



Ultrasound and Doppler

Ultrasonography has almost entirely replaced X-ray as a diagnostic tool in obstetrics. It has been lauded as perfectly safe for mother and fetus, as were X-rays when they were first introduced. And, as with X-rays, these statements have been made with no long-term research to back them up. Without dramatic birth defects to stop its use, subtler biological sequela may go unrecognized for years to come.

There are three types of ultrasounds: scanning devices, doptones, and external fetal monitors (EFMs). The Doppler is the small, hand-held device used to listen to the baby's heartbeat. The Doppler's exposure time is the shortest. The longest exposure occurs with EFM used in at least 76% of all hospital births. Ultrasound scans are routinely employed during any stage of pregnancy for a variety of reasons.

What is "ultrasound"? Sound is a form of kinetic energy that rapidly moves from a source through any mass, which has substance (such as the fetal body). Although we call it "sound" it is not, in fact, what we commonly think of as sound. Sound is between 20 hertz and 20 kilohertz. Ultrasound waves travel between one and 10 megahertz (1 to 10 million cycles per second), and have been classified by the Bureau of Radiological Health as radiation. Ultrasound proponents have objected to the use of the term "radiation" to describe ultrasound, even though this is a more accurate characterization of the emission. Ultrasound is not ionizing radiation (as are X-rays), but it is a form of radiation. (Hathaway, 1983)

There are a number of complex variables to consider when evaluating the possible biological impact of ultrasound exposure. The four primary and potentially damaging effects of ultrasound that have been identified thus far involve the radiation force, the generation of heat, acoustic streaming and cavitation (the production, growth and dynamics of oscillating bubbles in a sound wave which occurs when ultrasound emissions interact with gasses in tissues and especially fluids.) The mother's and her female fetus's ovaries are irradiated during an ultrasound scan, bringing up the question of possible chromosomal damage. Premature ovulation has been observed after ovarian ultrasonography. What does that mean regarding fetal ovaries? Although, the mothers' body absorbs much more of the total energy than does the fetus's.

Accurate interpretation of ultrasound imaging requires a skilled technician. Furthermore, the quality of the instrumentation will have a bearing upon the accuracy of the test. Major medical decisions are based upon the information gathered during ultrasound exams. However, some evaluations consist of educated guess work at best. One example is the estimation of gestational age, where inaccuracy greatly increases as pregnancy advances. Accurate detection of abnormalities can vary widely as well. In one study the rate of detection of cardiovascular defects ranged from 4% to 70%, depending upon the unit where the scanning took place. (Nolan, 1993) Figures showing how many "abnormal babies" turn out to be normal after elective abortion are rarely published. One study noted 33 abortions performed after a diagnosis of cystic hygroma in the fetus. Three of these babies turned out to be normal and one had only a cleft palate. (Atkins & Hey, 1991) Sometimes defects noted in an early exam seem to disappear later (one study found this true in one-third of scans supposedly revealing defects). (Robinson & Beech, 1990) Bottom line, there are false positive as well as false negative test results possible, no ultrasound exam is 100% accurate.

In the US, the American College of Obstetrics and Gynecology (ACOG) estimates that 60% to 70% of pregnant women are routinely scanned, despite an official statement from ACOG that recommends against routine ultrasound. It is this use of routine prenatal ultrasound (RPU) that is most controversial, as this practice involves scanning all pregnant women in the hope of improving the outcome for some mothers and babies.

Ultrasounds are used routinely to check for some of the following: First trimester: Confirm pregnancy, confirm viability, rule out ectopic pregnancy, confirm gestational age, assess for multiple pregnancy. Second and Third trimester: rule out placenta previa, monitor Rh disease, determine fetal position, determine fetal lung maturity, examine fetus for gross anomalies, determine fetal sex, detect problematic fetal growth patterns, determine amniotic fluid volume, assess fetal cardiac activity.

As with any medical procedure there are benefits to be weighed against any risk. Diagnostic assessment and testing with ultrasound has changed the outlook for many pregnancies with special problems. Using this technology when needed in a pregnancy can help to identify problems and assist in making treatment decisions.

If an ultrasound scan is deemed necessary or desirable, the mother can minimize the exposure she and her fetus receive. Prior to the exam she may request that it be performed as quickly as possible, and that the sonographer limit the exam to the specific reasons it is being done.

Hathaway J: Ultrasound in Controversy. Published fact sheet, copyright American Academy of Husband Coached Childbirth, 1983.

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