

## Ultrasound

One test that every one is familiar with is sonography, commonly known as ultrasound. Women want ultrasounds. When pregnant women were offered ultrasound scans, 96% accepted(1), even though they were having no medical complications. This is a perfect example of how belief systems are established among a community of women. In our society today, it is the rare woman who has not had a sonogram at least once during her pregnancy. This procedure is readily available and assumed safe. Mothers are anxious to learn the sex of their baby. Women and families are excited to see the “photograph” or even the “video” of their unborn babies in utero.

Physicians like to use sonography as a way to see into the womb, as they are fascinated with examining and documenting life before birth. Prenatal ultrasound has been used for the past 15 years to monitor the unborn baby’s breathing, movements, hiccups, eye movement and overall general activity. Scientists can document how often a fetus empties his bladder and stomach, but why? Why are these babies being exposed to long periods of ultrasonography and how profound are the scientific conclusions?

Doctors sometimes say that an ultrasound will allow a mother to bond with her baby prenatally. Mothers bond with their babies the moment they learn they are pregnant. There is an instant realization of “there’s a new life inside me!” When their baby flutters in utero and is constantly kicking and turning, they are bonding with their babies. Mother-infant prenatal bonding has been around a lot longer than prenatal ultrasound. Yet most women expect at least one, if not several, ultrasounds throughout their pregnancy. But are there risks involved?

In one study (2) of 57 women at risk for preterm birth, half of the women were

given ultrasound scans weekly while the other half had pelvic exams instead. Preterm labor in the ultrasound group was 52%; preterm labor in the control group was 25%.

In another study (3) over 9,000 women were divided into groups; some had ultrasounds and some did not. There were 20 late miscarriages (after 16 to 20 weeks gestation) in the ultrasound group and none in the control group. This must be more than just mere coincidence. There is some risk of miscarriage associated with multiple ultrasound exposure, however small.

When birth weights of babies exposed to multiple ultrasound scans were compared to only one ultrasound scan at 18 weeks gestation, babies with multiple scans tended to be shorter at birth, while not necessarily thinner, using measurements of their chest, abdomen, arms, etc.(4). This suggests that frequent ultrasound scans restrict baby's growth, and it is likely to be an effect on bone growth.

Five or more ultrasound scans or uses of doppler imaging between 18 and 38 weeks gestation lead to a greater number of growth restricted fetuses(5). There was significantly higher intrauterine growth restriction in the group of babies exposed to multiple ultrasound scans when compared with those exposed only once.

Women want an ultrasound to be sure "everything is ok". They want the peace of mind that the baby they are carrying is healthy. Yet, ultrasound may misdiagnose problems in perfectly healthy babies. In fact, fetal abnormalities are detected in only one to two percent of ultrasounds, but as many as two-thirds that are present don't show up(6).

A newly published analysis (7) has disproved the long held belief that ultrasound scanning can detect Down syndrome. Specific findings from an

ultrasound examination, such as certain brain cysts, shortened thigh and upper arm bones and a thickening of the nuchal cord, among others, were believed to indicate that the baby in utero was at risk for Down syndrome. When these findings were present, the mother was advised to undergo an amniocentesis for further clarification. However, these ultrasound findings could not discriminate between normal babies and those born with Down syndrome. At least one of seven ultrasound findings that were believed to alert doctors to a baby with Down's were found in between 10 to 14 percent of women, but less than one percent actually had Down's babies. The ultrasound markers that were believed to be indicative of Down syndrome are almost always harmless. The use of amniocentesis will result in more pregnancy losses than actual cases of Down syndrome detected, according to this recent analysis.

Ultrasound is used by doctors to determine the baby's due date, even if a woman knows the date of her last menstrual period and even if she knows the exact date of conception. There is often times a discrepancy between the due date according to the date of the last menstrual period and the date given as a result of the ultrasound. Doctors tend to put more faith in the date given by the ultrasound and a woman is then confused as to when her true due date really is. A physical examination early in pregnancy and a woman's own report of what she believes her due date is can be just as accurate as an ultrasound performed between 18 and 20 weeks gestation (8) (9).

There have been babies born by induction, or ultimately, taken by cesarean section who were "late" or post-dates due to the sonogram diagnosis, yet were really "early" or preterm when actually born. Some of these babies are required to spend time in a neonatal intensive care unit. This could be avoided if we trust that babies, themselves, know when to be born.

Babies often jump around when exposed to ultrasound waves. It is common for a baby who is small enough to swim out from under the doppler scanner to do so; one has to hold the baby in place to pick up the heart beat. One investigation (10) found a mean increase in fetal activity of over 90% when babies were exposed to doppler ultrasound. Why do these babies try to get away? One may venture to guess that they are indeed aware and are sensitive to the sensations that an ultrasound device emits. The sensation must be unpleasant if the babies are moving away from it.

During routine prenatal visits, a hand-held "doppler" device is used, which makes that baby's heart beat audible to the mother and others in the room. Continuous wave ultrasound in the form of high frequency sound waves are passed through the body and the sound that reflects back is what you are hearing; similar to an echo. Women need to realize that when their babies are exposed to "doppler" scans at each prenatal visit, they are actually exposed to even greater frequencies of ultrasonic waves than with a 30 minute sonogram.

For evaluation in pregnancy, pulsed ultrasound is used, mainly in real-time and in early stages of the baby's development. Pulsed ultrasound is what is used to create the moving images we know as "sonograms". In pulsed ultrasound, sound waves are emitted for a duration of one microsecond or less, and then there are periods of "listening" for the echo to return. The safety of diagnostic ultrasound is *assumed*, because of the absence of any reports of adverse effects in children following exposure(11).

There is now "trans-vaginal" ultrasound. With this procedure, a probe is inserted into the vagina and the ultrasound signals go directly to the baby, without having to pass through skin and tissue and fluid first. There seems to be no real advantage to this new form of ultrasonic diagnosis, except to measure the

length of a woman's cervix to use as a predictor of preterm labor. It was determined that a transvaginal ultrasonography performed at 18-22 weeks helped to identify women at risk for preterm delivery. However, its low sensitivity and low "positive" predictive value will limit its use in low-risk women (12).

Repeated prenatal ultrasound exposure and frequent use of a doppler should be restricted to those women who would be likely to benefit from its findings, rather than the entire pregnant population. The use of frequent ultrasound scans and the monitoring of babies with doppler devices does not improve pregnancy outcomes(13). Even the American College of Obstetricians and Gynecologists (ACOG) recommends against routine ultrasound in low-risk pregnancies(14).

Before ultrasound was the accepted window into the uterus, there were X-rays. X-rays were commonly used on pregnant women and considered to be safe for nearly 50 years before adverse effects were recognized and documented. Science now knows that radiation is harmful to unborn babies, but it was accepted as routine procedure for decades. It would be virtually impossible to do a controlled study on the long term effects of ultrasound, since nearly every woman has at least one exposure to ultrasound during her pregnancy. It may be many years before the final safety analysis of sonography is made. The coincidences which exist in reports of babies moving away from the sound waves, and the higher rate of miscarriage correlated to ultrasound exposure may make you stop and reconsider. Why gamble with you baby's well being?