

Title	Development and application of the PCC biodosimetry method in emergency preparedness
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Abstract	<p>A method for biological assessment of radiation dose for specific application in emergency preparedness was developed. Premature chromosome condensation (PCC) was investigated to provide a potentially faster means of analysis and the ability to assess higher doses than with the dicentric assay which is routinely applied in biodosimetry today.</p> <p>A review of existing methods was made, followed by experiments determine optimal assay conditions, and evaluations to determination of optimal conditions and the most appropriate endpoints for analyses. Twelve different experimental conditions were examined with four different evaluation approaches. Aspects during optimization such as practicality, speed, and reliability were considered. The conclusion from these studies was a PCC protocol utilizing okadaic acid for induction of PCC cells in stimulated lymphocytes but without the use of colcemid for metaphase arrest with the subsequent evaluation of ring chromosomes. Well-defined criteria were established for evaluation of PCC cells and ring chromosome aberrations. An inter-calibration was made by comparing assessment of ring chromosomes between all three laboratories. Agreement was made to count only rings with observable open spaces or large, obvious rings without open spaces. The finally a dose response curve for the PCC method was prepared and a comparison of the PCC method to the traditional dicentric assay in triage mode was made. The triage method requires a minimal number of evaluations so that categorization of high, medium and low doses may be made in an emergency situation where large numbers of people should be evaluated. The comparison of the PCC method with the dicentric assay triage method indicated that the PCC assay performed superior to the dicentric assay for evaluation of samples at higher doses, however, the dicentric assay appeared to provide more accurate dose assessment at lower doses.</p> <p>This project suggests a PCC assay method for biological dose estimates for emergency preparedness purposes. The conclusions indicate that an optimal approach in emergency applications would be the parallel cultures for both PCC and dicentric analysis, followed by triage analysis to indicate high or low dose, followed by more detailed analysis by either for PCC rings or dicentrics depending on the magnitude of dose.</p>
Key words	Biodosimetry, PCC, dicentric assay, dose reconstruction, emergency preparedness