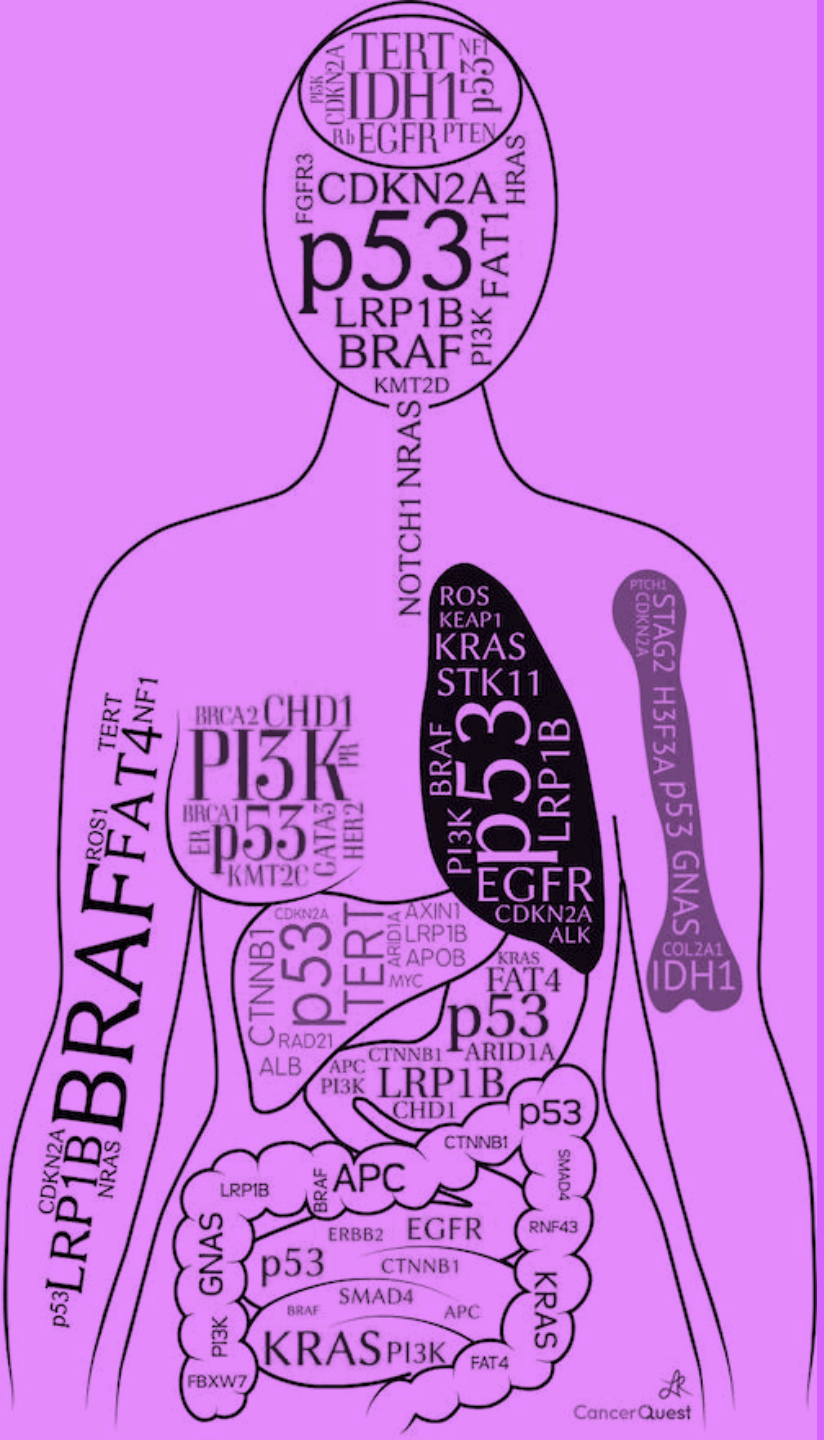


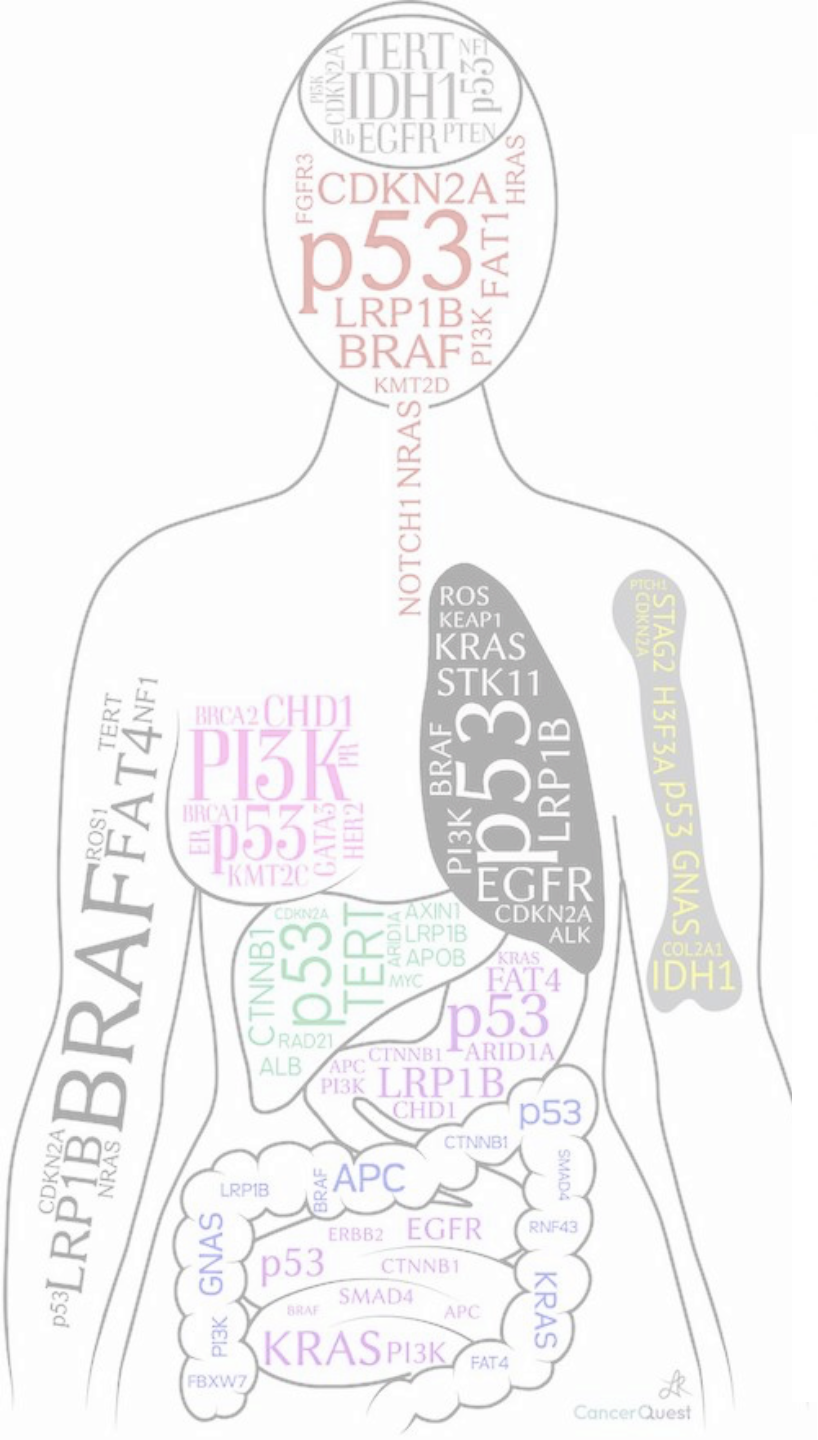
CANCER GENES

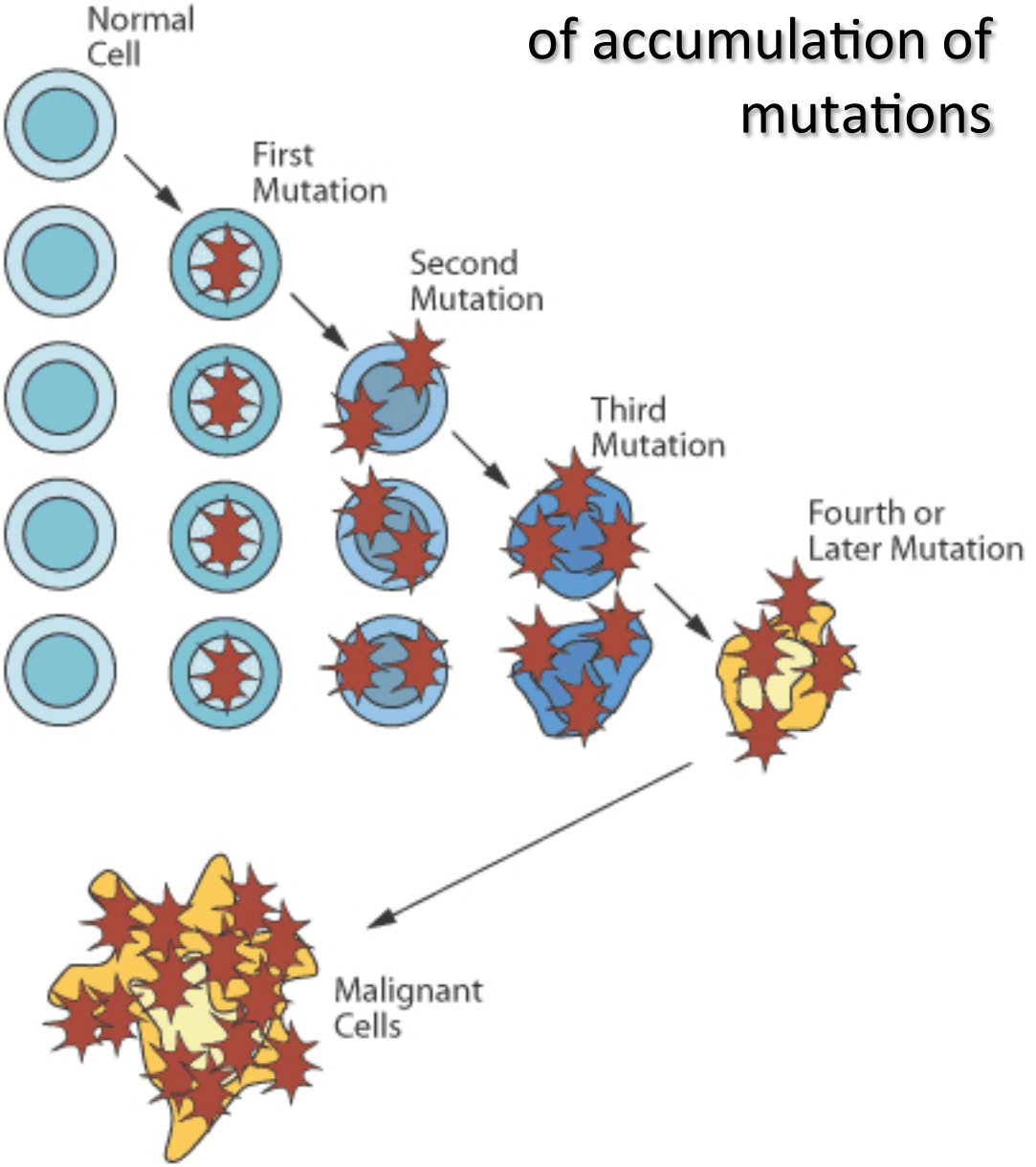
How are they normally expressed?

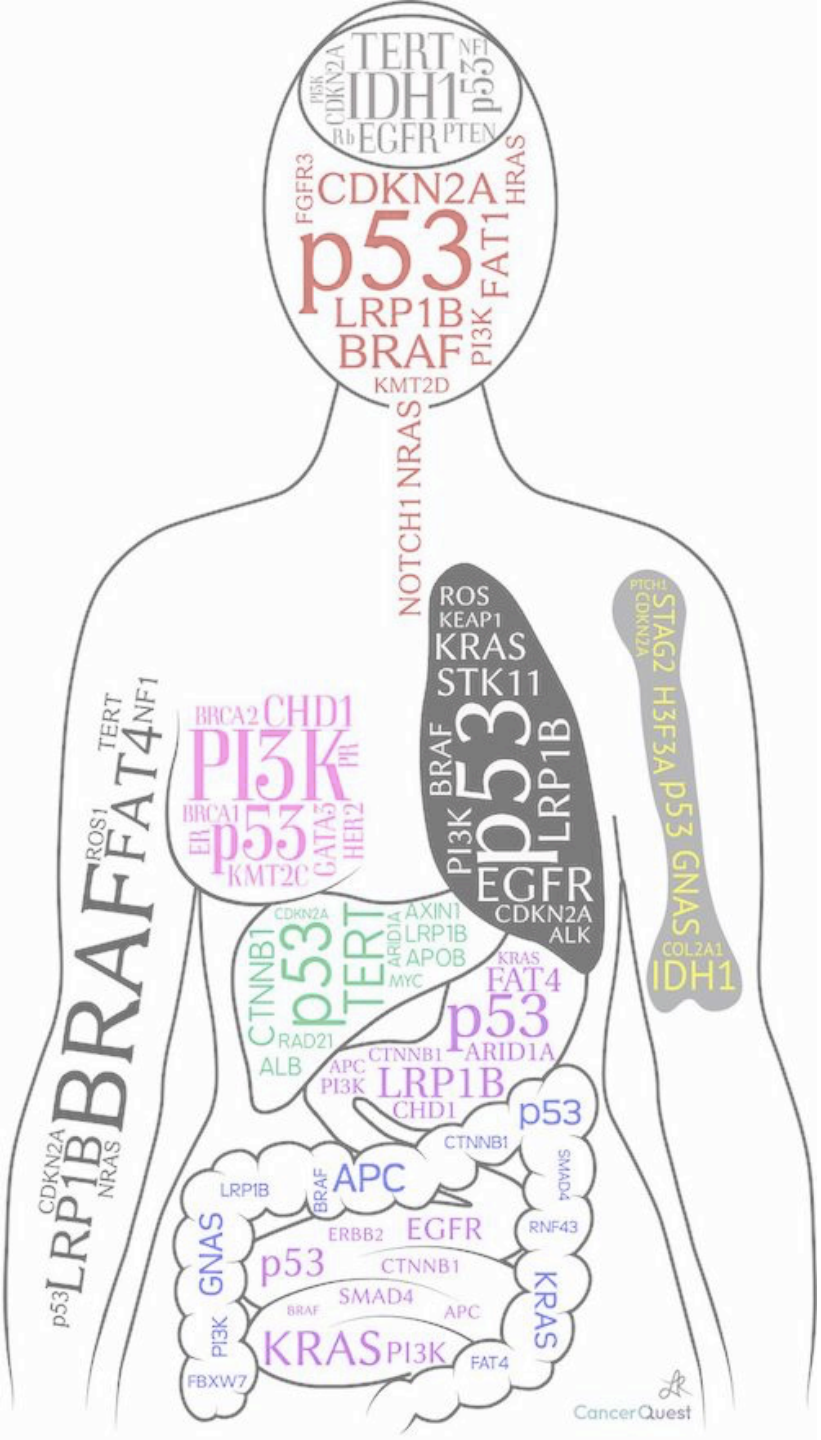
Supervisor: Tugce (2Che)
Bilgin Sonay

Solving Biological Problems that require Math
2018, Unil

Cancer occurs as a result of accumulation of mutations

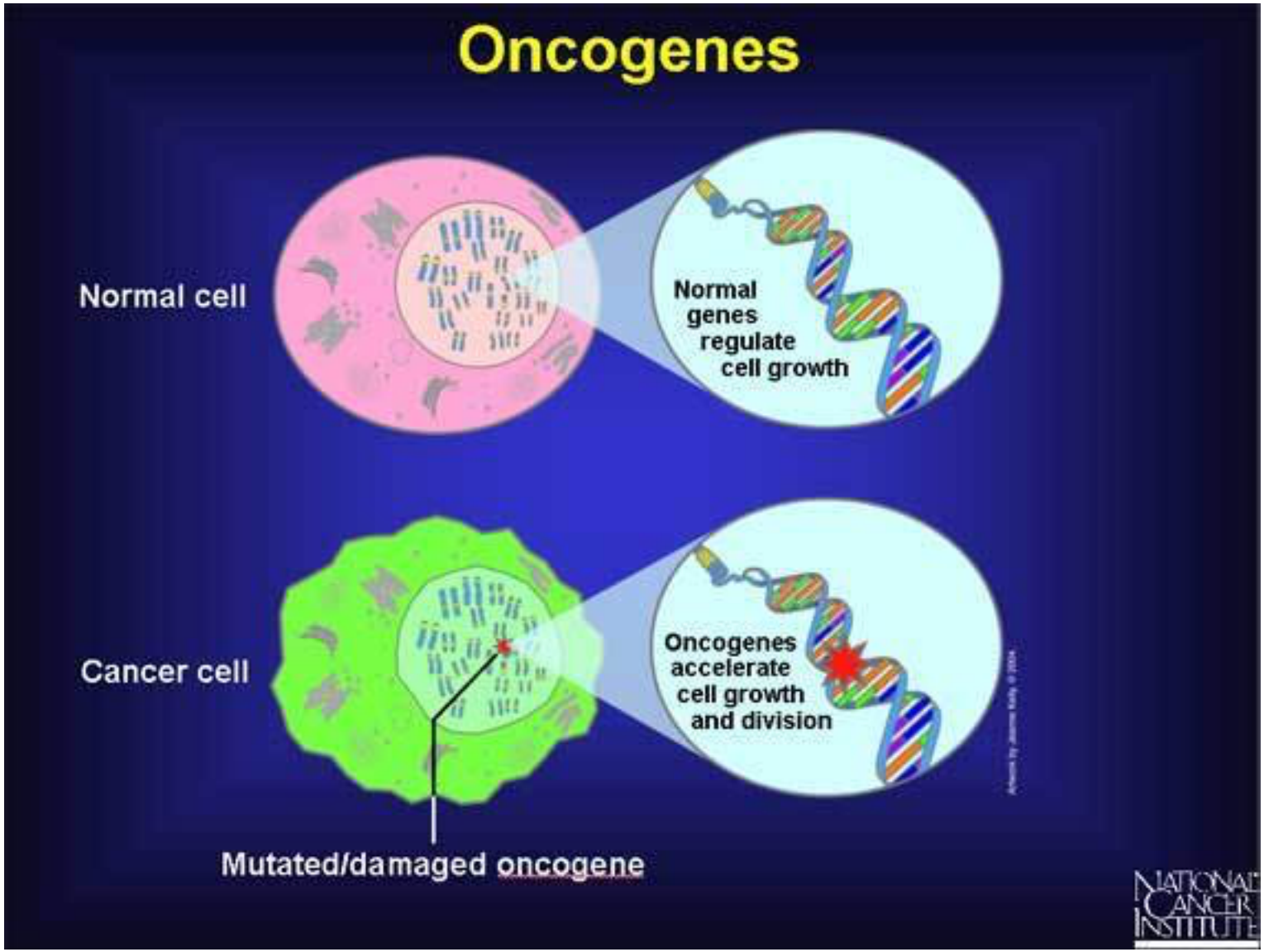


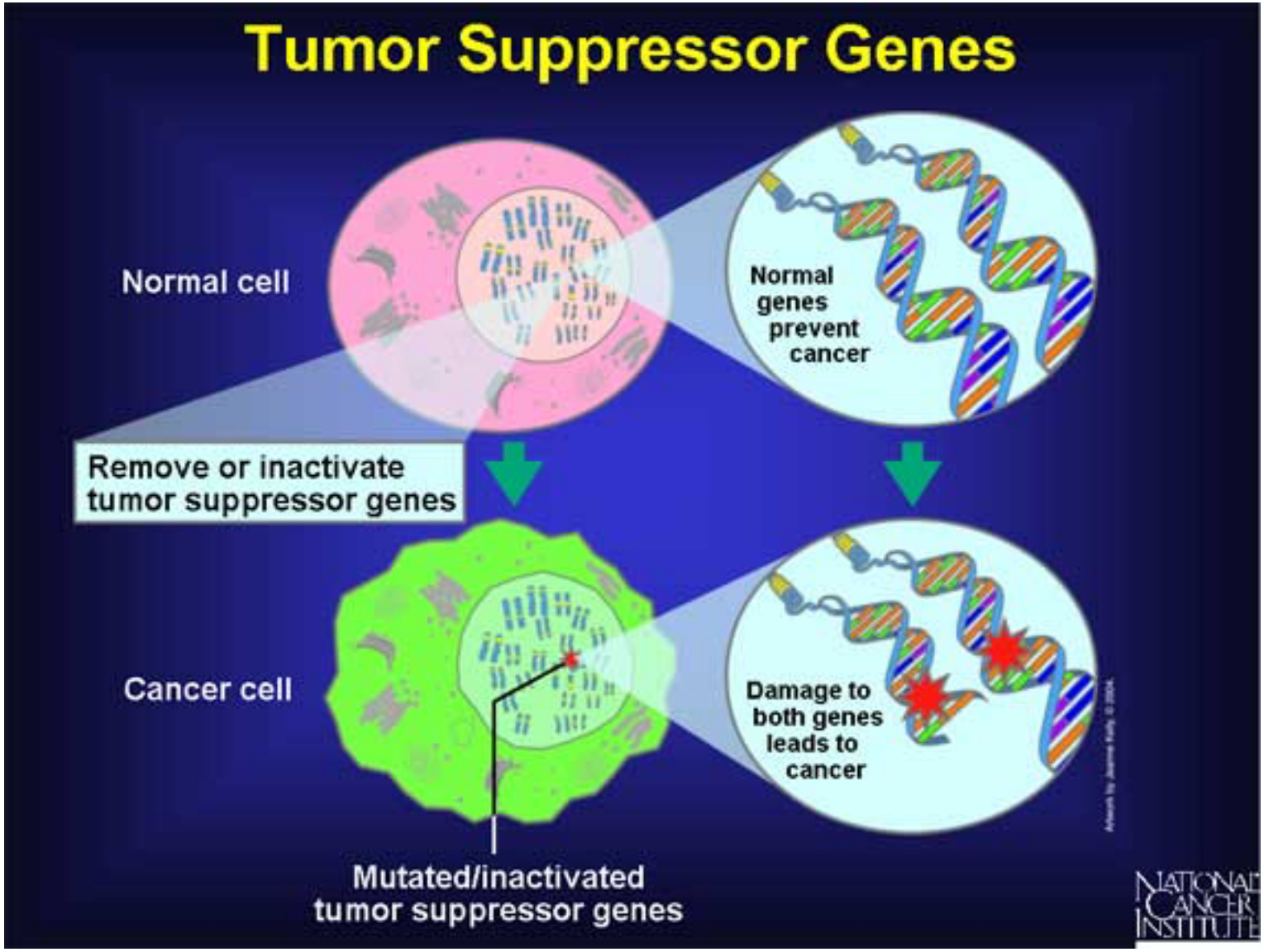


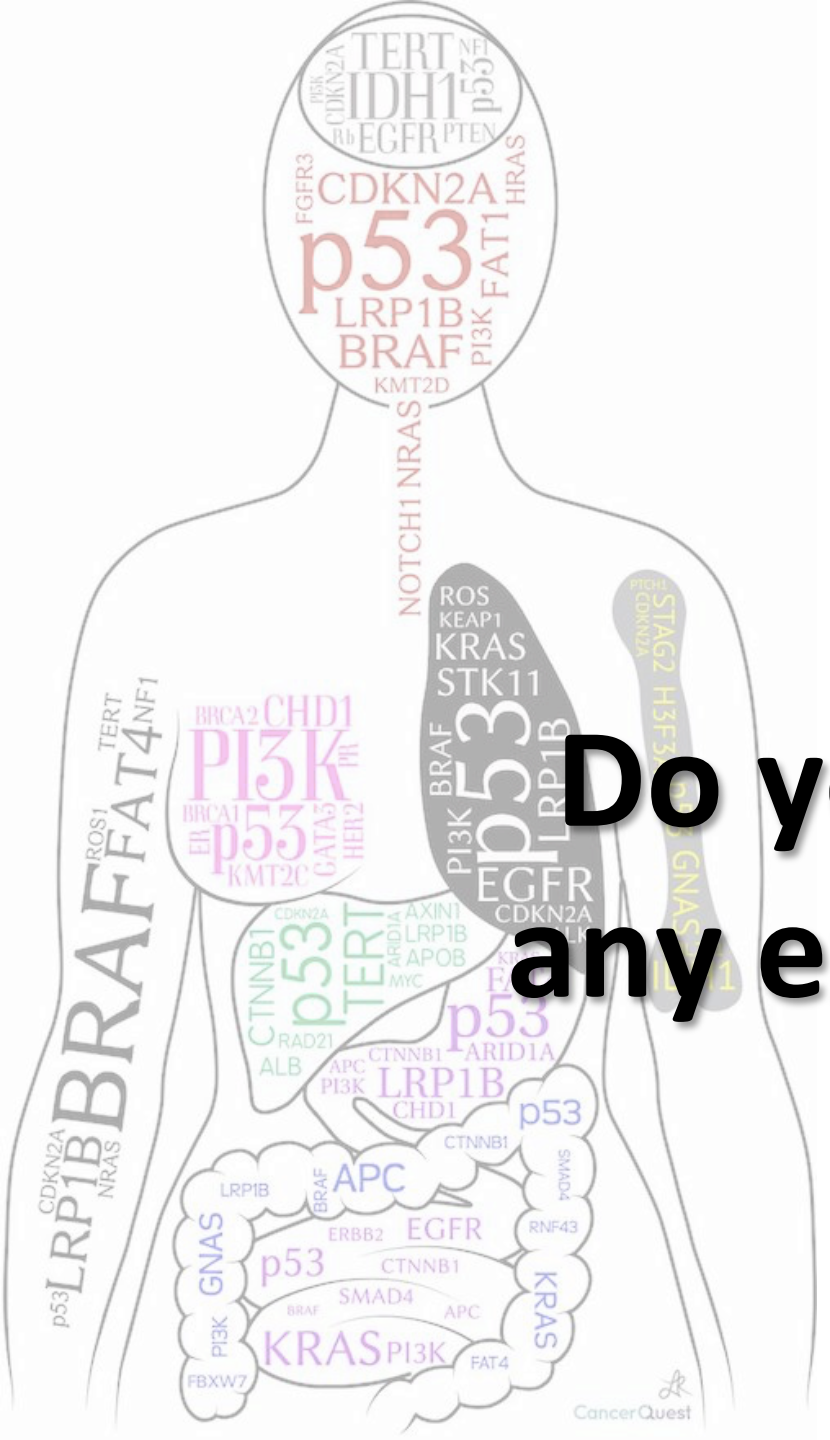


Cancer occurs as a result of accumulation of mutations

- tumor suppressor genes
- oncogenes


Oncogenes
Normal cell
Normal genes regulate cell growth
Cancer cell
Oncogenes accelerate cell growth and division
Mutated/damaged oncogene
NATIONAL CANCER INSTITUTE


Tumor Suppressor Genes
Normal cell
Normal genes prevent cancer
Remove or inactivate tumor suppressor genes
Cancer cell
Damage to both genes leads to cancer
Mutated/inactivated tumor suppressor genes
NATIONAL CANCER INSTITUTE

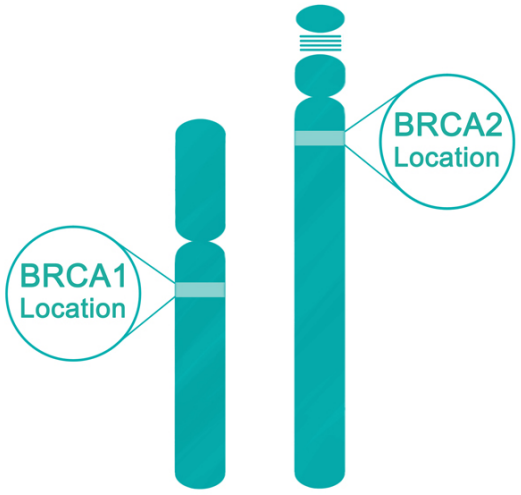


Cancer occurs as a result of accumulation of mutations

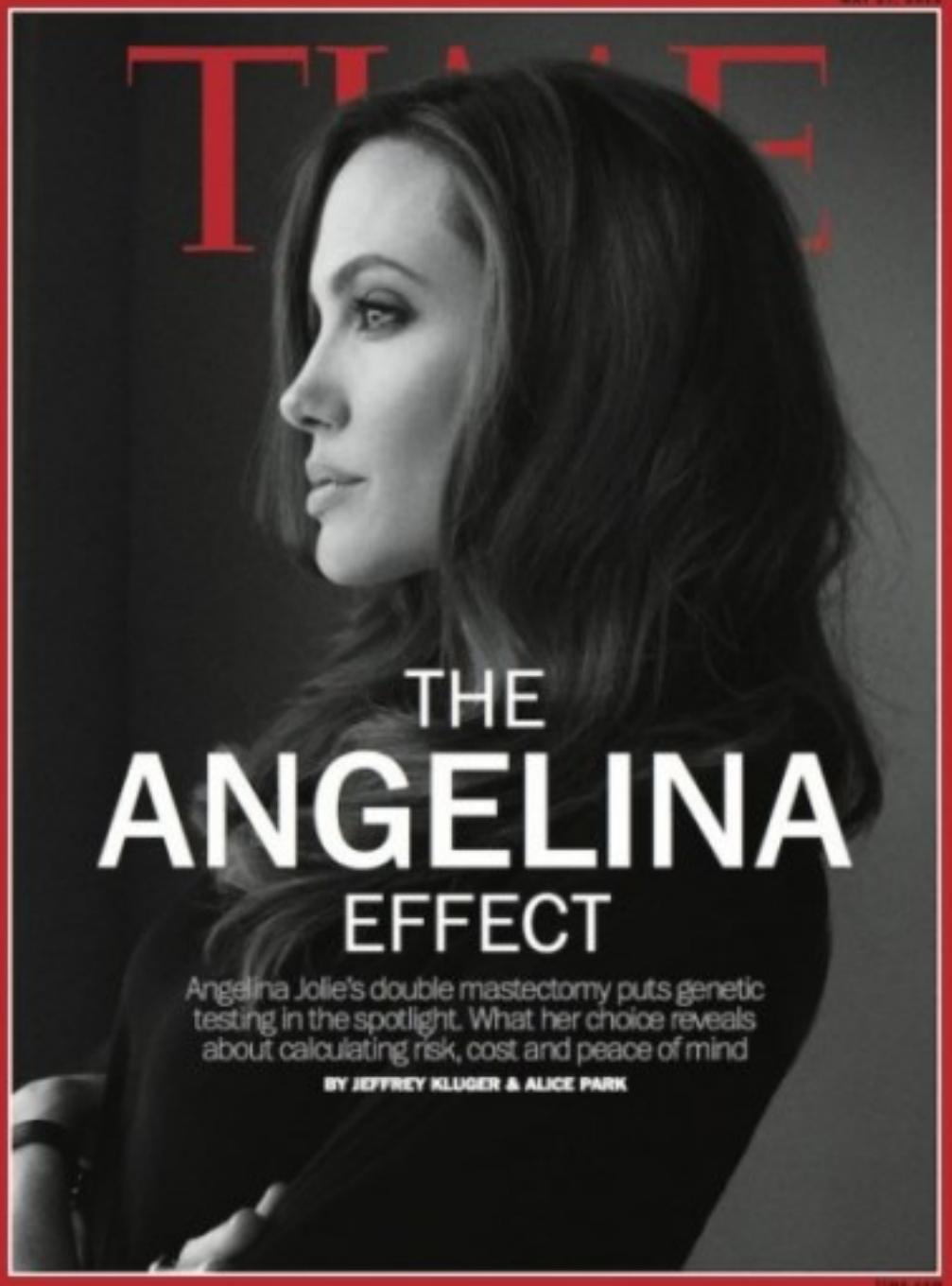
- tumor suppressor genes
- oncogenes

Do you know any examples?

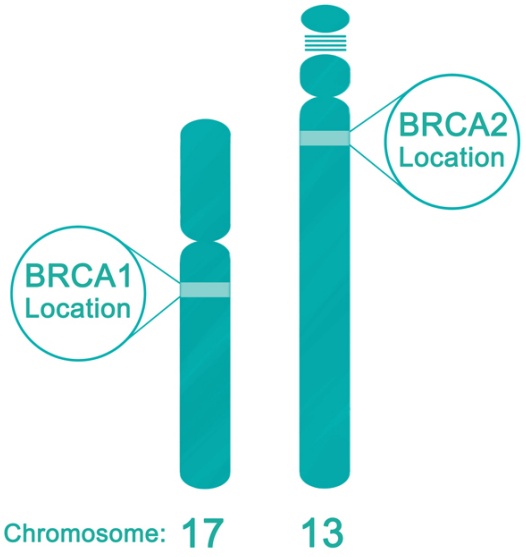
Where Are They ?



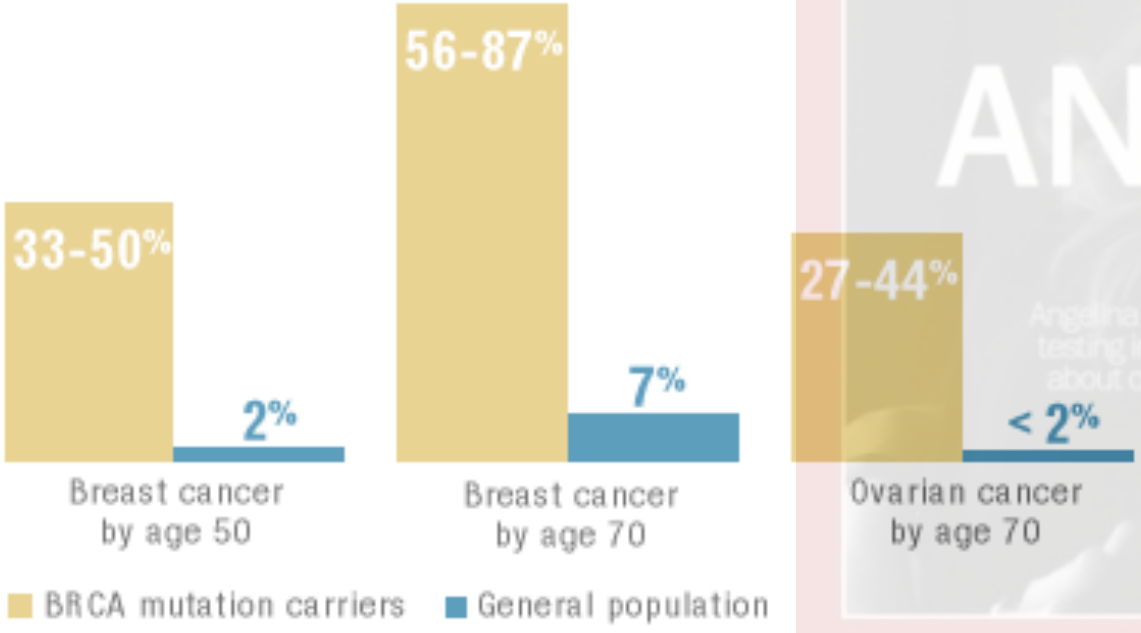
Chromosome: 17 13

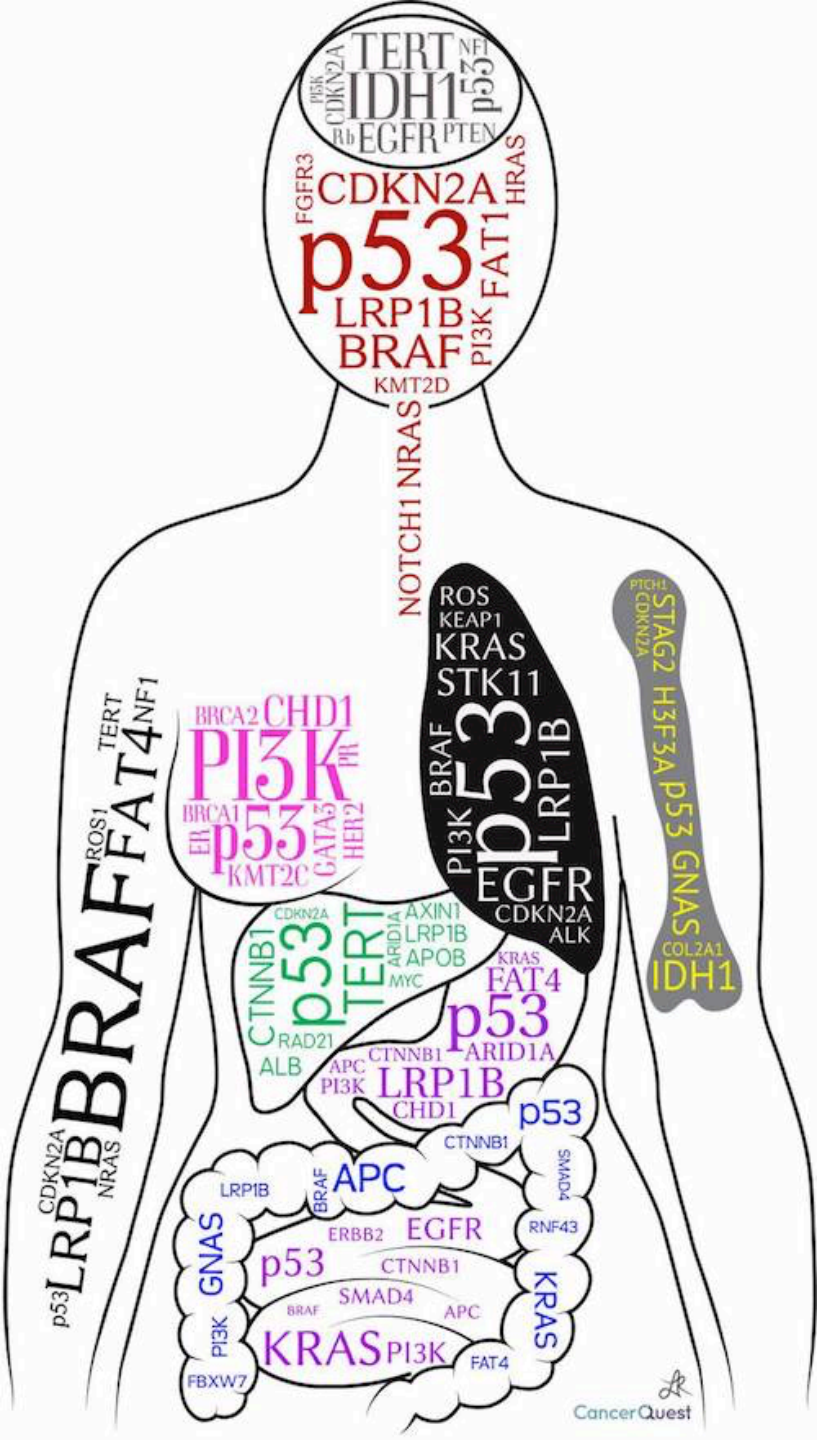


Where Are They ?



BRCA Mutation Increases the Risk of Cancer



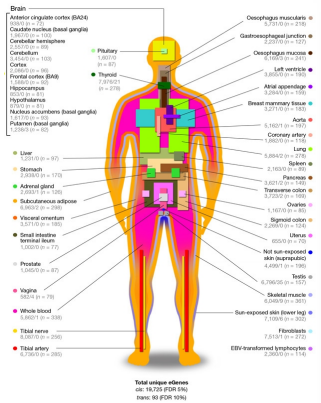


GTEx

How are they normally expressed?

Tumor Supressors

Oncogenes

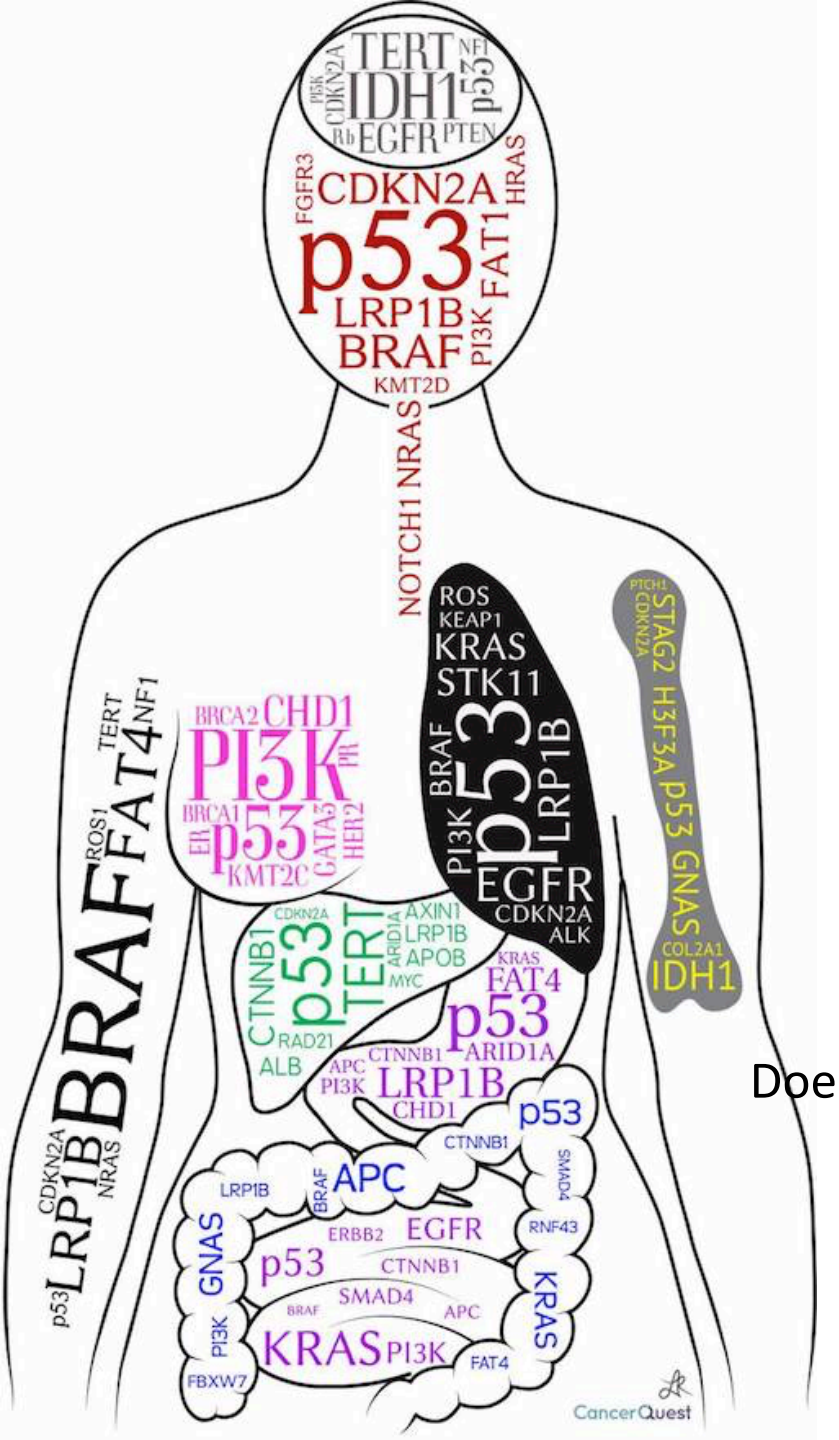


GTEx

Gene Expression

0 1 2 3 4 5 6

Muscle - Skeletal
Whole Blood
Skin - Sun Exposed (Lower leg)
Adipose - Subcutaneous
Artery - Tibial
Thyroid
Lung
Nerve - Tibial
Esophagus - Mucosa
Cells - Transformed fibroblasts
Skin - Not Sun Exposed (Suprapubic)
Esophagus - Muscularis
Adipose - Visceral (Omentum)
Artery - Aorta
Heart - Left Ventricle
Breast - Mammary Tissue
Colon - Transverse
Heart - Atrial Appendage
Stomach
Testis
Pancreas
Esophagus - Gastroesophageal Junction
Colon - Sigmoid
Adrenal Gland
Artery - Coronary
Brain - Cerebellum
Liver
Cells - EBV-transformed lymphocytes
Brain - Caudate (basal ganglia)
Brain - Nucleus accumbens (basal ganglia)
Brain - Cortex
Brain - Frontal Cortex (BA9)
Brain - Cerebellar Hemisphere
Prostate
Spleen
Pituitary
Brain - Putamen (basal ganglia)
Ovary
Vagina
Brain - Hypothalamus
Brain - Hippocampus
Small Intestine - Terminal Ileum
Brain - Anterior cingulate cortex (BA24)
Uterus
Brain - Amygdala
Brain - Spinal cord (cervical c-1)
Brain - Substantia nigra
Minor Salivary Gland
Kidney - Cortex
Cervix - Ectocervix
Bladder
Fallopian Tube
Cervix - Endocervix



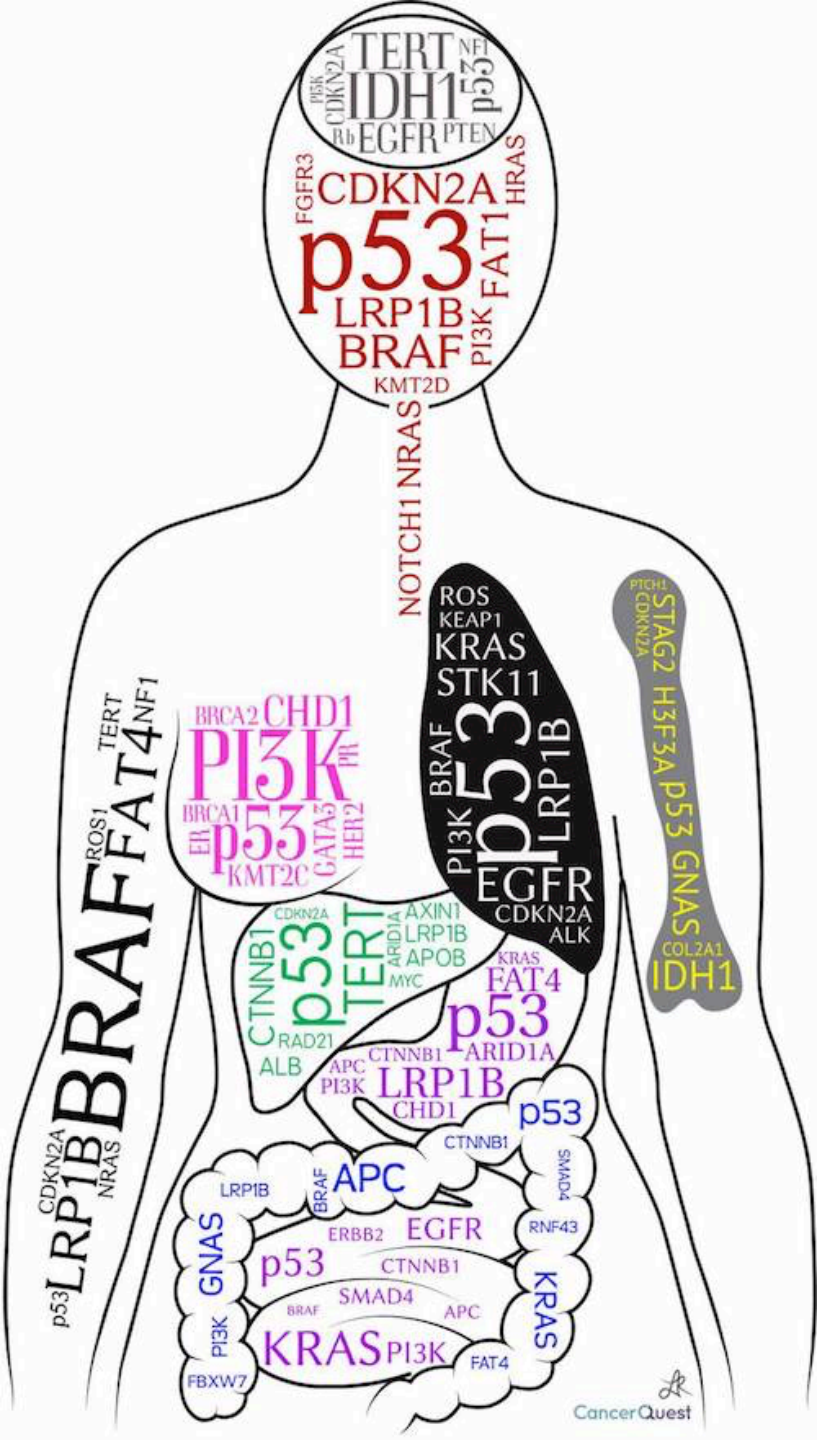
How are they normally expressed?

In which tissues are they expressed at greatest?

Which group is expressed higher?

Does the expression change based on age or gender?

Which group shows most variation?



Project Aims

- get familiar with gene expression analysis
- improve your R skills for data handling and statistical tests
- if possible, formulate your own questions on a given data set