Diagnostic and Prognostic Implications of Telomere Dynamics in Chronic Myeloid Leukaemia.

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Human telomeres are specialized nucleoprotein chromosomal end structures that are important in the function and integrity of the genome. These structures shorten with each round of cellular division, eventually leading to critically short telomeres signaling senescence. In cells with high cellular turnover, the specialized reverse transcriptase telomerase slows telomere erosion by extending telomeric repeat sequences. Over 85% of human malignancies take advantage of this longevity mechanism, making telomerase activation the most common genetic change in cancers. Chronic myeloid leukaemia (CML) is characterized by the Philadelphia chromosome (t9;22) and has distinctive disease stages. The mechanisms involved in telomere maintenance (telomere dynamics) are altered in the different stages of a malignancy. We aimed to determine whether telomere dynamics held any clinical relevance in CML. Measurement of telomere length by a real-time polymerase chain reaction (PCR); telomerase catalytic subunit expression by a reverse transcription PCR, and telomerase activity by the Telomeric Repeat Amplification Protocol was carried out in eleven chronic phase CML patients and one in blast crisis. Telomerase activation did not always correlate with telomerase catalytic subunit expression, but substantially raised enzyme levels occurred with increased blast counts in peripheral blood. Telomere lengths varied between patients and clinical stages of the disease. We conclude that although changes in telomere dynamics are evident in CML, the lack of a pre-disease baseline level, as well as the costly and labour intensive assays make the measurement of telomere dynamics in CML unsatisfactory for diagnosis or prognosis.