The WHO BioDoseNet image repository for dicentric assay

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Study Goal: The WHO BioDoseNet was founded as a global network of biodosimetry laboratories for radiation emergencies. The new established image repository is a databank of various galleries of electronically scanned images of metaphases which have been already analyzed with the dicentric assay by many international experts. The detailed scoring results and dose estimations were published in most cases and make the image repository a valuable tool for training and research purposes in biological dosimetry.

Abstract: The images were captured from human blood samples, irradiated in different radiation exposure scenarios (projects of WHO BioDoseNet, MULTIBIODOSE, RENEB) and analyzed with dicentric assay. With this cytogenetic method, a retrospective dose reconstruction in assumedly exposed subjects is feasible.

The image repository is structured as a collection of several independent modules. Each module consists of galleries with 20, 50, 150, 300 or 800 metaphases. One complete dose effect curve and corresponding blind samples are included, too. This is the first time that access to the scored images will be opened to the members of the WHO BiodoseNet. No special software is needed to score the image galleries; this can be done with any conventional internet browser.

During inter-comparisons of biodosimetry service laboratories, whole blood samples or slides were circulated. The new method of web based scoring opened the opportunity of sharing virtual slides via the internet. The results obtained so far are very promising, showing a lower variation between the results of different labs than expected. Furthermore, the use of web based images provided a lot of information about the scoring criteria of the participating laboratories and about the cells, which either gave clear results or were controversial and discussed. Thus, the image repository provides a powerful tool towards the harmonization of scoring criteria.

For new scorers the WHO image repository can be a valuable training set for dicentric assays. The existing published data allow the users to directly compare their own results with those from other labs. Furthermore, the now existing image repository with > 23,000 images and 8 modules is an excellent instrument for intra-laboratory training purposes or inter-comparisons between laboratories. Both procedures are very important for maintaining quality and quality assurance as recommended by the ISO standards and IAEA manual.

Conclusion: The image repository is an open database, where further training or research modules (incl. contact persons) can be added easily. Therefore, the image repository can become a helpful tool to reduce turn-a-round time for dose estimation; sharing the workload by mutual assistance of several laboratories in case of a large scale radiation event, when a lot of images have to be analyzed. Furthermore, the image repository opens the opportunity to receive a second opinion in single cases immediately.