

Comet Assay: A Promising Tool for the Risk Assessment and Clinical Management of Head and Neck Tumors

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Abstract : The Single Cell Gel Electrophoresis Assay (SCGE, known as comet assay) is a potential, uncomplicated, sensitive and state-of-the-art technique for quantitating DNA damage at individual cell level and repair from in vivo and in vitro samples of eukaryotic cells and some prokaryotic cells, being popular in its widespread use in various areas including human biomonitoring, genotoxicology, ecological monitoring and as a tool for research into DNA damage or repair in different cell types in response to a range of DNA damaging agents, cancer risk and therapy. The method involves the encapsulation of cells in a low-melting-point agarose suspension, lysis of the cells in neutral or alkaline (pH > 13) conditions, and electrophoresis of the suspended lysed cells, resulting in structures resembling comets as observed by fluorescence microscopy; the intensity of the comet tail relative to the head reflects the number of DNA breaks. The likely basis for this is that loops containing a break lose their supercoiling and become free to extend towards the anode. This is followed by visual analysis with staining of DNA and calculating fluorescence to determine the extent of DNA damage. This can be performed by manual scoring or automatically by imaging software. The assay can, therefore, predict an individual's tumor sensitivity to radiation and various chemotherapeutic drugs and further assess the oxidative stress within tumors and to detect the extent of DNA damage in various cancerous and precancerous lesions of oral cavity.

Keywords : comet assay, single cell gel electrophoresis, DNA damage, early detection test

Conference Title : ICODOP 2016 : International Conference on Oral Dermatology and Oral Pathology

Conference Location : Istanbul, Türkiye

Conference Dates : January 25-26, 2016