



Antibodies Prolific Immunoproteins

Human's total ~  $100 \times 10^{6}$  immunoproteins Combinatorial syntheses from libraries of 250, 10, and 6 possible contributors

Human Genome ~20,000 proteins



















## Hemoglobin (Hb) / Myoglobin (Mb)



## Allosteric Effects

- Hemoglobin transports and myoglobin stores oxygen in mammalian cells.
- Myoglobin is monomeric; hemoglobin is tetrameric
- Mb: 153 amino acids, 17, 200 da
- Hb: two alpha units of 141 residues, 2 beta units of 146
- Oxygen binding curves show the relationship of hemoglobin and myoglobin. The two proteins are in a complex equilibrium.











































Cells & Metabolism: Division / Replication / Sexual Reproduction Equilibrium: *Balance / Homeostasis* Imbalance: *Cancer Chemical Therapy (Chemotherapy)* 





## **Definitions:**

- Homeostasis maintenance of stable equilibria: in part through the critical replacement of dead cells with new cells
- Apoptosis programmed cell death with cell disposal that does not harm the organism
- Neoplasm abnormal new cell growth: excessive and uncontrolled compared to normal cells
- **Tumor -** a non-specific term meaning lump or mass of tissue. Often synonymous for neoplasm
- Cancer any malignant neoplasm or tumor
- Metastasis discontinuous spread of a malignant neoplasm to distant sites





































