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Automation of the Buccal Micronucleus Cytome Assay

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Originally, the buccal micronucleus technique was a simple assay in which only micronuclei (MNi) are scored. It eventually evolved into a complex two-stage cytome assay in which cells are first classified into seven types (Basal, Differentiated, Binucleated, Condensed chromatin, Karyorrhexis, Pyknotic, Karyolytic cells) and secondly MNi and nuclear buds (NBUD) are scored in differentiated cells only. Both the relative frequency of the various cell types and the number of differentiated cells with MNi and/or NBUD have diagnostic value with regards to toxic environmental exposures, poor lifestyle, malnutrition and a wide range of diseases. Scoring this complex profile of biomarkers is laborious and limits the possibility of doing genetic toxicology studies efficiently using a relevant epithelial cell type that can be obtained in a minimally invasive manner.

Therefore, there is a legitimate need to automate some of the best validated biomarkers of the Buccal Micronucleus Cytome assay and ultimately achieve a fully automated system that scores all the biomarkers. In my presentation I shall discuss which of the buccal biomarkers may be easier to measure automatically by image analysis and present some preliminary data with DAPI stained slides using the Metafer system. A key question is which slide preparation and staining system is most suitable for both visual and automated scoring of buccal cell biomarkers?

Keywords:
Buccal, micronucleus, cytome, scoring, automation.