Guidance for Public Health Departments and Clinicians Caring for Individuals Who May Have Been Recently Exposed to Polonium 210 (Po-210)

Background Information Concerning Polonium 210

Po-210 is considered to be one of the most hazardous radioactive materials known, but it must be inhaled or ingested to exert its toxic effects. It is found naturally in the environment, and the general population is internally contaminated with small but measurable amounts of it on a regular basis through food, water, and air. Because tobacco leaves are known to concentrate Po-210, users of tobacco products are likely to have higher levels of this radioactive element in their bodies. Po-210 decays to a stable isotope of lead (Pb-206) by emitting alpha particles, and the largest part of the alpha dose is delivered over the first 100 days following a single administration. Between 50% and 90% of ingested polonium promptly appears in the gastrointestinal (GI) tract; from there it leaves the body in the feces. The retained fraction enters the bloodstream where it concentrates in the soft tissues. Approximately 45% of ingested Po-210 is deposited in the spleen, kidneys, and liver; 10% is deposited in the bone marrow and the remainder is distributed throughout the body. Within the bloodstream, polonium combines with the globin portion of hemoglobin.

The physical half-life of Po-210 is about 140 days. Physical half-life is a measure of the time required for one-half of the activity of a particular radioactive substance to be lost due to radioactive decay. The whole body biological half-life of Po-210 is approximately 50 days. Biological half-life is a measure of the time required for biological processes to eliminate one-half of the radionuclide retained by the body. The effective half-life of Po-210 (the time required for the combined action of the physical and biological half-lives to reduce the activity by 50 percent) is approximately 40 days.

Clinical Guidance Recommendations

CDC recommends that clinicians conduct a thorough history and physical examination on all individuals who present with health concerns following recent travel to locations in the United Kingdom (UK) identified as being environmentally contaminated with Po-210. The primary goal of this evaluation should be to rule out a diagnosis of Acute Radiation Syndrome (http://www.bt.cdc.gov/radiation/arsphysicianfactsheet.asp) as a result of internal contamination with Po-210. Although the onset of Acute Radiation Syndrome (ARS) due to internal contamination may be delayed as compared to that caused by external radiation exposure, it is unlikely that an individual will develop new onset ARS many weeks following travel to the UK.

CDC further suggests that clinicians consider the appropriateness of the following tests when providing care for individuals who have recently traveled to locations known to be environmentally contaminated with Po-210

- Complete Blood Count (CBC) with differential. In otherwise asymptomatic individuals, abnormal CBC results may be useful in detecting/diagnosing subclinical ARS caused by internal contamination with Po-210. Identification of subclinical decreases in lymphocyte or neutrophil counts, however, is unlikely to alter the acute medical management of the individual.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
SAFER • HEALTHIER • PEOPLE™

(continued from previous page)

- 24-hour urine collection to assay for the presence of Po-210.* Detection of Po-210 in the urine (in excess of background) is strongly suggestive of internal contamination. In the absence of adverse health effects, however, individuals identified as being internally contaminated with Po-210 do not face an immediate health risk. CDC does not recommend the use of conventional or alternative medical therapies to treat elevated body burdens of Po-210 in individuals without clinical findings of ARS.

*For information on laboratories capable of testing for Po-210, contact your state health department, which will work with your state radiation control program office to identify an appropriate facility.