Improving the Validity of Am and Pu Bone Burden Estimation from Bone Samples taken at Autopsy

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USTUR

The United States Transuranium and Uranium Registry (USTUR) is a resource of human tissue samples donated by workers occupationally exposed to actinides.

The USTUR studies the retention, relocation and final fate of actinides in the human body using tissue samples obtained at autopsy of occupationally exposed workers.

The USTUR receives two types of donations:

- Whole body
- Partial body

Tissue Samples

USTUR autopsy protocol often includes tissue samples from:

- Lung
- Trancheobronchial lymph nodes
- Liver
- Bone

Bone samples are taken from:

- Sternum
- Ribs
- Lumbar
- Vertebral bodies
- Patella

Estimation of Bone Burden

The samples are radiochemically analyzed for americium and plutonium to determine the activity concentration.

The average activity concentration in these bone samples are then used to extrapolate to the total skeletal mass of reference man assuming a uniform skeletal distribution or, applying a correction factor.

How Good are these Estimations?

Because the distribution of Am and Pu in the skeleton is not well known, the accuracy of such estimations is unclear.

- It is known that actinide concentrations are greater in trabecular bone than cortical bone.
- Very little is known about the variations in concentration in individual bones

Skeletal Actinide Distribution

In order to improve the estimates and their credibility a better understanding of Am and Pu concentrations in the skeleton is needed.

The best way to improve our understanding of these distributions is to study whole or half skeleton cases.

Skeletal Actinide Distribution

Analysis from thirteen skeletons provide an opportunity to determine the ratio of skeletal concentration in individual bone to the average skeletal concentration.

We are considering the consistency of the ratio of the concentration within an individual bone to that of the skeleton

Skeletal Actinide Distribution

- Using the USTUR database, we hope to improve estimation techniques
- We are considering a determination/reaffirmation of which bones samples are best suited for making these estimates of bone burdens
- There are also plans to apply these techniques to MAYAK worker data.

References

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- Kathren 1987 Actinide Distribution in the Human Skeleton

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