Oncogene Encyclopedia Article

Oncogene

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Oncogene

Oncogenes are segments of genetic material (DNA) that are able to induce cancer in animals. They were first discovered in retroviruses (viruses containing the enzyme, reverse transcriptase, and RNA rather than DNA) that were found to cause cancer in many animals. Studies of humans led to the discovery of related genes called proto-oncogenes, which do not normally cause cancer, but have similar DNA sequences. Proto-oncogenes have since been found to play an important role in the growth, differentiation and proliferation of normal cells. They may be converted into oncogenes by several mechanisms, the simplest of which is a point mutation that alters a single nucleotide base pair. They may also be converted to cancer-causing agents by chromosomal rearrangements that remove them from controlling elements present in unaltered chromosomes. The altered oncogenes can no longer function as control agents do, and the result is uncontrolled cell growth resulting in a cancerous tumor. About 60 oncogenes have been discovered in humans. They have been linked to malignancies of the breast, lung, colon, and pancreas.

The nomenclature in this field is somewhat confusing. Oncogenes were discovered first, and their name was derived from the Greek onkos, meaning bulk, or mass, because of their ability to cause tumor growth. Proto-oncogenes were named for their potential to become agents of malignant growth, and as a result, their important role as regulators of normal cellular activity is not properly emphasized.