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Proto oncogene

A proto-oncogene is a normal gene that could become an oncogene due to mutation or increased expression. Proto-oncogenes code for proteins that help to regulate cell growth and differentiation. Proto-oncogenes are often involved in signal transduction and execution of mitogenic signals, usually through their protein products. Upon acquiring an activating mutation, a proto-oncogene becomes a tumor-inducing agent, an oncogene.

Examples of proto-oncogenes include RAS, WNT, MYC, ERK, and TRK. The MYC gene is implicated in Burkitt's Lymphoma, which starts when a chromosomal translocation moves an enhancer sequence within the vicinity of the MYC gene. The MYC gene codes for widely used transcription factors. When the enhancer sequence is wrongly placed, these transcription factors are produced at much higher rates. Another example of an oncogene is the Bcr-Abl gene found on the Philadelphia Chromosome, a piece of genetic material seen in Chronic Myelogenous Leukemia caused by the translocation of pieces from chromosomes 9 and 22. Bcr-Abl codes for a tyrosine kinase, which is constitutively active, leading to uncontrolled cell proliferation.