

The Ultrasound-Autism Connection

<http://www.ultrasound-autism.org>

Autism Spectrum Disorders. Autism is most accurately known as autism spectrum disorders (ASD) because it encompasses a range of developmental disorders, most familiarly an impaired ability to communicate with others and a need for repetition. There are different levels of severity and combinations of symptoms in autism. A small percentage of cases can be linked to genetic factors, but a recent major study of twins supports earlier studies concluding that environmental exposures during or shortly after gestation cause a majority of autism cases.²²

Neurological Effects. During brain development, cells form and migrate to the cerebral cortex. In many autism cases, brain scans reveal an increased number of cells and of minicolumns of cells. Extra minicolumns and cells can affect the brainwide connectivity pattern for communication between cells, thereby altering brain function.^{25,26} In a recent study, autistic children had reduced connectivity between the two sides of the brain.³⁰

Ultrasound Technology. Ultrasound imaging developed from sonar used to “see” objects in the ocean. An ultrasound device for fetal imaging emits short pulses of high frequency sound waves that reflect off the tissues of the fetus. The return echoes are converted into images. In addition to vibration, ultrasound waves can cause heating of the tissue and bone.^{15,23,27} Therapeutic ultrasound devices use these effects for healing in adults.²

Evidence. A recent study found an apparent link between multiple second-trimester ultrasound exposure of girls and autism.¹² Animal studies show that ultrasound can both damage cells and alter their migration, creating the patterns observed in autistic brains.⁸ Because the fetal skull is much thinner and more vulnerable to hyperthermic injury than the skull of an adult, any increase in fetal temperature can interfere with normal brain development. For some exposure conditions, the thermal index (TI), as used in the FDA-approved output display standard, underestimates the extent of ultrasound-induced intracranial temperature increase.²⁸ Ultrasound devices for increasing the rate of formation of new cells in fractured bones use a pulsed wave of lower intensity than imaging ultrasound.^{2,24} The ability of ultrasound to produce these biological effects supports the possibility of an unintended impact on fetal development.

Matching Timelines. Autism was once a rare diagnosis. Today, it affects 1 in 110 U.S. children, and 1 in 70 U.S. boys.^{ODC} Prenatal ultrasound was once a rare medical procedure, reserved for women with high-risk pregnancies. Prenatal ultrasound is now routine for most pregnant women in developed countries. Twenty years ago, the FDA increased the allowable intensity of prenatal ultrasound 8-fold to improve images.²³ Autism rates have risen dramatically since that time. Now, the ultrasound vaginal probe, which places the acoustic beam closer to the embryo is in common use. Every year, more women have prenatal ultrasounds and have them more often during a pregnancy.²⁹ The rate of autism continues to rise.

Ultrasound Safety. The levels set by the FDA are not based on safety studies but on relative risk.^{4,6,14} There is essentially no evidence that prenatal ultrasounds do not damage the fetus.^{3,7} Effects noted in two of the few research projects are low birth size⁹ and increased left-handedness.¹⁰ Researchers who have touched on the topic uniformly call for closer examination of the effects of ultrasound on the fetus.^{1,2,5,18} Two other safety issues are the need for calibration of many older devices^{16,19} and the widespread misunderstanding among ultrasound operators of the safety guidelines.¹³ Not only are there no Federal requirements for operator training, a fast-growing commercial business is keepsake ultrasound photos. Franchisers advertise that no medical background or certification is required.^{Ad}

Call for Action. The public deserves to know immediately that there is evidence of harm. If women knew that ultrasound posed any risk to their developing baby, most – if not all – would rather be safe than sorry. Meanwhile, a swift analysis of the autism rate in children not exposed to prenatal ultrasound can be completed using existing research studies in which ultrasound data were collected. While scientists seek more definitive answers, public health and common sense demand utmost caution in the prenatal use of ultrasound.