



General Pathology

Neoplasia

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Neoplasia – Definition and Characteristics

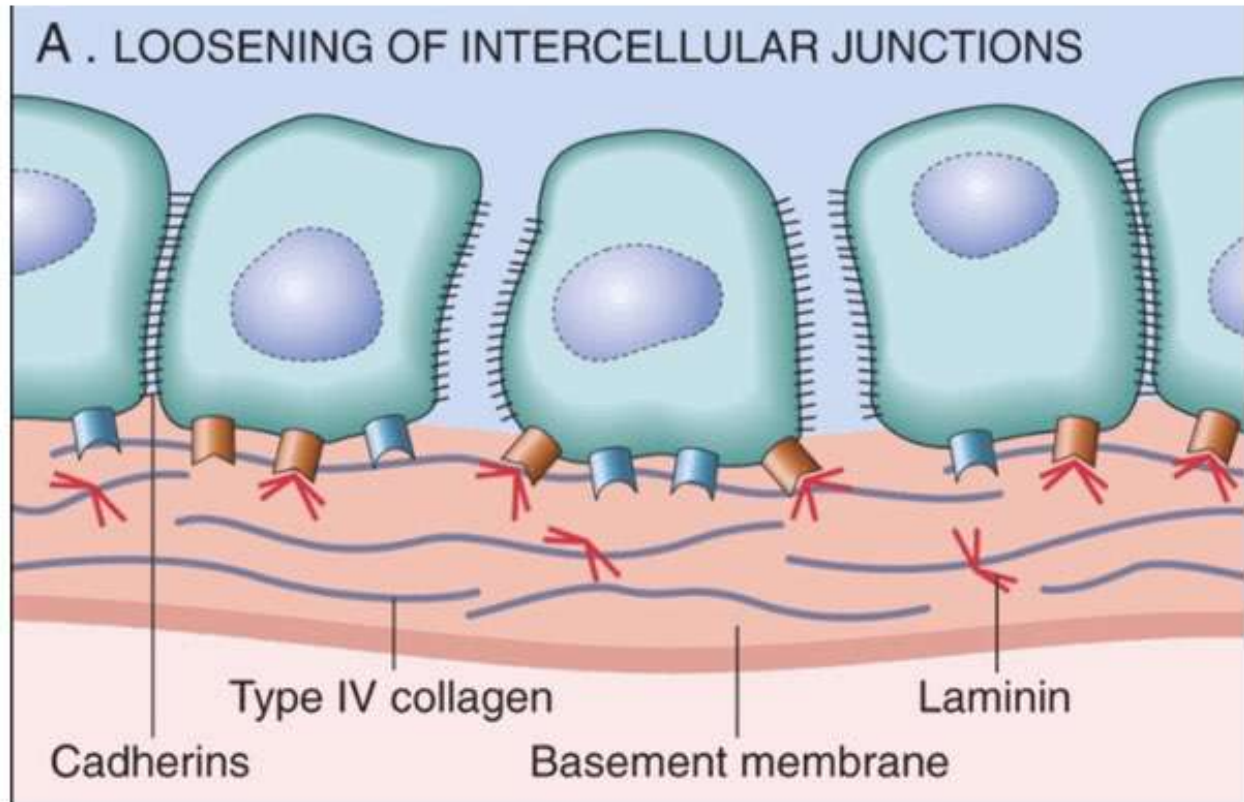
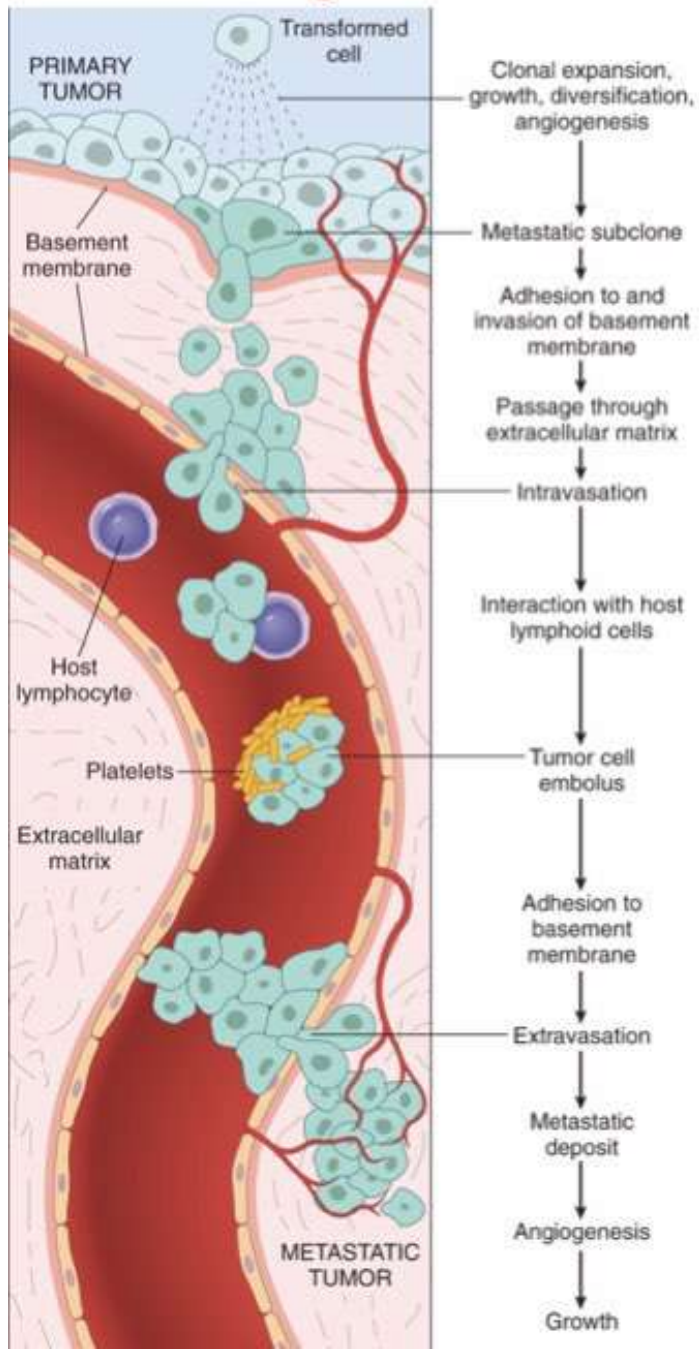
Neoplasia refers to **new, uncontrolled growth of abnormal tissue**, which forms a mass known as a **neoplasm or tumor**.

Neoplastic cells proliferate **autonomously** (without normal regulatory controls) and **persist even after the stimulus is gone**.

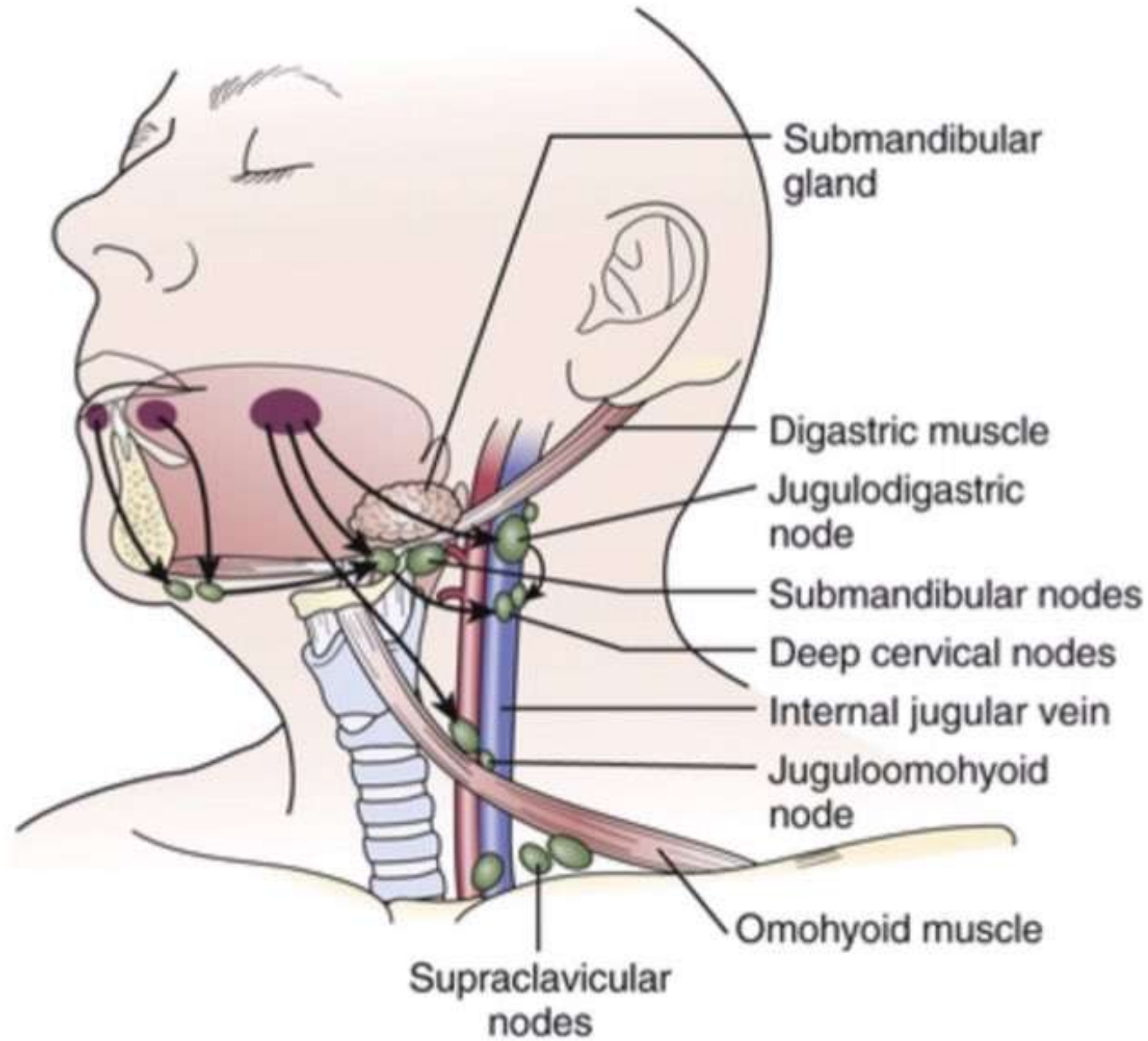
Neoplasms can be:

Benign: Non-invasive, localized, and generally non-lethal.

Malignant: Invasive, can metastasize, and often fatal if untreated.



Cancer Metastasis



Benign vs Malignant Tumors

Benign vs Malignant Tumors

Feature	Benign Tumor	Malignant Tumor
Growth Rate	Slow	Fast, uncontrolled
Differentiation	Well-differentiated	Poorly differentiated (anaplastic)
Invasion	No invasion; well-circumscribed	Invades surrounding tissues
Metastasis	Never	Frequently metastasizes
Prognosis	Usually good	Often poor without treatment

Benign examples: Lipoma, adenoma, Leiomyoma.

Malignant examples: **Carcinoma** (epithelial origin), **sarcoma** (mesenchymal origin), e.g. Leiomyosarcoma.

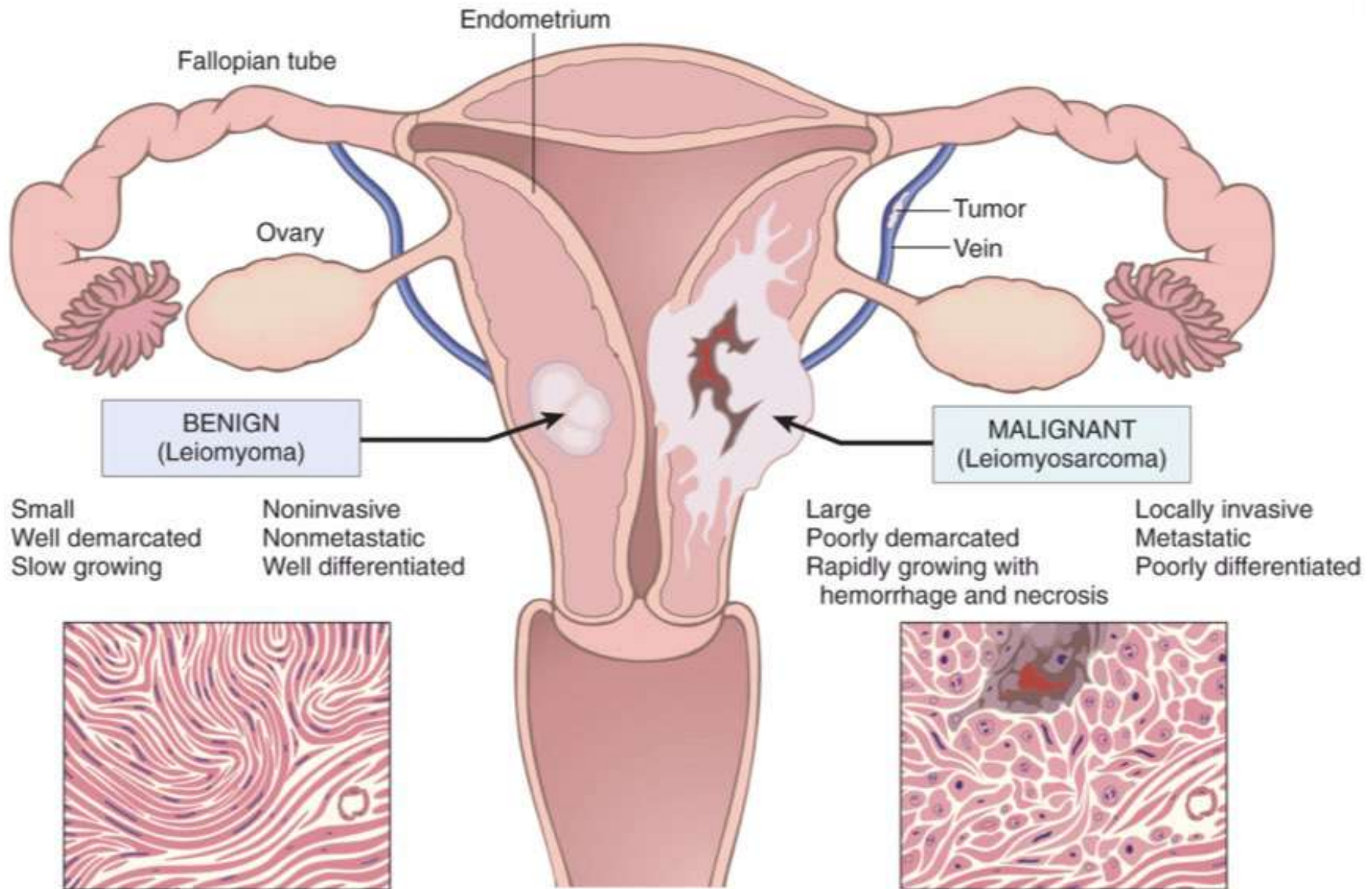
Tumor types

Category	Suffix / Term	Implication
Benign	—oma	Localized, non-invasive
Carcinomas	—carcinoma	Malignant, epithelial origin, spread via lymphatics first
Sarcomas	—sarcoma	Malignant, connective tissue, spread via blood first
Blastomas	—blastoma	Malignant, pediatric, embryonic cells
Exceptions	Melanoma, Lymphoma	Malignant despite the name

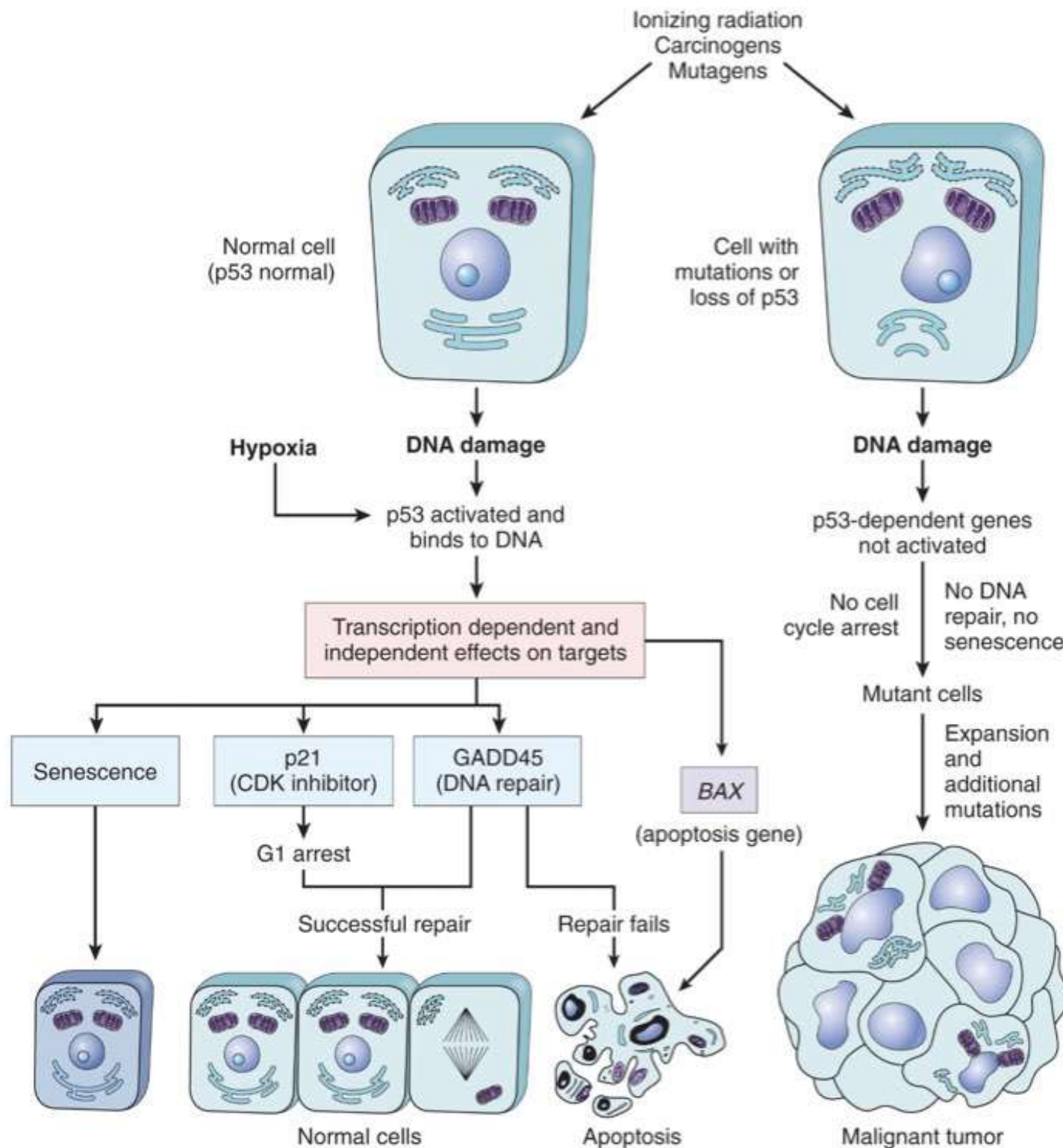
Tumor names

Tissue type	Root word	Benign	Malignant
Fat	Lip—	Lipoma	Liposarcoma
Bone	Osteo—	Osteoma	Osteosarcoma
Cartilage	Chondro—	Chondroma	Chondrosarcoma
Smooth muscle	Leiomyo—	Leiomyoma	Leiomyosarcoma
Skeletal muscle	Rhabdomyo—	Rhabdomyoma	Rhabdomyosarcoma
Blood vessel	Angio/ Hemangio—	Hemangioma	Angiosarcoma

Benign vs Malignant Tumors



Molecular Basis of Tumors



Tumor development involves **genetic and epigenetic changes** that affect key regulatory genes:

DNA Repair Genes

- Mutations here lead to **genomic instability**.
- Cells accumulate mutations faster.
- Example: **BRCA1, MSH2**

Oncogenes – "Gas pedal stuck down"

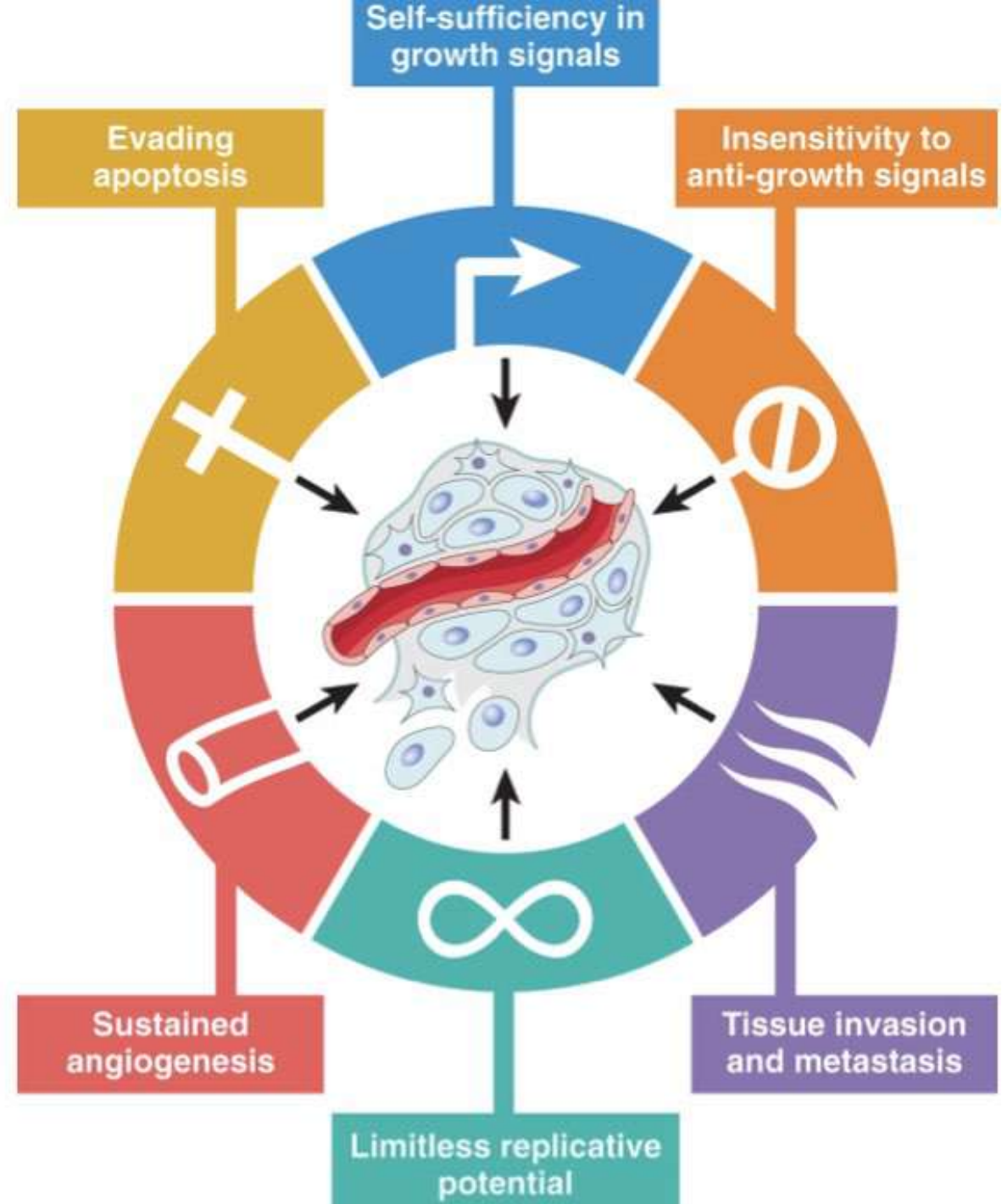
- Mutated or overexpressed **proto-oncogenes** → **oncogenes**
- Promote uncontrolled proliferation.
- Example: **RAS**, **MYC**

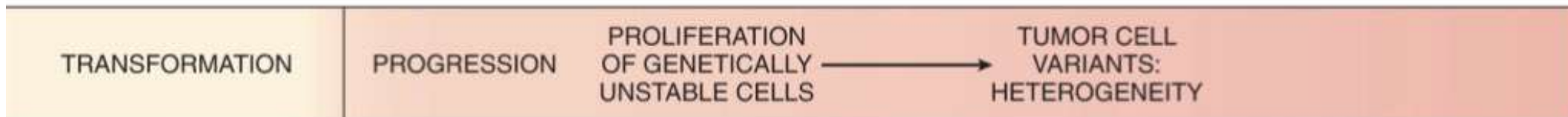
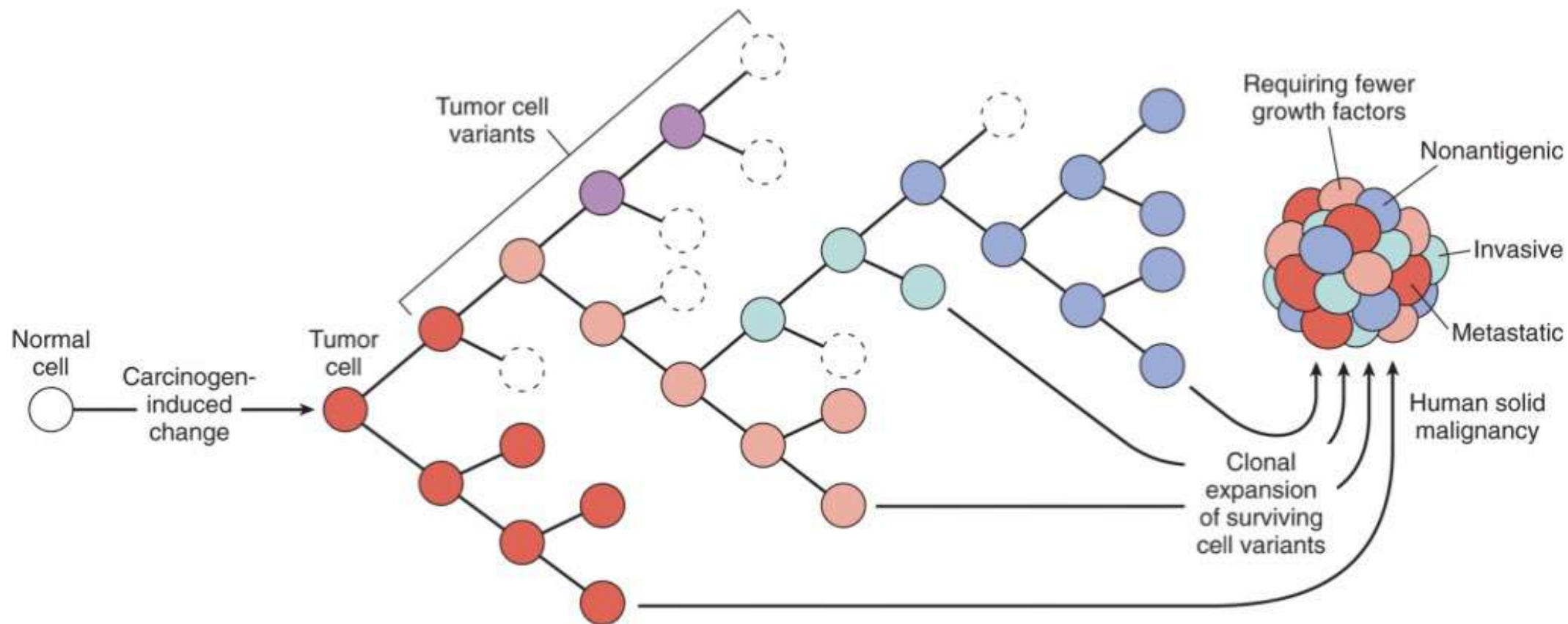
Tumor Suppressor Genes – "Brakes fail"

- Normally inhibit cell growth.
- When mutated → cells grow unchecked.
- Example: **TP53**, **RB**

Hallmarks of Cancer:

1. Sustained proliferative signaling
2. Evading growth suppressors
3. Resisting cell death
4. Enabling replicative immortality
5. Inducing angiogenesis
6. Activating invasion and metastasis





Conclusion

Neoplasia represents abnormal cell growth with loss of normal control mechanisms.

The key distinction between benign and malignant tumors lies in their invasiveness and metastatic potential.

At the molecular level, tumor development is driven by mutations in oncogenes, tumor suppressors, and DNA repair genes, leading to the hallmarks of cancer.