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General overview of the comet assay

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The comet assay measures DNA strand breaks in single cells. Cells in agarose on a microscope slide are lysed with detergent and high salt. Electrophoresis results in structures resembling comet tails formed by DNA fragments moving towards the anode. The assay is used for genotoxicity testing, ecotoxicity, human biomonitoring, molecular epidemiology and basic research into DNA damage and repair and effects of nanoparticles. This overview will consider examples from the author's group and collaborators. These will include for genotoxicity testing the specificity and sensitivity of the assay, for ecotoxins that work with DBP halogenated acetic acids, for human biomonitoring and molecular epidemiology work with mother and babies, diabetes and lead-exposed children and for fundamental research drug resistant non-Hodgkin's lymphoma patients over-expressing p53 mutant protein and lacking DNA repair. Most of this work is in somatic human lymphocytes and human sperm. Using sperm, the positive response to oestrogens can be diminished with anti-oxidants, suggesting a ROS involvement. Also as age increases in men so does DNA damage and in both cell types nanoparticles of zinc and titanium dioxide can also produce damage. When modified, it can be used as a blood test to predict cancer. From a regulatory viewpoint, the assay is regarded as an indicator test, but is incorporated into guidelines in some countries.

Biography

Diana Anderson has completed her PhD at the University of Manchester, UK in the Faculty of Medicine. She is the Established Chair in Biomedical Sciences at the University of Bradford. She has published more than 450 papers, 8 books, successfully supervised 30 PhD students, and has a Hirsch factor of 54. She is Editor-in-Chief of a Book Series for the Royal Society of Chemistry and is consultant to many international organisations, such as the World Health Organisation/International Programme of Chemical Safety.

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