

# TECHNICAL TIPS OF THE MONTH

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In this edition of our Technical Tips we would like to provide some background on the nature of satellite DNA.

**Kreatech Diagnostics offers the most complete range of Satellite DNA probes for the enumeration and identification of the centromeric regions available today. We distinguish ourselves from Vysis by including specific probes hybridizing to the centromeric regions of chromosomes 1, 15, 19; one for chromosomes 13 and 21; and one hybridizing to chromosomes 14 and 22, respectively. In addition, we also offer universal probes hybridizing to the entire chromosomes complement at once (All Human Centromere and All Mouse Centromer probes). All of these probes are supplied in a 5x concentrated format, to allow convenient mixing of chromosomes of your choice in 3 different colors (red, green, or blue).**

## What is Satellite DNA?

The name originated in the early Sixties: Specific DNA regions were called satellites since in density gradients, they sediment as distinct, satellite bands separate from the bulk of genomic DNA due to a distinct base composition.

## What is the composition of Satellite DNA?

Satellite DNA consists of DNA sequences tandemly repeated.

Subfamilies can be defined both by nucleotide sequence, and by the distribution of restriction sites delimiting higher order tandemly repeated structures (Willard and Wayne 1987).

## Where is Satellite DNA located within the chromosome?

Alpha satellite DNA is a family of tandemly repeated DNA sequences present at the centromere of all human chromosomes (Manuelidis 1978), with a size of repeat unit of 171 bps. Other satellite DNA are present at the centromeric/pericentromeric region, specific for one or a small group of chromosomes: Beta satellite (size of repeat unit of 68 bps), Satellite I (25-48 bps), Satellite II and III (5 bps).

## What is the centromere and where is it located within the chromosome?

The centromere is the constricted portion of the chromosome at which the chromatids are joined and by which the chromosome is attached to the spindle during cell division.

In humans, centromeric regions can be metacentric or acrocentric (e.g. chromosomes 13, 14, 15, 21, 22).

In mouse, centromeric regions are all telocentric, i.e. located at the terminal end of the chromosome.

## Is Satellite DNA specific for every chromosome?

In humans, chromosome-specific Satellite DNA sequences allow the design of probes able to recognize the centromeric region of only one chromosome at the time.

However, there are some exceptions. Some probes cannot distinguish between two alpha satellite sequences sharing a strong sequence homology, even in high stringency conditions, as in the case for chromosomes 13 and 21, that for example exhibit 99.7% homology (Jorgensen et al. 1987), chromosomes 14 and 22, and chromosomes 1, 5, 19.