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Potential cancer predictive biomarkers: a case of papillary thyroid cancer

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Abstract

Thyroid cancer represents 2.1% of new cancer cases, yet it is the most common endocrine cancer and one of the fastest growing cancer types in the world. The incidence of thyroid cancer is the highest in elderly population (60-69 years), but novel data suggest decline in age when this cancer is frequently diagnosed to 50-59 years. Thyroid cancer is 2-4-fold more common in female population what is usually associated with female hormones and the differences in oxidative stress levels. Since the WHO suggest that roughly 30% of cancer can be prevented, the aim of this study was to evaluate the role of micronucleus test and comet assay as cancer predictive biomarkers.

In this study, 36 patients with papillary thyroid cancer (PTC) were recruited in accordance with all ethical standards. The average age of the group was 52±14 years, 28:8 female:male ratio, and 33% of active smokers. Control group was matched for age, gender, and smoking habits (52±14 years, 28:8 female:male ratio, and 33% of active smokers).

The number of micronucleated (MNed) cells in human peripheral blood lymphocytes was significantly higher ($p<0.05$) in PTC group (12.94±5.81) compared to control group (4.36±2.58). Additionally, the comet assay tail moment (TM) was also significantly ($p<0.05$) higher in the PTC group compared to control group (0.39±0.71 vs 0.14±0.05). These results indicate that people with PTC had more genome damage compared to healthy controls. The immunohistochemical analysis of thyroid revealed 97.2% BRAF positive and 20.6% RET/PTC positive samples.

Taken together, the PTC group had more DNA damage what is associated with high prevalence of BRAF mutations and RET/PTC translocations as a consequences of disrupted genome integrity. The results imply that cytogenetic tools might be used in human biomonitoring for identification of high-risk groups but further research is needed to assess normal and cut-off values.

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References