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Microsatellite instability: A potential target for development of new cancer biomarkers

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Microsatellites represent tandem iterations of 1-6 bp DNA constituting the hypervariable regions of the genome due to high mutation rates. Variations in the microsatellite regions referred to as microsatellite instability (MSI) resulting from insertions, deletions and single nucleotide transformation may alter the expression of microsatellite associated genes including those involved in DNA repair, tumor suppression and cell proliferation processes. Here, we present and critically analyze the information available on various aspects of MSI and its association with various organ-specific cancers with an assessment of using MSI as a prognostic marker for cancer.

We have constructed a database CancerMicroSatdb which contains information about microsatellite positive cancer genes. A total of 3107 cancer genes were studied for the presence of microsatellites in CDS, 3' and 5' UTRs and introns, of which 2865 cancer genes were found microsatellites positive. While mononucleotide repeats were overall most frequent, there was a preponderance of trinucleotide repeats, particularly CGG/CCG repeats, in the coding regions of these genes. MySQL was used as database architecture software and a user friendly web interface was prepared by using PHP. This database can be searched by using various search parameters such as gene name, gene symbol, entrez id, microsatellite sequence, location of repeat, repeat length, cancer tissue, etc. The output provides information about exact repeat coordinates within the gene, OMIM number, repeat length and sequence, cancer type, etc. This database is likely to become popular in the groups studying microsatellite instability in cancer with an aim of developing microsatellite based prognostic biomarkers for different cancers.

Biography

Prof. P. C. Sharma obtained his Ph. D. from Meerut University in 1983 and has worked as visiting scientist at Frankfurt University, Germany and IBRC, Japan. During last two decades, he has been engaged in research on microsatellites for diverse applications like germplasm characterization, gene tagging, linkage mapping, etc. in different plant species. His recent research interests focus on role of microsatellites in genome evolution, and microsatellite instability in cancer. He has published over 90 research publications. He is a reviewer for a number of reputed research journals.

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