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Review Article

A Single Exposure to Ultrasound Causes DNA Damage Similar to 250 Chest X-Rays

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Birth Trauma and the Dark Side of Modern Medicine and The Dark Side of Prenatal Ultrasound and the Dangers of Non-Ionizing Radiation – Part 1, Birth of a New Earth, Greater New York City, United States

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Abstract

The information below is excerpted from Jeanice Barcelo's book, *The Dark Side of Prenatal Ultrasound and the Dangers of Non-Ionizing Radiation – Part 1*. It concerns the myriad studies that have documented DNA damage as a result of exposure to ultrasound. Such damage includes DNA shearing, single and double strand breaks, chromosome rearrangements and DNA uncoiling, deformities and mutations in offspring, sister chromatid exchange, and the complete deactivation of genetic material within sonicated cells. Although we have been repeatedly told that ultrasound is "*just sound waves*" and therefore "*perfectly safe*" to be used during pregnancy, in fact ultrasound is based on non-ionizing radiation and this type of radiation has been repeatedly shown to be harmful. Based on the information presented in *The Dark Side of Prenatal Ultrasound and the Dangers of Non-Ionizing Radiation – Part 1*, it is suggested that ultrasound should be immediately banned from obstetrics. Learn more at: www.BirthofaNewEarth.com.

"*It was noticed that ultrasound in all used intensities induced DNA damage*" [1].

"*DNA fragmentation happens to be the foremost theory for cancer causation*" [2,3].

Earlier in this book we learned from the FDA's website that ultrasound is based on non-ionizing radiation and, therefore, according to the FDA, it does not have the same damaging effects as x-rays or other technologies that are based on ionizing radiation. However, what you are about to read will confirm that ultrasonic irradiation does indeed produce similar biological effects to those caused by x-rays and other forms of ionizing radiation.

Keywords: *Dark Side; Prenatal Ultrasound; Non-Ionizing Radiation*

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Almost 100 years ago (1927), researchers Robert Wood and Alfred Lee Loomis noted the harmful effects of ultrasound and concluded that ultrasound "could be just as injurious [to the human body] as xrays and atomic radiation" [4].

"*High doses of ultrasonic energy on the body is as injurious as atomic radiation. The effects… normally are irreversible*" [5].

Likewise, a study published in 1949 found that: "*The immediate effects of ultrasonic vibrations upon the nuclei and chromosomes of living plant cells show marked visible resemblances to the primary and secondary effects produced by electromagnetic radiations such as x-ray… and also to those produced by mustard gas*" [6].

In a 1966 study, researcher Mikio Kato demonstrated that: "*Ultrasonic vibration would be a better proximate cause of mutation than X-ray irradiation*" [7].

In an article published in 1979, ultrasound researchers working with mice found that: "*Brain defects were produced at all stages of gestation but tended to involve the forebrain more at earlier times. Defects such as fusions of the ribs or vertebrae, spina bifida, and limb reductions were produced... The types of malformation produced by ultrasound thus appear to follow the same pattern of change with gestational age as do those produced by X-ray irradiation*" [8].

A rat study published in 1986 concluded that: "*It is clear that the stage of gestation at the time of ultrasound exposure influences the types of malformations that are produced and the organ systems which are affected… Malformations of the heart and great vessels were primarily associated with exposures at 9 [days gestation])… Fusion defects of the vertebral column and limb defects progressively increased*

in frequency with exposures later in gestation… Brain defects were produced by exposure at all stages although incidence was less at 12 [days gestation]… It appears that the pattern of sensitivity with gestational age for malformation production by ultrasound is similar to that reported for ionizing radiation and for thermal insult" [9].

In 2012, it was determined that rat fetuses exposed to ultrasound suffered from "bioeffects similar to X-ray exposure" [2,10,11]. Researchers found "substantial alterations in gene expression" including those "implicated in important developmental signaling pathways" [10]. The researchers concluded that ultrasound "could probably affect expression of highly important genes implicated in embryonic development…" and "should be used with caution, particularly in early pregnancy".

Dr. Doreen Liebeskind, attending radiologist at Beth Israel Medical Center and head of cardiac nuclear medicine at St. Francis Hospital in New York, studied the effects of ultrasound on human and animal cells [11,12] in the early 1980s. Jim West describes her findings in the following way: "*Ultrasound damage was similar to Xray damage. When the results were extrapolated to a typical clinical session, they indicated an equivalent risk of 250 chest Xrays. Damage was permanent, heritable through cell division, demonstrating like Cachon (1981) that DUS exposure could conceivably affect many human generations*" [2,10,11].

Dr. Liebeskind observed: "*Abnormal changes in the look and behavior of the cells - changes she says that look the same as cells exposed to 29 rads of ionizing radiation, or Xrays*" [13].

"*After exposure to ultrasound, [the cells] became a tangled mass, growing wildly and literally all over each other. 100% of them became distorted*" [12].

Figure 1: *Image of normal cells [12].*

Figure 2: *Cells after exposure to ultrasound [12].*

Figure 3: *Normal cells in motion "with smooth edges, moving in a clear direction" [12].*

Figure 4: *Cells in motion after exposure to ultrasound. 100% "become frenetic and distorted" [12].*

According to Dr. Liebeskind: "*Things are happening. They're happening to the DNA of these cells, they're happening to the behavior, they're beginning to grow in a funny way, they're beginning to behave in an aberrant fashion, and in some cases, they're becoming tumor cells. There are some longlived effects on the DNA of the cells, on the behavior of the cells, and on the cell growth that persist for many, many generations after a single exposure*" [12].

Dr. Liebeskind noted that these effects persist for more than 10 generations, and part of the reason for this is as follows: "*When a female fetus is born… all of the eggs for the next generation are present at the time of birth. And therefore, when you subject a female fetus to ultrasound near term, you have not only subjected her cells to ultrasound, but also all her eggs for the next generation*" [12].

Thus, in utero exposure to ultrasound has the potential to damage not only a baby in the womb, but all of a female's eggs as well. The genetic damage is long-lasting and will impact the health and genetics of future children for many generations to come.

In addition to all of the above, dozens (perhaps hundreds) of other studies have confirmed DNA fractures, double strand breaks, free radical production, and other DNA damage as a result of exposure to ultrasound.

"*Intensities lower than those used in therapy have a drastic effect on purified [calf thymus] DNA in solution. We found very considerable damage for various durations; all the DNA molecules were broken down, no molecules of relative length remained*" [14].

From a study entitled "Double-Strand Breaks in Genome-Sized DNA Caused by Ultrasound" we learn the following: "*Recently, we studied the effect of ascorbic acid against DSBs [double-strand breaks] in DNA and found that ascorbic acid has a marked protective effect against the damage induced by reactive oxygen species. In contrast, ascorbic acid offers almost no protection against the damage caused by ultrasound. Thus, DSBs caused by ultrasound are most likely caused by the shockwave under the generation of cavitation*" [15].

Ultrasonic cavitation is a topic we will discuss in more detail in a later chapter. Cavitation has been shown to induce a phenomenon called "acoustic microstreaming" [16] or spiralling vortexes of energy that build up around ultrasonically exposed cells that stretch and pull at the cells, causing them to rip apart.

"*It has also been shown that the biological effects of microstreaming can destroy cells due to the rapid stretching that shearing fields cause, thus resulting in cell membrane rupture… Experiments support the hypothesis that acoustic streaming mechanisms are important stresses that cause the destruction of red blood cells…*" [17].

"*While the effect of this force is not fully understood, research suggests that it may… have adverse effects on both early and late prenatal and postnatal development*" [18,19].

Shearing fields caused by radiation force are extremely destructive and have been described in the following ways: "*A push [that is] induced deep in the tissue by acoustic radiation force. The disturbance created by this push travels sideways through the tissue as a shear wave*" [20].

Naturally, cell necrosis has been documented in response to ultrasonic microstreaming, along with disturbances in calcium signaling [21] that are known to induce serious biological damage and neurodevelopmental disorders like autism [22].

"*Ultrasound facilitated an influx of calcium ions in fibroblasts, and this action may have resulted from a mechanical effect on ion channels. Acoustic microstreaming was the postulated mechanism by which ultrasound caused efflux of intracellular potassium ions. Cell necrosis was shown to increase when nonlethal hypotonicity (146 mOsm) was combined with low-intensity ultrasound (0.5 W/cm^2)* [23-28].

An increased incidence in sister chromatid exchange has also been documented in numerous studies [29], providing further evidence of DNA damage.

"*We analyzed sister chromatic exchange (SCE) frequencies as an indicator of DNA damage induced in human lymphocytes… to determine whether ultrasound is capable of producing genetic effects in dividing cells… A range of exposure times and intensities was tested… Our studies showed small but consistent effects of ultrasound on SCE frequencies, for each experiment. Our results are consistent with those of Liebeskind., et al. (1979). Cultures in this study were derived from adult lymphocytes rather than fetal tissues. Fetal cells could show different responses, perhaps more extreme because of their actively dividing state*" [30].

Since fetal development is based on the process of cell division, the above finding (along with the findings below) confirms that developing babies should never be exposed to ultrasound.

"*Cells appear to be most sensitive to ultrasound during mitosis" [31].*

"Dividing cells are more susceptible than non-dividing cells to the effects of mutagenic agents, therefore, mutagenic effects of US (or any other agent) may be more relevant in children and young people than older people… repeated chromosome aberrations (Barnett, 1997) and point mutations have been demonstrated in plants and insects" [32].

"Ultrasound scans can stop cells from dividing and make them commit suicide. The researchers detected two significant changes in the cells of the small intestine in scanned mice compared to the mice that hadn't been scanned. Four and a half hours after exposure, there was a 22 per cent reduction in the rate of cell division, while the rate of programmed cell death or "apoptosis" had approximately doubled" [33].

"The first eight weeks of pregnancy referred to as the embryonic period are the time of an infant's greatest vulnerability to teratogenic exposures. Founder cells are actively dividing and expanding their populations. Agents which target these founder populations can have some of the furthest reaching effects such that irreparable insults can be passed on to all subsequent progeny… Unwarranted exposures, especially those occurring in the first trimester, pose considerable risks to patient safety" [34].

Indeed, ultrasonic exposure during the first trimester is a major threat because it is a time of rapid cell division. Since we are certain that cell mutations are occurring as a result of exposure to ultrasound (as illustrated in the above photos and outlined throughout this chapter), it is greatly concerning that these mutations can replicate during the process of cell division. As a result, developing babies are at great risk of both mutated development and the development of cancer. These conditions may take years or decades to develop, and the same risk will be passed on to their offspring.

"*Delayed health effects occur a long time after exposure… These health effects are believed to be caused by modifications in the genetic material of a cell following radiation exposure. Examples of delayed effects are solid tumours and leukaemia occurring in exposed persons and genetic disorders occurring in the offspring of persons who were exposed to radiation*" [35].

Although the above quote is referring to ionizing radiation, it nonetheless also describes the insidious nature of ultrasonic and all forms of radiation damage-the effects of which may not show up for many years. Because of the now ubiquitous exposure of our children to radiation while they are still in the womb, although they may appear normal and healthy at birth, they may still be in danger of developing later health challenges and possibly giving birth to children with genetic defects as well. This is a very serious issue and one that should send parents marching through the streets with torches and pitchforks to demand that those responsible pay the price for what they have done to our children and our bloodlines.

"*A sonofied fetus would at birth appear overtly healthy, though hormonally and intracellularly damaged" [36].*

"It now appears that even babies who seem to be healthy and normal at birth may suffer disorders later on as a result of the use of ultrasound equipment…" [37,38].

Ultrasonically induced biological damage, including interrupted cell division [33], chromosome damage [39], mitochondrial damage [40], free radicals [41-46], cell death [47] and more, may result in genetic information being permanently lost [48], scrambled, and/or "deactivated".

"*After I'd exposed a DNA molecule to ultrasound, I noticed something that stupefies you. You see, normally in aqueous solution, DNA molecules produce a continuous sound. They create a complex melody with recurrent musical phrases. So, I irradiate it with the ultrasound waves of the same frequency as in diagnostic ultrasound, and what do I hear? Not a complex melody, but only one monotonous note. This means that by utilizing ultrasound, we've erased a massive amount of information from this DNA molecule. Then I thought to myself, Oh My God! We don't have any healthy kids left. I mean literally, worldwide, there are no healthy kids now because all of them, apart from those born in wild tribes, are exposed to medical ultrasonography*" [49].

Russian scientist, Dr. Peter Gariaev further states the following: "*I have to confess, at the beginning of the research, we were very concerned that the laws of genetics could be destructively used against humans. But it has been proven for a long time by official ultrasound examination medicine. And now it's hard to imagine the long-term destructive consequences that these extensive experiments on humans will bring".*

Before using an ultrasound generator, DNA molecules produce sounds over a wide range, from several to hundreds of hertz-Hz. And after using ultrasound, molecules sounded with special emphasis on the same frequency of 10 Hz. This frequency remained the same for several weeks after the experiment and its amplitude was not reduced at all. Figuratively speaking, the diversity of frequencies has been lost in the symphony of life, and one penetrating frequency - tone has prevailed.

Finally, the most striking was the following result when they prepared a new DNA preparation and placed it in an old ultrasound-stricken place. Suddenly the specimen began to show all signs as if he had been hit by ultrasound.

After a series of tests, scientists came to a surprising conclusion. Ultrasound hurt DNA molecules and they remembered it. DNA molecules have experienced a strong shock, after which they have long recovered and eventually created a wave phantom of pain and fear that remained in place for their terrible experiment. Under the influence of this phantom, even the second, new DNA molecule, they experienced a similar shock that left them with the same consequences!

This means that a genetic program may fail, a distorted wave genome generates damaged tissues, and a healthy organism cannot develop from it…

It is horrible to think what ultrasound will create in human cells. No wonder so many sick are born in today's hospitals, ultrasound could change their wave genome and thus the genetic program. Similarly, ultrasound scanning of diseased organs causes more complex treatments for adults.

Using ultrasound can have disastrous consequences for future generations. It is not excluded that ultrasound techniques can be carried out in a targeted manner to damage the genetic potential of humans [50].

Again, the extreme genetic damage just described is the same type of damage that has, in the past, been attributed only to ionizing radiation [51].

Meanwhile, the radiation establishment continues to publicly insist that ionizing radiation is the only danger while radiation scientists work behind the scenes using ultrasound to deliberately induce DNA damage and deactivate biological material.

"*In biological applications, sonication may be sufficient to disrupt or deactivate a biological material. For example, sonication is often used to disrupt cell membranes. Sonication is also used to fragment molecules of DNA, in which the DNA subjected to brief periods of sonication is sheared into smaller fragments*" [52].

The above quotation tells us pretty much all we need to know about the medical radiation establishment that has, for decades, denied the damaging effects of ultrasound and other forms of so-called "non-ionizing" radiation. In plain and simple language, the establishment has been blatantly lying while working furiously behind the scenes to devise ways to induce maximum biological damage with ultrasonic and other forms of non-ionizing radiation.

Ultrasonically induced chromosome abnormalities and DNA degradation have been extremely well documented across a number of different species [53,54].

"*Ultrasound can degrade DNA in solution, and it is reported to cause chromosome breakage and genetic effects…*

The type of damage reported varies from chromatid and chromosome breaks, chromosome fusions, coagulations, uncoilings, etc. through to nuclear dislocation and complete necrosis. [There have been] two reports of chromosome rearrangements.

Longer doses gave sterility and death. Similarity was drawn between ultrasound and ionising radiation…

Treatment of germinating seeds… gave deformities and abnormalities.

Treatment of goldfish… gave dominant lethal effects and a dominant visible mutation in offspring…

Ultrasound could readily induce major and minor abnormalities in the resultant adult form. This teratogenesis (varying from abnormal segmentation to clear duplications and omissions of whole organs) was found with physiotherapeutic dosage.

Weinland (1963) noted abnormalities in the embryos of irradiated hamsters" [42].

Although Weinland lists multiple studies, some of which date back to the 1930s and all of which confirm serious biological harm, he nevertheless concludes the following:

"*A glance at the headings of the foregoing sections might lead one to believe that ultrasonic radiation has some similarities in mode of action to ionising (electromagnetic) radiation upon living organisms. However, it is suggested that such comparison is found to be superficial*" [42].

Truly amazing. The extensive evidence presented in the above-cited paper was not enough for its author to acknowledge that ultrasonic irradiation is causing the very same effects as those being attributed to ionizing radiation. And yet, DNA damage is a "hallmark" cellular response to ionizing radiation—and ultrasonic irradiation is causing the very same damage [10,55].

Furthermore, "*MacIntosh and Davey (1972) reported results which were alarming in terms of medical diagnostics. These authors treated peripheral blood lymphocytes with ultrasound… and calculated a threshold of 8.2 mW/cm^2 for induction of chromosome aberrations. Galperin-Lamaitre., et al. (1975) presented electron micrographs showing significant DNA shearing when cells were irradiated at 200 mW/cm for 30 minutes at 1 MHz*".

Please note that, in the above-cited study, induction of chromosome aberrations occurred at a mere 8.2 mW/cm^2 of intensity while DNA shearing occurred at 200m W/cm^2. Meanwhile, the FDA has approved intensity levels for obstetrical ultrasound machines as high as 720 mW/cm^2 [56] and this despite the federal government admitting in 1976 that anything between 1 - 15 mW/cm^2 should be considered a health hazard [57]. Since the allowable intensity levels in obstetrics are so high, we should not be surprised to learn that chromosome aberrations have been induced in human blood cultures by exposure to ultrasonic fetal heart monitors.

"*Human blood cultures were exposed to ultrasound from an ultrasonic fetal heart detector for periods of one and two hours. Considerable increases in the number of chromosome aberrations over control values were found*" [58].

Please keep in mind that pregnant women are often exposed to ultrasonic fetal heart monitors for hours (or even days) during hospital birth. Since past studies have documented (a) chromosome aberrations, (b) rupture and destruction of red blood cells [59], (c) reduced white blood cell counts in exposed populations [60] and (d) free radicals in amniotic fluid and blood plasma [61], from exposure to ultrasound-it is important to determine what is happening to the blood of incoming infants when they are exposed to ultrasonic irradiation during pregnancy and childbirth.

"*When the pregnant women during the whole period of pregnancy were ultrasonically irradiated once or twice, the forming rate of rosette red blood cell C3b receptors of the newborns decreased…, and the forming rate of rosette red blood cell immune complexes increased... These results indicate that erythrocyte immune regulative systems of the newborns are out of control when they [are] irradiated with ultrasound… [After] 30 minutes [of exposure], immune regulative systems of the newborns become dysfunctional*" [62].

Conclusion

Could exposure to ultrasound in utero and/or during labor be contributing to the rise in childhood leukemia, which has risen 35% since 1975 (about the same time developing babies began to be irradiated with ultrasound)? [63] We will explore this possibility later. For now, it is important to understand that the genetic damage being caused by ultrasound is very farreaching, and the real extent of harm will only be made known as the next few generations of irradiated children come of age and begin to have (or at least try to have) children of their own. They may or may not be successful in reproducing, and if they are, it is highly likely that the radiation-induced genetic mutations they now carry will be passed on and will affect many generations to come.

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