WPM-C - Internal Dosimetry
Wednesday, 12 July 2017
306 AB
2:30 - 5:00 p.m.
Chair(s): Jim Neton

WPM-C.1 A BIOASSAY MONITORING LESSON LEARNED FROM A SPECIAL EXPOSURE COHORT EVALUATION. *Taulbee, T.*, Davis, J., Findley, W.; National Institute for Occupational Safety and Health, Oak Ridge Associated Universities, MJW Corporation;* taulbet@gmail.com

A Special Exposure Cohort (SEC) evaluation for the Idaho National Laboratory, conducted under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA) of 2000, provides a good opportunity to influence current bioassay monitoring programs that use surrogate radionuclides as indicators of internal exposure. From 1963 through 1974, the Chemical Processing Plant (CPP) separated and recovered plutonium in conjunction with the primary process of recovering enriched uranium from a wide variety of spent nuclear reactor fuels. During this time period, there was a degradation of the radiological controls as indicated by the access corridor in the process building transitioning from a relatively clean area where no personal protective equipment (PPE) was required to an area that required coveralls and shoe covers. Even though surveys indicated that contamination was increasing and spreading, special bioassay monitoring for plutonium was not instituted. The general belief was that significant intakes would be identified either through air monitoring or through mixed fission product bioassay. This practice was considered an adequate defense in depth approach at the time. In 1972, an airborne radioactivity incident in the Mass Spectroscopy Laboratory at CPP required follow-up bioassay for plutonium. During the follow-up evaluation, bioassay from one of the workers exhibited a different $^{238}Pu/^{239}Pu$ ratio than expected. The investigation revealed that this worker had been involved in a separate, undetected internal exposure incident approximately 6 mo earlier. This incident brought into question the National Institute for Occupational Safety and Health's (NIOSH's) ability to reconstruct internal dose with sufficient accuracy by raising the following question: Were there other CPP workers who received undocumented intakes from undetected incidents? As a result of our review of this issue, NIOSH recommended that all CPP workers with employment between 1963 and 1974 be added to the Special Exposure Cohort. The lesson learned from this example is that air monitoring and surrogate bioassay may not be sufficient to adequately monitor a workforce when the radionuclide of concern can be separated from the surrogate radionuclide. Special attention should be given to analytical laboratories and portions of operational processes where separations can occur.

WPM-C.2 PLUTONIUM IN TISSUES OF OCCUPATIONALLY EXPOSED INDIVIDUALS *Tabatadze, G.*, Avtandilashvili, M., Tolmachev, S.; U.S. Transuranium and Uranium Registries, Washington State University;* george.tabatadze@wsu.edu

The United States Transuranium and Uranium Registries (USTUR) studies actinide biokinetics and tissue dosimetry by following up occupationally exposed workers. The USTUR research relies heavily upon postmortem autopsy findings and radiochemical analysis of tissues. Tissue analysis provides data on actinide distribution, retention, and radiation dose estimation from internally deposited radionuclides. In this study, 1,678 tissue samples from 295 voluntary donors to the USTUR were analyzed for plutonium using alpha-spectroscopy. The activity concentrations of $^{239+240}Pu$ were measured in 288 lung tissues, 265 thoracic lymph nodes (LNTH), 285 liver samples, and 840 bones from 253 cases. For each case,

SIXTY-SECOND ANNUAL MEETING OF THE HEALTH PHYSICS SOCIETY

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Abstracts of Papers Presented at the Meeting

MONDAY

MAM-A – PLENARY SESSION
Monday, 10 July 2017
Ballroom C
8:00 a.m. - 12:00 noon
Chair(s): Robert Cherry

[Titles and authors not available at time of print.]

MONDAY

P - POSTER SESSION
Monday, 10 July 2017
Exhibit Hall A
1:00 – 3:00 p.m.

P.1 IMPLEMENTATION OF A SCHOTTKY DIODE DETECTOR AT THE MCMASTER MICROBEAM ACCELERATOR *Urlich, T.*, Thompson, J., Byun, S.; McMaster University;*
tomas.r.urlich@gmail.com

Transmission Δ detectors are an attractive solution for single ion irradiation facilities. By positioning a detector before the biological specimen, doses can be more accurately determined and therefore better controlled. Such detectors must be very thin in order to minimize beam energy loss and particle scattering. Based on the work at other international microbeam facilities, a Schottky diode based detector has been specifically designed for detection of up to 3 MeV protons at McMaster University's microbeam accelerator. A fundamental requirement of the microbeam is the ability for the beam to target a single cellular nucleus. To accomplish this, detector dimensions and placement within the microbeam's end station facility were carefully optimized using TRIM (Transport of Ions in Matter) software to reduce beam broadening. Detector fabrication using 10 micron silicon is in its final stages and will be followed by electrical characterization and experiments

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