

Automation and Rapid Detection Methods for Biodosimetry Emergency Response

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Objective

To use the methods of biological dosimetry to improve high throughput, rapid detection and automated analysis as well as develop new technologies for use in emergency biodosimetry. This project will aim to improve and sustain the capability for emergency response with expansion of methods and emerging technology for dose estimation, as well as develop new partnerships in which to test the response and capability with relevant federal partners as well as internationally.

Past Work

Year 1 (2018-19)

- Completed method development to perform retrospective dosimetry in support of Health Canada
- Developed a new method using imaging flow cytometry using the Cytokinesis-block micronucleus (FCBMN) assay for high throughput.
- Begun development on a new assay using the imaging flow on a DNA double strand break assay (F-H2AX).
- Participated in a yearly intercomparison exercise with the Canadian network as well as some International biodosimetry laboratories.

Current Work

Year 2 (2019-20)

- Accepted abstract for oral and poster presentation to ICRR (international Congress of Radiation Research) in Manchester England, August 2019.
- Performing experiments to improve method from 2018-19 on F-CBMN to shorten time to achieve dose estimations.
- Further development on F-H2AX for higher specificity for dose estimations.
- Scoring of the dicentric chromosome assay (DCA) to update previous gamma dose response curve to reflect staff and laboratory changes for accurate emergency use.

Outcomes/Future Work

- Newly generated gamma dose response curve to be used for emergency biodosimetry for the Dicentric analysis
- Complete development of method for F-CBMN by imaging flow cytometer at shorter culture time.
- Further development of methods to automate DCA analysis.
- Complete optimization of H2AX assay (F-H2AX) by imaging flow cytometry

Achievements

- Presented at international conference (ICRR) on emergency biodosimetry methods in Canada.

- Developed method for emergency biodosimetry using H2AX assay for rapid triage by image flow cytometry.
- Completed method for use in emergency biodosimetry using the CBMN assay on the imaging flow cytometer

Stakeholders

Health Canada – Consumer and Clinical Radiation Protection Bureau (primary)