

**Automatic detection of dicentric chromosomes in biodosimetry**

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In case of large scale accidental overexposure to ionizing radiation, a rapid triage of the population exposed is needed first, followed by an accurate dose estimation for each individual. Currently, these two steps are performed by scoring unstable chromosomal aberrations (dicentrics, rings and fragments) in peripheral blood lymphocytes after Giemsa staining. For the triage step, only 50 metaphases are currently manually analysed. This is rapid but not accurate and may introduce false negative dose classification. For the second step, 500 metaphases are currently manually analysed. This is very accurate but very long. To improve the method, we have studied the automatic dicentrics detection by Metafer 4 software (MetaSystems) on accidental overexposure victims of the Dakar accident (Africa). The study has been performed firstly by the manual scoring of dicentrics on 50 metaphases (50 MS) used for a population triage, secondly by the manual scoring of dicentrics on 500 metaphases (standard approach; 500 MS) and thirdly by the automatic scoring of dicentrics (ADS). The comparison between dose classification obtained by 50MS and obtained by 500MS methods shows 54.2% (32 on 59 individuals) correlation however there is 45.8% (27 on 59 individuals) of underestimation. Moreover, comparisons of dose classification between the results obtained by ADS and 500MS show 95.7% (44 on 46 individuals) of correlation and 4.3% (2 on 46 individuals) of underestimation. In addition, the mean doses obtained by ADS method are near to the mean doses obtained by 500MS. To conclude, ADS method is faster and more accurate than the manual scoring of 50 cells and could be used in case of triage. In addition, ADS method could also be used instead of 500MS in case of individual dose estimation as it is as accurate and much faster.