Current needs of biodosimetry in studies of long term health risk following radiation exposure

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Study Goal: Motivation for the development of new biodosimetry techniques, suitable for use in long-term epidemiologic (health risk) studies.

Abstract: While the conduct of epidemiologic (long term health risk) studies may not comprise the most crucial need for the development of new biodosimetry measurement techniques, it is a need that repeatedly becomes obvious as new health risk studies are undertaken and new cohorts of exposed persons are identified for study with the hopes of deriving a deeper understanding of radiation risk. The ultimate application of biodosimetry in health risk studies would be, of course, for biodosimetry methods to completely replace model-based dose reconstruction – a complex suite of methods for retrospectively estimating doses that is almost always fraught with large uncertainties due to absence of important exposure-related information, as well as imperfect models. Presently, however, there are numerous limitations of available biodosimetry techniques that constrain their widespread application in health risk research, including limited ability to assess doses received far in the past, high cost, great inter-individual variability, invasiveness, higher than preferred detection limits, and the inability to assess internal dose (for the most part). The most likely use today of biodosimetry in health risk research is for the techniques to potentially improve radiation epidemiologic studies by providing a means to corroborate analytical or model-based dose estimates, to assess bias in models and their dose estimates, and to reduce uncertainty in individual or group-average doses. The requirements of biodosimetry for health risk research might be considered to be more stringent than for emergency response where accident or terrorist-related doses were received hours or days earlier and the level of precision required must only distinguish levels of triage. In contrast to triage, radiation epidemiologic studies typically rely on accurate estimation of doses to specific organs of individuals in order to derive reliable estimates of risk of cancer or other health outcomes.

Conclusion: Because an understanding of radiation risk underpins all efforts and programs to control intentional and unintended exposures, researchers should be cognizant of the potential contribution that new biodosimetry assessment tools could make to the science and practice of radiation protection. These issues will be explored in this presentation.

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