of the fetal anatomy which are in themselves normal but can be associated with an increased chance of genetic anomalies. Detection of soft markers or true abnormalities allows women the chance to consider options to further diagnosis or rule out a condition (i.e. triple marker screen, amniocentesis), as well as the opportunity to consider termination of the pregnancy or the ability to engage resources/prepare for the birth of a special needs baby.

Uterine formation: Although rare, some women have a uniquely shaped uterus that increases the likelihood of complications such postpartum hemorrhage. More commonly, many women (30% over the age of 30) have uterine fibroids; in rare cases, they are large enough and low enough in the pelvis to make vaginal birth difficult or impossible. Detection by ultrasound may aid women and their caregivers in making birth plans, e.g. hospital instead of home.

Placental Location: Ultrasound can rule out placenta previa (a condition affecting 0.5% of the population where the placenta grows over top of the cervix; cesarean birth is indicated). For the small number of women affected by placenta previa, early detection may result in healthier moms and babies.

Parents' Experience of Ultrasound: Many parents say that they are happy to see their baby move and swim around on screen. While the mother has often being feeling the baby move for a few weeks, a number of partners report that this is the first time the baby seems "real" and that this allows them to feel "more connected" to the pregnancy.

What are the limitations of ultrasound in pregnancy?

Dating: While some research shows ultrasound to be more effective in determining a due date than simply calculating based on a woman's last menstrual cycle, the difference detected in most cases would be unimportant and not impact the outcome for mother or baby. (The exception to this would be in cases of preterm/post-term pregnancies)

Placental Location: There is no evidence that routine screening ultrasounds at 18-21 weeks improve outcomes for mother or baby in the case of placenta previa.

Malformations of the Fetus: At least 50% of fetal malformations will not be detected via ultrasound. Additionally, some malformations will be "diagnosed," but in reality not be present, causing undue stress to expectant parents. Approximately 4 -17% of women who are told that their fetus has "soft markers" associated with an increased chance of Down syndrome will actually be carrying a genetically normal baby. Many women given this type of information consider proceeding to diagnostic testing (I.e. amniocentesis), which carries a degree of risk (1 in 200 chance of miscarriage following the procedure).

Estimated fetal size: Ultrasound only gives a rough estimate of fetal size. It is especially difficult to accurately estimate the size of very large or very small babies at term, when the margin of error is +/- 1lb. Therefore, ultrasound is only one tool of many that are used to estimate fetal size (and whether it will fit through a mother's pelvis).

Parents' Experience of Ultrasound: While an ultrasound has the potential to be a happy experience, real or mistaken diagnosis of abnormalities of the fetus can be very upsetting for parents. If soft markers are noted, some parents have a hard accepting even after further testing shows these markers are variations of normal, that their pregnancy or their baby is not abnormal. Some women also say it leaves them feeling "less connected" to their pregnancy to use external technology to view what they feel happening inside their bodies. As well, while most ultrasound technicians are warm and welcoming, the occasional one who is not may cause the parents to wrongly fear that

something is wrong. (Any problems will be immediately addressed by the radiologist who supervises the technicians.)

Like choosing any test, families choosing ultrasound screening should consider the positive, negative or equivocal findings that could be revealed so as to be prepared for unexpected results, and the potential for further testing options to be offered.

Is ultrasound safe?

The effects of ultrasound are difficult if impossible to study, due to the many variables including age of the exposed fetus, different levels of exposure by different machines and different technicians, frequency of exposure, inherent genetic differences between fetuses, and a large variety of measurable outcomes. We can say, however, that so far there has been no well designed study to date linking ultrasound to adverse outcomes for mom or baby. As well, ultrasound has been used on millions of pregnant women for more than 30 years without any clear adverse effects. Recent literature may show a potential link between ultrasound exposure in pregnancy and subsequent left-handedness, especially in boys, but the significance of this, if any, is unknown.

At the same time, because there have never been any long term, scientific studies on ultrasound, most experts agree that ultrasound exposure should be minimized and only be used during pregnancy for medical indications.

Private ultrasound clinics offering 3-D images or videos have become very popular among expecting families. In 2004, the FDA (Food and Drug Administration in the USA) put out a caution discouraging women from obtaining "keepsake" ultrasounds during pregnancy. Their rationale for this cites studies that acknowledge ultrasound as a form of energy that can raise the temperature of tissue. While there is no evidence that this could harm a fetus, the FDA says that there is a potential that ultrasounds in pregnancy aren't entirely innocuous.

Is there an alternative to having an ultrasound in pregnancy?

While it is considered the standard of care for women to be offered a detailed scan from 18-21 weeks in pregnancy, some debate exists about whether or not routine ultrasound is necessary in normal pregnancies. There are some alternatives for detection of *some* fetal anomalies (i.e. maternal serum screening ---- see the Genetic Screening handout). The main alternative to having a routine ultrasound is simply to not have one. Women choosing to decline a scan in pregnancy ideally are aware of the benefits and limitations of ultrasound, as well as potential information that could be gained solely via this method of prenatal screening.

Can I find out the sex of my baby?

In BC, if discovered by ultrasound, the sex of the baby will not be disclosed until after 20 weeks. If you would like to know the sex of your baby but are still less than 20 weeks pregnant, you can request that the information is recorded on the ultrasound report given to your careprovider, who will then tell you after 22 weeks. Of course, when you go for your ultrasound there is no guarantee that the baby will be willing to show you! If the genitals are not easily seen, do not expect the technician to spend extra time looking, due to the high volume of patients needing to be seen for clinical reasons. And there is also the chance of making the wrong diagnosis, therefore the only way of being 100% sure is through chromosome analysis by amniocentesis or chorionic villus sampling.

What about Doppler use in the clinic?

The Doppler that careproviders in clinic settings use to verify the fetal heart rate, is a form of ultrasound. If you wish to minimize ultrasound exposure, your midwife can

(occasionally or always) use a specially designed stethoscope called a fetoscope to listen to the heartbeat.

The limitations of using the fetoscope include:

- having to wait until the fetus is large enough to hear (usually after 20-24 weeks)
- sometimes it's hard for parents to hear without a trained ear
- it is impractical to use during labour as mom needs to be lying flat

The advantages of using the fetoscope, besides minimizing ultrasound exposure, include:

- there is something magical about hearing the *actual* heartbeat of your baby, not an electronic representation produced by the Doppler technology
- helping to verify the position of the baby