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Editorial on Cytogenetics Chromosomal Genetics

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Editorial

Cytogenetics is the branch of genetics that correlates the structure, number, and behaviour of chromosomes with heredity and diseases. Giemsa has become the most commonly used stain in cytogenetic analysis. Most G-banding techniques require pretreating the chromosomes with a proteolytic enzyme such as trypsin. Gbanding preferentially stains the regions of DNA that are rich in adenine and thymine. The study of chromosomes, which are long strands of DNA and protein that contain most of the genetic information in a cell [1]. Cytogenetics involves testing samples of tissue, blood, or bone marrow in a laboratory to look for changes in chromosomes, including broken, missing, rearranged, or extra chromosomes. Changes in certain chromosomes may be a sign of a genetic disease or condition or some types of cancer. Cytogenetics may be used to help diagnose a disease or condition, plan treatment, or find out how well treatment is working. Cytogenetic analysis provides a genome-wide snapshot of an individual's chromosomes by the process of pairing and arranging all of them in an order, and can reveal changes in chromosome numbers (aneuploids) and more delicate structural changes chromosomal deletions, duplications, translocations and inversions [2].

The labeled DNA probes are then pooled and used in hybridization experiments with metaphase chromosome spreads. The labeled DNA probe sets bind to their complementary chromosomes, allowing each individual chromosome to be labeled with a specific fluorescent color along its entire length. Cytogenetics is the study of chromosomes and their role in heredity [3]. A normal human karyotype contains 22 pairs of autosomes and one pair of chromosomes. Aneuploidies, or changes in chromosome number, are easily detected on karyotypes. Cytogenetic analysis is very crucial in the diagnosis of oncologic and hematologic disorders [4]. It helps in the diagnosis and classification of disease as well as in planning treatment regimens and monitoring the status of disease. Karyotypes can reveal changes in chromosome number associated with aneuploid conditions, such as trisomy 21 (Down syndrome). Careful analysis of karyotypes can also reveal more subtle structural changes, such as chromosomal deletions, duplications, translocations, or inversions [5]. Anyone who is pregnant can choose to have a diagnostic test, regardless of the risk of chromosomal abnormalities. These tests can count the chromosomes and look for any differences, including those that are less common. The two types of diagnostic tests are Chorionic Villus Sampling (CVS) and amniocentesis.

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