

# Environmental toxicology

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Environmental Toxicology: Chernobyl

Throughout history there have been many instances where manmade structures and processes lead to accidents or, in some way, cause toxicants to be released into the air in amounts that can be truly dangerous to human beings, animals, and entire ecosystems. There is probably no other singular event that represents how awful these sorts of accidents can be is the story of Chernobyl. Most people have heard references to the Chernobyl and Nuclear plant accident that made it famous. However, most people today probably do not know the magnitude of the effects of these accidents and the horrifying side-effects that it has had and continues to cause. Understanding the side-effects of exposures, the lingering effects of this radiation exposure, and the relationships of the exposure to diseases that are prevalent in the areas studied, environmental toxicologists can better assess risk, nature and protocol needed. Using research tools like biomonitoring and the finding of biomarkers toxicologists and environmental scientists make it possible to understand how exposures to dangerous toxicants, and in the case of Chernobyl, high doses of radiation, effects individuals and populations as whole. On April 26, 1986 an accident occurred, at the Chernobyl nuclear power plant in the Ukraine, during an experimental test of the electrical control system while shutting down one of the reactors. However, despite regulations prohibiting the shutdown of certain control systems that should never be shut down, they were allowed to completely shutdown. For this reason, one of the reactors, already flawed, reached unstable conditions. A power surge into the system caused a " steam explosion," rupturing reactor containment, and damaged the reactor core. This caused a graphite fire that

burned for, approximately, 10 days. Because of wind and rain patterns radioactive particles and gases into the atmosphere sending toxicants, as far as, parts of Europe. (UNSCEAR, 2012) In fact, it has been reported that the fallout from the Chernobyl accident was greater than both Hiroshima and Nagasaki. The damaged reactor, Number 4, has been sealed off and encased in concrete; which is deteriorating. To this day, a 20 mile “ off limits” radius is maintained, however, 1000s of workers still are employed to care-take portions of the facility, which has been officially closed since 2000 (Cruz, 2010). The dangerous toxicants released in the accident included iodine-131, caesium-134 and caesium-137, and Iodine-13, the latter of which has a half life of 8 days, but are very common to pick up. It has a tendency not to be eliminated by the body easily and can accumulate in the thyroid. Caesium 134 has a half life of 2 years and, the much more disturbing, caesium 137 has a half life of 30 years. These radionuclides can cause longer term damage.(UNSCEAR, 2012) Toxicologists have been using biomonitoring, which is the process of measuring people’s exposure to the toxic substances within their environment. The researchers do this by sampling population’s blood and urine. In the case of radiation the effects can be seen in hematological tests. They can, also, study the thyroids of exposed individuals to seek out the accumulation of iodine there. Biomarkers can be used to determine if the cause of an illness can be attributed to certain exposure events, like Chernobyl. Again the thyroid is an organ of interest in the case of stored and dangerous iodine (World Health Organization, 2011). Although 115, 000 to 220, 000 people were evacuated and relocated from Chernobyl’s surrounding areas the accident, ultimately, caused the deaths

30 workers within the first few weeks and contributed to significant radiation injury to hundreds of others. (UNSCEAR, 2012) It is believed that the damage of Chernobyl has led to crippling birth defects, like enlarged limbs, absence or excessive growth, malformed or undersized limbs, along with cancer, are all side effects of the accident at Chernobyl. Many of these side-effects seem, sadly, to affect children more so than any other. These are truly disturbing photographs. As can be seen, in the images above, how very real and tangible consequences of the accident of Chernobyl really was. This is the effect that radiation can have on human growth, development, and quality of life. It is physical defects like these, along with, as of 2005, six thousand cases of diagnosed thyroid cancer. Human beings are directly responsible for the majority of environmental issues and negative environmental occurrences that are a result from the processes involved in human manufacturing or a result of human negligence or error. We as a species do not work with nature we force it to conform to our needs ; then, yet, seemed shocked when our actions interfere, damage, or, completely, destroy ecosystems. We are probably lucky that we haven't done far worse damage overall, but all the same, we need to be more responsible with the world that we abuse and accountable for repairing the damage that we have done. We need to spend more time determining how to find new means and resources that can be produced and acquired without so many negative repercussions to the environment and to the people of the world. In the end, we a human be beings are very responsible for many of the environmental issues because our society is directly linked to them. Chernobyl was clearly a matter of human error. Had the operators followed procedure and not allow

the computer to deactivate all the control systems then it never would have occurred; unfortunately the result of that negligence has and continues to cause illness and deformity even today. I am a supporter of finding alternative energies, alternative mean, and more environmentally, and therefore, health friendly solutions to maintaining and improving society.

References Cruz, G. (2010, May 3). Top 10 environmental disasters: Chernobyl. Time Magazine, 1. Retrieved from [http://content.time.com/time/specials/packages/article/0,28804,1986457\\_1986501\\_1986443,00.html](http://content.time.com/time/specials/packages/article/0,28804,1986457_1986501_1986443,00.html) UNSCEAR. (2012). The chernobyl accident. United Nations Scientific Committee on the Effects of Atomic Radiation, 1. Retrieved from <http://www.unscear.org/unscear/en/chernobyl.html> World Health Organization. (2011). Biomarkers & human biomonitoring. Childrens Health and the Environment, 1-35. Retrieved from <http://www.who.int/ceh/capacity/biomarkers.pdf>