INCREASING TRIAGE SCORING CAPACITY FOR DICENTRIC CHROMOSOME ASSAY

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The dicentric chromosome assay (DCA) is the currently accepted biodosimetry method for radiation dose assessment. The DCA can be used for quickly assessing dose to individuals following a radiological or nuclear incident in order to provide input to the medical community. The DCA's application in radiation mass casualties necessitates greater chromosome aberration analysis capacity which can be achieved by increasing the personnel devoted to analysis through networking and through decreasing the number of metaphase cells scored. In Canada, both these strategies are currently being explored.

Towards increasing personnel devoted to analysis, a network has been formed, comprised of four core reference laboratories and multiple clinical cytogenetic laboratories that can assist in scoring of the DCA. A recent exercise was performed, testing the capacity of the four core laboratories. The goal of this exercise was to establish the number of individuals that were qualified to perform the DCA for triage quality biological dosimetry. The results of this exercise demonstrate that, based on scoring a minimum 50 metaphase cells or 30 dicentrics, dose estimates within 95% confidence intervals (CI) were made 9 times out of 10.

Using data from this exercise and examining previously scored samples, the required number of scored cells for a reasonable dose estimate was re-examined. For doses over 2.0 Gy, it is evident that fairly representative dose estimates can be made after scoring 5 dicentrics. Although the CI on these dose estimates is large, experience shows that the predicted dose does not change significantly after scoring 5 dicentrics, although the CI decreases substantially. In addition, when examining lower doses, if no dicentrics are found within the first 10 cells, the dose is likely to be less than 2.0 Gy. When responding to an emergency situation, especially one with many casualties, being able to provide dose information very early after exposure is essential to the medical management of these casualties. More accurate dose estimates can be made at a later time if required.

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