

Current Status of Emergency Biodosimetry

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The accepted generic multiple-parameter and early-response biodosimetry and dosimetry assessment approach for suspected high-dose radiation (i.e. life-threatening) exposure includes measuring radioactivity associated with the exposed individual (if appropriate); observing and recording prodromal signs/symptoms; obtaining serial complete blood counts with white-blood-cell differential; sampling blood for the chromosome-aberration cytogenetic bioassay using the 'gold standard' dicentric assay (premature chromosome condensation assay for exposures >5 Gy photon acute doses equivalent), measurement of proteomic biomarkers and gene expression assays for dose assessment; bioassay sampling, if appropriate, to determine radioactive internal contamination; physical dose reconstruction, and using other available opportunistic dosimetry approaches. Biodosimetry and dosimetry resources are identified and should be setup in advance along with agreements to access additional national, regional, and international resources. This multifaceted capability needs to be integrated into a biodosimetry/dosimetry 'concept of operations' for use in a radiological emergency. The combined use of traditional biological-, clinical-, and physical-dosimetry should be use in an integrated approach to provide: (a) early-phase diagnostics to guide the development of initial medical-management strategy, and (b) intermediate and definitive assessment of radiation dose and injury. Use of early-phase (a) clinical signs and symptoms, (b) blood chemistry biomarkers, and (c) triage cytogenetics shows diagnostic utility to predict acute radiation injury severity. In addition, identified diagnostic gaps in a national biodosimetry strategy will be discussed. Funding support was provided by the following grants: JPC (AF-B2-10664; AFRRRI (AFR-B2-11659). Disclaimer: The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH, the DoD, or the Uniformed Services University of the Health Sciences Department; nor does it imply the endorsement of any product.