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## The 2011 Japan Earthquake and Tsunami and Public Health Preparedness

### Introduction

The powerful earthquake and tsunami that severely damaged the coast of Japan on March 11<sup>th</sup>, 2011 provide an important reminder to all Alaskans of the need to be prepared for earthquakes and other natural disasters. Furthermore, the ongoing threat of a substantial radiation release from the Fukushima Daiichi nuclear power plant necessitates public health officials, health care providers, and other responders to re-familiarize themselves with radiation emergency preparedness and response measures. Fortunately, at this point, *there is no immediate or anticipated indication that Alaska will be exposed to levels of radiation that would pose a public health threat* due to the deteriorating Fukushima Daiichi power plant.

### Earthquake and Tsunami Preparedness

Minimizing the health impact of an earthquake requires preparation, planning, and practice. Far in advance, people should gather emergency supplies, identify and reduce possible hazards in their homes, develop a family communications plan, and practice what to do during and after an earthquake. Detailed information regarding earthquake preparedness is available at the Centers for Disease Control and Prevention's earthquake preparedness website.<sup>1</sup> Everybody should have emergency supplies readily available in their homes, including a first aid kit, medications, food, water, and a survival kit with essential tools and supplies.<sup>2</sup>

In the event of a tsunami warning, persons living in a tsunami evacuation zone should follow the advice of local emergency and law enforcement authorities, which typically involves moving quickly inland to higher ground. The National Weather Service West Coast and Alaska Tsunami Warning Center, located in Palmer, Alaska, is constantly monitoring for earthquakes and tsunamigenic events in Alaska and posts real-time updates on their webpage (<http://wcatwc.arh.noaa.gov>).

### Radiation Emergency Preparedness and Response

The Alaska State Public Health Laboratory (ASPHL) and the U.S. Environmental Protection Agency (EPA) actively monitor *beta* and *gamma* radiation levels in Anchorage, Fairbanks, and Juneau. The monitors are currently taking at least 15 readings per day collectively; historical data through September 2010 are currently available via the EPA RadNet query site.<sup>3</sup> ASPHL will be posting gross radiation data on the DPH radiological preparedness webpage in the near future.<sup>4</sup>

If the levels of radiation begin to rise substantially above the background level, government officials will inform the public of what protective actions to take, depending on the situation.<sup>5</sup> If a radiation emergency involves the release of large amounts of radioactive materials, the public might be advised to either "shelter in place," which means to stay in their home or office, or evacuate to another location. If people are advised to shelter in place, they should do the following:

- close and lock all doors and windows;
- turn off fans, air conditioners, and forced-air heating units that bring in fresh air from the outside;
- only use ventilating units to recirculate indoor air;
- close fireplace dampers;
- move to an inner room or basement; and
- keep a radio tuned to the emergency response network or local news to find out further instructions.

If people are advised to evacuate, they should leave the area as quickly and orderly as possible. In addition, they should take a flashlight, portable radio, batteries, first-aid kit, supply of sealed food and water, hand-operated can opener, essential medicines, and cash and credit cards.

### Radiation Sickness

Radiation sickness, known as acute radiation syndrome (ARS), is a serious illness that occurs when a person receives a high dose of radiation, usually over a short period of time. Persons exposed to radiation will get ARS only if the radiation dose was high; the radiation was penetrating (i.e., reached the internal organs); most of the person's body was exposed; **and** the radiation was received in a short time (e.g., minutes).<sup>5</sup>

The first symptoms of ARS--nausea, vomiting, and diarrhea--start within minutes to days after the exposure, and can last for up to several days. Then the person usually looks and feels healthy for a short time, after which he or she will become sick again with loss of appetite, fatigue, fever, nausea, vomiting, diarrhea, and possibly seizures and coma. This stage may last from a few hours up to several months. Patients with ARS might also have some skin damage and hair loss. Most patients who do not recover from ARS will die within several months of exposure. The cause of death in most cases is the destruction of the person's bone marrow, which results in infections and internal bleeding. For the survivors, the recovery process may last from several weeks up to 2 years.<sup>5</sup>

### Potassium Iodide and Prussian Blue

Potassium iodide (KI) should only be taken in a radiation emergency that involves a substantial exposure to radioactive iodine.<sup>5</sup> The thyroid gland readily absorbs radioactive iodine, which can lead to cancer or abnormal growths. KI prophylaxis saturates the thyroid gland with iodine, decreasing the amount of harmful radioactive iodine that can be absorbed. KI only protects the thyroid gland and does not provide protection from any other radiation exposure. KI can lead to adverse side effects, including intestinal upset, allergic reactions, rashes, and inflammation of the salivary glands. KI is contraindicated for persons with iodine allergies and certain skin disorders.<sup>5</sup>

Prussian blue is used to treat patients who have been internally contaminated with radioactive cesium and thallium because it traps these radioisotopes in the intestines and prevents them from being re-absorbed in the body. Health care providers can prescribe Prussian blue at any point after they have determined that a person who is internally contaminated would benefit from treatment. Should Prussian blue and/or KI be needed anywhere in the United States, federal supplies will be made available to state and local health officials for distribution. Prussian blue and KI dosing information is available online.<sup>5</sup>

### Recommendations

1. Health care providers should educate their patients about the importance of emergency preparedness, and encourage them to have an emergency supply kit at home.
2. Inform patients that at this time, there is no immediate or anticipated indication that Alaska will be exposed to levels of radiation that would pose a public health threat from the deteriorating Fukushima Daiichi power plant.
3. Alaska providers should *not* recommend KI prophylaxis for their patients at this time.
4. Providers should sign up to receive Public Health Alert Network messages at: <http://www.epi.alaska.gov>

### References

1. CDC. Earthquake Preparedness. Available at: <http://emergency.cdc.gov/disasters/earthquakes>
2. CDC. Emergency Supplies for Earthquake Preparedness. Available at: <http://emergency.cdc.gov/disasters/earthquakes/supplies.asp>
3. EPA RadNet query page. Available at: [http://oaspub.epa.gov/enviro/erams\\_query.simple\\_query](http://oaspub.epa.gov/enviro/erams_query.simple_query)
4. State of Alaska Radiological Preparedness Homepage. Available at: <http://www.hss.state.ak.us/prepared/radiological.htm>
5. CDC Radiation Emergencies Fact Sheets. Available at: <http://emergency.cdc.gov/radiation/factsheets.asp>