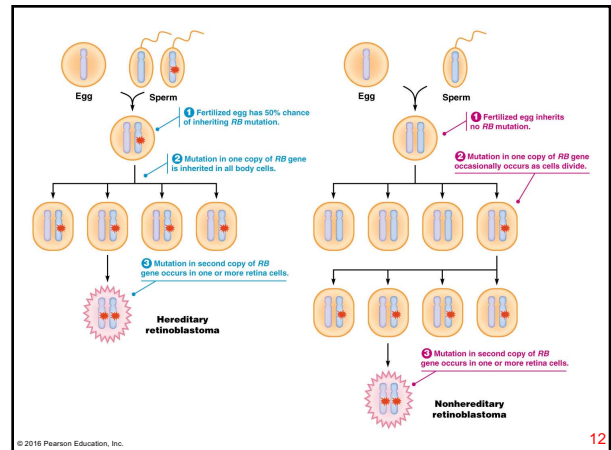
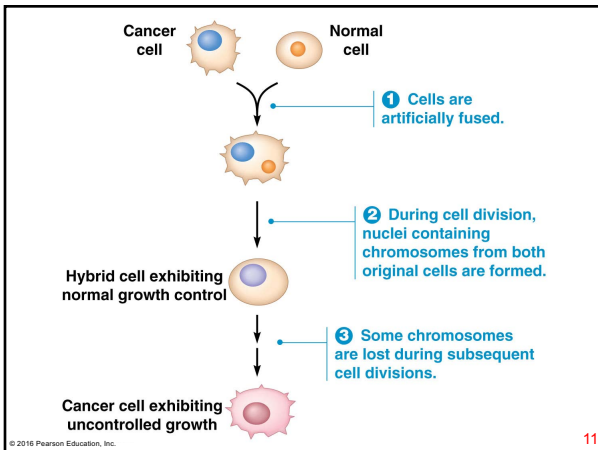
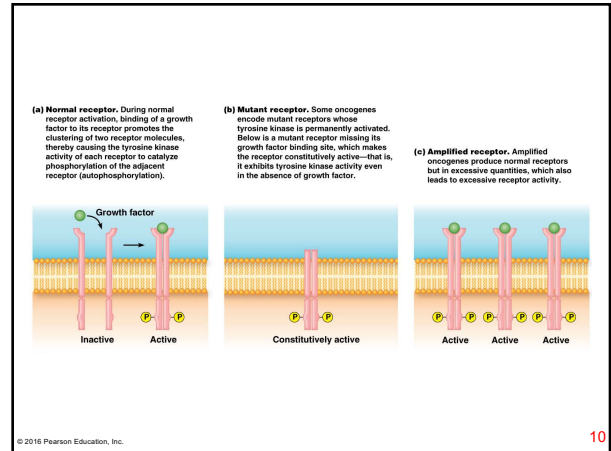


Table 26-1 A Few Examples of Oncogenes Grouped by Protein Function

Oncogene Name	Protein Produced	Oncogene Origin	Common Cancer Type*
1. Growth factors			
v-src	PDGF	Viral	Sarcomas (rinosarcoma)
COL1A1-PDGFB	PDGF	Translocation	Fibrosarcoma
2. Receptors			
erbB-2	Epidermal growth factor receptor	Viral	Leukemia (chickens)
TRK	Nerve growth factor receptor	DNA rearrangement	Thyroid
ERBB2	Epidermal growth factor receptor 2	Amplification	Breast
v-mpl	Thrombopoietin receptor	Viral	Leukemia (mice)
3. Plasma membrane GTP-binding proteins			
KRAS	Ras	Point mutation	Pancreas, colon, lung, others
HRAS	Ras	Point mutation	Bladder
NRAS	Ras	Point mutation	Leukemias
4. Nonreceptor protein kinases			
BRAF	Raf kinase	Point mutation	Melanoma
v-src	Src kinase	Viral	Sarcomas (chickens)
SRC	Src kinase	DNA rearrangement	Colon
TELJAK2	Jak kinase	Translocation	Leukemias
BCR-ABL	Abl kinase	Translocation	Chronic myelogenous leukemia
5. Transcription factors			
MYC	Myc	Translocation	Burkitt lymphoma
MYCL	Myc	Amplification	Small cell lung cancer
v-myc	Myc	Insertional mutagenesis	Leukemia (chickens)
v-jun	Jun	Viral	Sarcomas (chickens)
v-fos	Fos	Viral	Bone (mice)
6. Cell cycle or apoptosis regulators			
CYCD1	Cyclin	Amplification, translocation	Breast, lymphoma
CDK4	Cdk	Amplification	Sarcomas, glioblastoma
BCL2	Bcl-2	Translocation	Non-Hodgkins lymphoma
MDM2	MDM2	Amplification	Sarcomas, lung, breast, others

*Cancers are in humans unless otherwise specified. Only the most frequent cancer types are listed.

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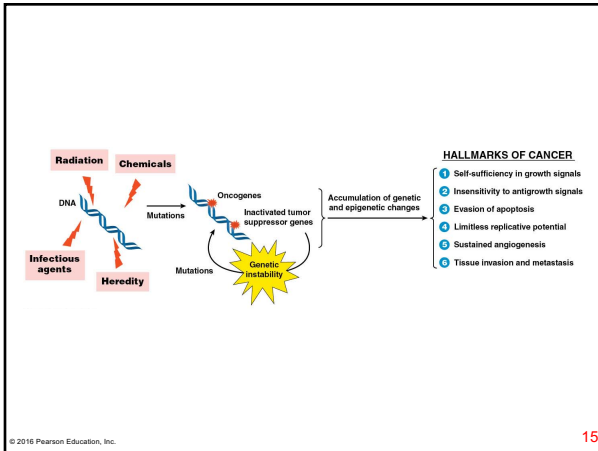
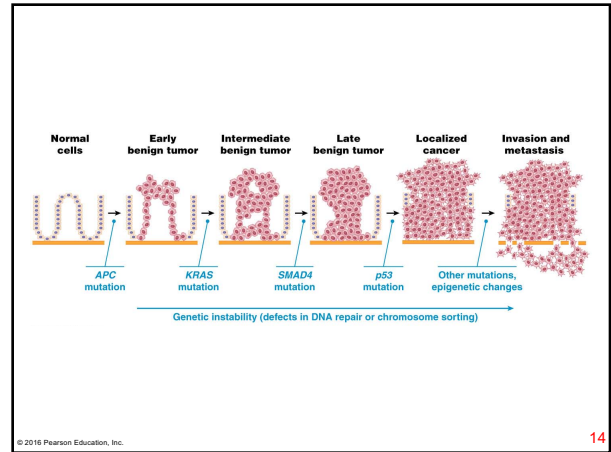
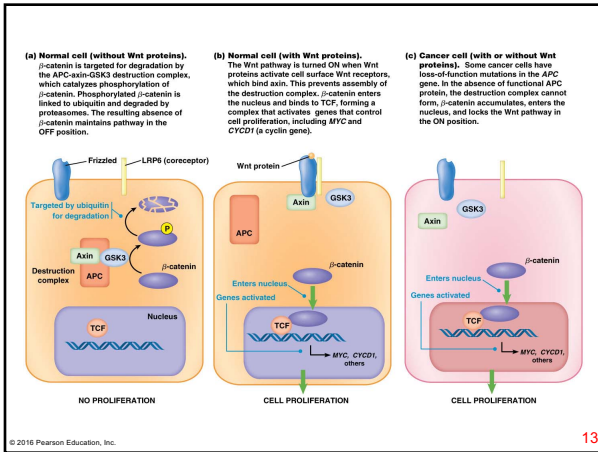


Table 26-3 Some Differences in the Microscopic Traits of Benign and Malignant Tumors

Trait	Benign	Malignant
Nuclear size	Small	Large
N/C ratio (ratio of nuclear to cytoplasmic volume)	Low	High
Nuclear shape	Regular	Pleomorphic (irregular shape)
Mitotic index	Low	High
Tissue organization	Normal	Disorganized
Differentiation	Well differentiated	Poorly differentiated
Tumor boundary	Well defined	Poorly defined

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