

New Publication

Assessing the Applicability of FISH-based Prematurely Condensed Dicentric Chromosome Assay in Triage Biodosimetry. Health Physics, 2015 March,108(3): 371-376.

<http://www.ncbi.nlm.nih.gov/pubmed/25627950>

Supplementary Technical Note

For assessing the applicability of the prematurely condensed dicentric chromosome (PCDC) assay for the triage mode dosimetry, we first evaluated technical issues concerning the reproducibility of cell fusion, which has been pointed out as the most crucial drawback in PCC experiments. The efficiency for the yield of fused cells containing prematurely condensed human chromosomes was dependent on the active states of both human and mitotic Chinese hamster ovary (CHO) cells. Mononuclear cells isolated from one-day old whole blood samples gave satisfactory cell fusion results. Cells prepared from older whole blood samples sometimes caused disturbance of cell fusion mainly because of leukocyte aggregation and erythrocyte contamination. As for the mitotic CHO cells, those derived from the same batch of cell stock obtained from the same shaking-off experiments showed the constant efficiency of cell hybridization.

Second, the feasibility of the present method for mass-casualty incident scenarios was assessed by simulation. Assuming that 20-50 blood samples are to be examined at once, the cell hybridization procedure would be a crucial and rate limiting step. In a series of preliminary experiments, we found that five samples could be examined simultaneously. After adding polyethylene glycol (PEG) solution to the test tube to hybridized cells for one minute, the tube could be kept for several minutes on ice. The one-minute hybridization step could be processed in line with an interval of a few minutes. More than 50 blood samples would be overloaded for the capacity of a single laboratory considering the time needed to analyze cells by fluorescent microscopy. Furthermore, the low number of cells scored in triage mode may pose difficulties in the case of non-uniform exposures. For rapid triage, a multi-laboratory collaborative strategy can offer increased throughput and reliability of obtained data even with a lower number of scored cells in a single laboratory.