

Proto-oncogenes and Tumor suppressor Genes

Genes that contain instructions to make proteins that will become positive cell cycle regulators are called proto-oncogenes and the genes that contain instruction to make proteins that will become negative cell cycle regulators are called tumor suppressor genes. If a proto-oncogene experiences a mutation that renders the associated protein nonfunctional, the cell would be unlikely to complete the cycle, but a mutation that increases activity of the protein could result in increased cell growth. Likewise, mutated genes associated with negative cell cycle regulators that render the protein inactive are like removing the breaks from an automobile. Indeed, more than half of human tumors show mutated forms of p53 genes!



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