

Radiation Dangers and Yellow Duckies

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Radiation surrounds us. It comes from the solar system, oceans, soil, the sun, and rocks. Medical and scanning equipment, televisions, microwaves, cell phones, power lines, also add to our exposure, and every time we fly, we are exposed to additional radiation.

According to Dr. Frank N. von Hippel, a nuclear physicist and a professor at Princeton University (USA) it will be years before we know the full health consequences of the disaster at the Fukushima Daiichi Nuclear Power Plant in Japan. Not only have millions of gallons of radioactive waters entered the Pacific Ocean, but radioactive isotopes have contaminated the air, soil, and other waters surrounding the nuclear power site.

DANGERS of RADIATION EXPOSURE

Except for workers directly exposed to extremely high levels of radiation, many experts feel that limited radiation exposure does not pose a danger. Others are concerned that the numbers of cancer cases, and birth defects, will increase in populations exposed to radiation.

Much of the information on radiation-induced illness comes from studies of a nuclear power station explosion in Chernobyl, Ukraine. Massive amounts of radioactive material were released into the environment, exposing its inhabitants and surrounding areas to radioactive contamination.

One hundred and thirty-four workers were exposed to whole-body radiation and developed acute radiation syndrome. One third of these individuals eventually died, but survivors suffered from other complications, including tumors and leukemia (blood cancer).

Radioactive fallout landing on grass was picked up by grazing cows. Their milk became contaminated, especially with radioactive iodine-131, which is concentrated

by the thyroid. (This is a special problem in children who use iodine for growth and development.)

The British Imperial Cancer Research Fund reported a 500 percent increase in thyroid cancers among children. Experts feel that many of these cases might have been avoided by simply not drinking contaminated milk.

WE ARE ONE WORLD

After the most recent nuclear disaster, trace amounts of radiation from the plant were detected in the air, tap water, soil, food, and rainwater throughout much of the world. This was not unexpected since weather patterns were moving easterly from Japan towards the States, Caricom, and the European continent.

Foods such as spinach, broccoli, milk, and beef test at levels far exceeding existing safety standards. However, since the radiation levels are 100,000 times less than the amounts typically found in a typical day's exposure to natural sources of radiation, many authorities feel that the readings pose no environmental or health risks. Experts say that a person would have to consume huge quantities of tainted foods and water before reaching the amount of radiation to which we are exposed when having a single CT scan.

Since oceans and wind travel throughout the world, catastrophic events can easily affect all of us. Over 15 years ago 29,000 plastic toys, including yellow duckies from a cargo ship, ended up in the Pacific Ocean. Water-tight and durable, many have floated in the oceans for years and over 17,000 miles, washing up

on the shores of many nations. This might mimic what we see with contaminated fish.

Seaweed and plankton can become contaminated with radioactive isotopes. Keystone "bait" species such as lance fish consume the plankton. The smaller fish are in turn eaten by larger fish, etc. right up the foodchain. Radioactive elements concentrate in the animals closer to the top of the food chain which humans can consume.

RESPONSES TO RADIATION EXPOSURE

The immune system is constantly surveying the body, trying to recognize and eliminate perceived threats. There are two major categories of immune factors produced by immune white blood cells: 1) Y-shaped antibodies and 2) cellular factors. The antibodies bind to the invader marking them for destruction by other immune cells. The smaller cellular factors, such as cytokines, help the body regulate immune inflammatory responses.

Imagine radioactive elements as being small, blinking "lights" that put out a killing laser beam every time they blink on. Immune cells protect the body by ingesting and trying to destroy these elements, but too often the radioactive activity destroys the cells which have taken up the radioactive material.

When cells are "burned" by radiation, the body triggers inflammatory immune responses which start the healing process. Once the damage is resolved and/or dead cells removed from the area, levels of inflammation need to decrease back down to "normal".

In order to survive a condition such as acute radiation syndrome, or high doses of medical radiation sometimes used in cancer treatments, the body must be in immune balance (homeostasis).

Initial symptoms of high-dose radiation may be nausea, vomiting, and diarrhea, which often last for days, after which for a short period of time people feel healthy and look good. Unfortunately however often the individual becomes ill again, and they do not live.

This sequence of events may be a reflection of unbalanced inflammatory responses. Initially inflammation helps the body heal. Then an exaggerated inflammatory response occurs in response to the tissue damage. The response may result in a "cytokine storm" during which the immune system goes "haywire", and the very molecules that are supposed to help the body trigger non-specific inflammatory responses throughout the body which causes illness or death.

SUMMARY

The nuclear risk level of the Fukushima nuclear plant is at the same level as that of the Chernobyl accident, and its short- and long-term implications may not be known for decades. How well one survives radiation exposure depends on how successfully the immune system copes with the challenge. The key to an optimal response is immune homeostasis, immune balance.

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