

NPHL Investigates Effects of Sterilizing Irradiation on Newborn Screening Tests

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Contamination of U.S. Senate offices by anthrax spores delivered through the mail prompted the United States Postal Service (USPS) to institute a program of sterilization of mail for the Washington, D.C. area. This program was initiated in October 2001. Sterilization is being performed by irradiation. The level of irradiation needed to kill spore-forming bacteria such as *Bacillus anthracis* is known to affect the integrity of diverse items that may be sent through the mail, including electronics, film, food, and paper as well as medical diagnostic test kits and biological samples.

Among approximately 25,000 bloodspot specimens per year tested by the Nebraska Newborn Screening Program, as many as 10% of these samples are transported to the testing laboratories via the USPS. The potential effects of irradiation on bloodspot newborn screening tests were unknown. Although there are currently no plans by the USPS to irradiate mail in Nebraska, irradiation effects on newborn screening bloodspots were investigated by the University of Nebraska Medical Center in collaboration with Quest Diagnostics in Lincoln.

The study found that enzyme activities (biotinidase and galactose-1-phosphate uridylyl transferase), and concentrations of the hormones thyroxine and thyrotropin, were reduced by irradiation, but that the reductions due to irradiation would be unlikely to cause false negative screening results for those tests. However, it was found that degradation of hemoglobins by irradiation would likely cause the interpretation of hemoglobinopathy screening to indicate the possible presence of hemoglobin variants, a result that would require follow-up testing. Overall, the study concluded that alternative means of transport for newborn screening bloodspots would be advisable were irradiation of USPS mail be undertaken on a large scale. A report of this NPHL study will be presented at the 2002 National Meeting of the American Association for Clinical Chemistry, July 28-August 1, Orlando, FL. Detailed information about the

USPS irradiation program, and about the means and effects of sterilizing irradiation, can be found in the following sources: Barnaby JF, Feder AC. A nation challenged: killing anthrax. New York Times 2001, October 25.

Day TG, Government postal service customer announcement, October, 2001 (<http://www.usda.gov/dalusdaoperations/USPS.htm>).

Florig HK. Is safe mail worth the price? Science 2002;295:1467-1468.

Hanson DJ. Zapping the mail. Chem Eng News 2002;80:30-32.

N'Gadi A. The effects on research specimens and museum collection items from electron beam irradiation of mail by the US Postal Service. Smithsonian Center for Materials Research and Education, November 2001 (http://www.si.edu/scmre/mail_irrad)