\mathfrak{A} totipotent: any mature cells that can "dedifferentiate" and then give rise to all the specialized cell types of the organism \mathfrak{A} stem cell: a relatively unspecialized cell that can both reproduce itself indefinitely and under appropriate circumstances differentiate into specialized cells of one or more types \mathfrak{A} pluripotent: cells capable of differentiating into many different cell types \mathfrak{A}

16.3 Abnormal regulation of genes that affect the cell cycle can lead to cancer

A The product of **proto-oncogenes** and **tumor-suppressor genes** control cell division. A DNA change that makes a proto-oncogene excessively active converts it to an **oncogene** which may promote excessive cell division and cancer. A tumor-suppressor gene encodes a protein that inhibits abnormal cell division and possibly to cancer. A tumor-suppressor genes and tumor-suppressor genes encode components of growth-stimulating and growth inhibiting signaling pathways, respectively and mutation in these genes can interfere with normal cell-signaling pathways.

A Oncogenes: cancer-causing genes A proto-oncogenes: normal versions of the cellular genes that code for proteins that stimulate normal cell growth and division. A Tumor-suppresor genes: genes whose normal products inhibit cell division A ras gene: is a G protein that relays a signal from a growth factor receptor on the plasma membrane to a closed of protein kinases. A p33 gene: a tumor suppressor gene A tumor