What We Can Learn From Low Level Measurements of Long Lived Activity in Human Tissues

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This multidisciplinary presentation includes a brief review of what human tissue measurements have provided to date, and a view of what lies on the horizon from the perspective of the health physicist, radiation biologist, and radiochemist. Postmortem human tissue measurements have for some years yielded important new understanding of the basic biokinetics and dosimetry and, to a lesser extent, possible biological effects. Of low levels of long-lived radionuclides, and in particular the actinide elements. As a result of these measurements, new biokinetic parameters have been put forth for plutonium and americium, and suggested revisions to existing standard bikinetic models made. Recent high sensitivity techniques such as kinetic phosphorescence analysis (KPA) for uranium fission track, analysis for plutonium, and simpler and less expensive methods for separation of the 239 and 240 isotopes of plutonium promise to refine and extend our knowledge to even greater heights. Already KPA has been used to evaluate diurnal variation in human uranium output and to validate the commonly used simulated 24-hour urine sample. While these new and improved low level physical and chemical measurements promise to extend even further our understanding of what might be termed the macrobiokinetics of the actinide elements, when combine with available and emerging biological measurements such a fluorescent in situ hybridization (FISH), chromosomal aberrations, and biomarker protocols will aid us in identifying and quantifying the ability of ionizing radiation and other environmental pollutants (e.g. hazardous waste stream chemicals), acting alone or in combination, to induce neoplasia, Moreover, in combination they hold promise for extending our understanding to the molecular and gene level rather than the mor3 generalized understanding we have today.

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