

Investigation of DNA Damage and DNA Repair Capacity in Patients with Colorectal Cancer and Their First Degree Relatives

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Objective: Studies have reported that genetic susceptibility and environmental factors play an important role in the formation of colorectal cancer (CRC). Individuals with incidence of colorectal cancer in the first-degree relatives are about twice as likely to develop CRC as those without any family history. Biomarkers are often utilized for the determination of increased risk of cancer. The aim of our study was to investigate the potential DNA damage using by comet assay and chromosomal aberrations (CAs), measurement of DNA repair capacity by using challenge assay as biomarkers of susceptibility in peripheral lymphocytes of CRC patients and their first degree relatives.

Methods: Peripheral blood samples were taken from untreated patients diagnosed with CRC (n=56), their first degree relatives (n=50) and healthy controls (n=25) were analyzed by comet assay and challenge assay and CAs.

Results: Chromosomal aberration frequency by chromosomal aberration technique in peripheral blood lymphocytes in CRC patients and their first degree relatives were not statistically different as compared with the controls ($p>0.05$). However, a statistically significant increase in DNA damage was observed by comet assay ($p<0.001$). Challenge assay demonstrated statistically significant reduction in DNA repair capacity in CRC patients ($p<0.001$) and as in their first degree relatives ($p=0.001$) as compared with the controls.

Conclusion: These results demonstrate that comet assay can be used as a biomarker for detecting DNA damage in CRC and challenge assay can be utilized clinically for identification of CRC susceptibility in individuals who has relatives with CRC.

Key words: DNA damage, colorectal cancer, comet assay, chromosomal aberration, DNA repair capacity