

Overview of BioDose 2008 and the Needs for Biodosimetry

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The need for biodosimetry arises from the great need for information on radiation doses to individuals following the potential exposure of large numbers of individuals, combined with the lack of methods to obtain this estimate by other means. This information is needed for acute exposures that may be sufficient to lead to the acute radiation syndrome and also for lower doses that may result in long term consequences. The information is needed for dealing with the potential consequences to individuals and also for understanding the probability of long term effects from the “natural experiments” resulting from the exposures of populations to radiation. The needs for the measurements of acute exposures include for triage to enable the response system to cope with the large numbers of individuals effectively and efficiently, and also for management of individual patients. Depending on the circumstances in the use for triage there may be a need for rapid screening in the field or, if there is not severe local disruption, it may be possible to proceed more deliberately and obtain the results from samples that are processed elsewhere. There are two types of biodosimetry:

1) based on physical changes in tissues (detected by techniques such as EPR or luminescence) and (2) based on changes in biological parameters such as gene activation or chromosomal abnormalities.

The biologically based parameters are potentially very sensitive, but may require time for the changes to occur via biological processing and may be affected by other perturbations that may be associated with an acute event including stress, wounds, and burns. The physically based methods are not subject to these limitations but may not fully reflect the biological implications of some of the biologically based methods.

Characteristics of types biodosimetry include differences in capacity, requirements for specially trained personnel, field deployability, interval before measurement can be made, interval before results are available, precision, applicability to the population, response to the energy of photons, response to neutrons, determination of dose distribution, and variation in response among individuals.

Considering all of the above, several conclusions can be drawn:

1. The applicability of a particular type of biodosimetry will depend on the characteristics of the particular event
2. It is unlikely that any single type of biodosimetry will be the method of choice for most situations
3. Some types of biodosimetry may be the method of choice for particular situations
4. The best approach is likely to be the use of more than one type of biodosimetry
5. Decisions on the use of particular types of biodosimetry methods will be facilitated by knowledge of their detailed characteristics
6. The employment of biodosimetry should be integrated into other types of information that bear on the exposure doses of the particular event.

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