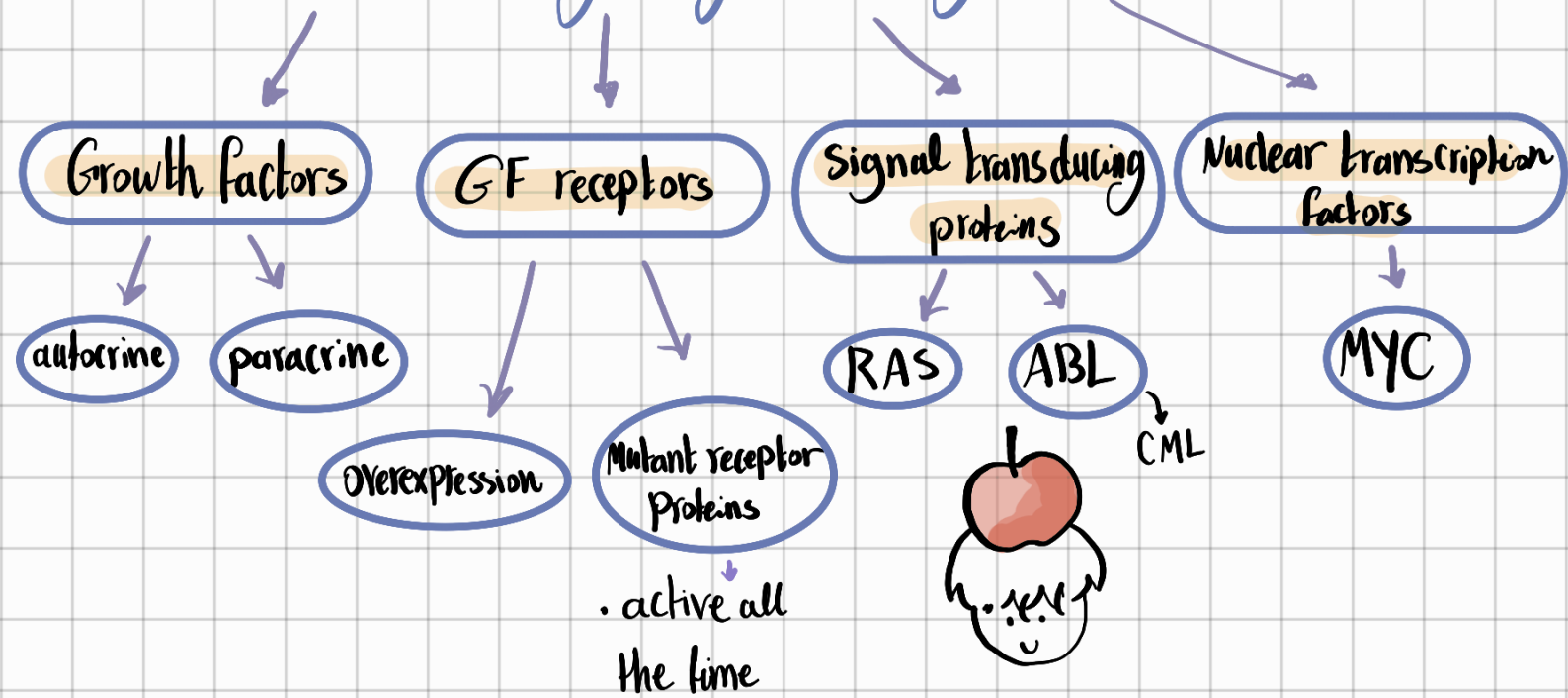
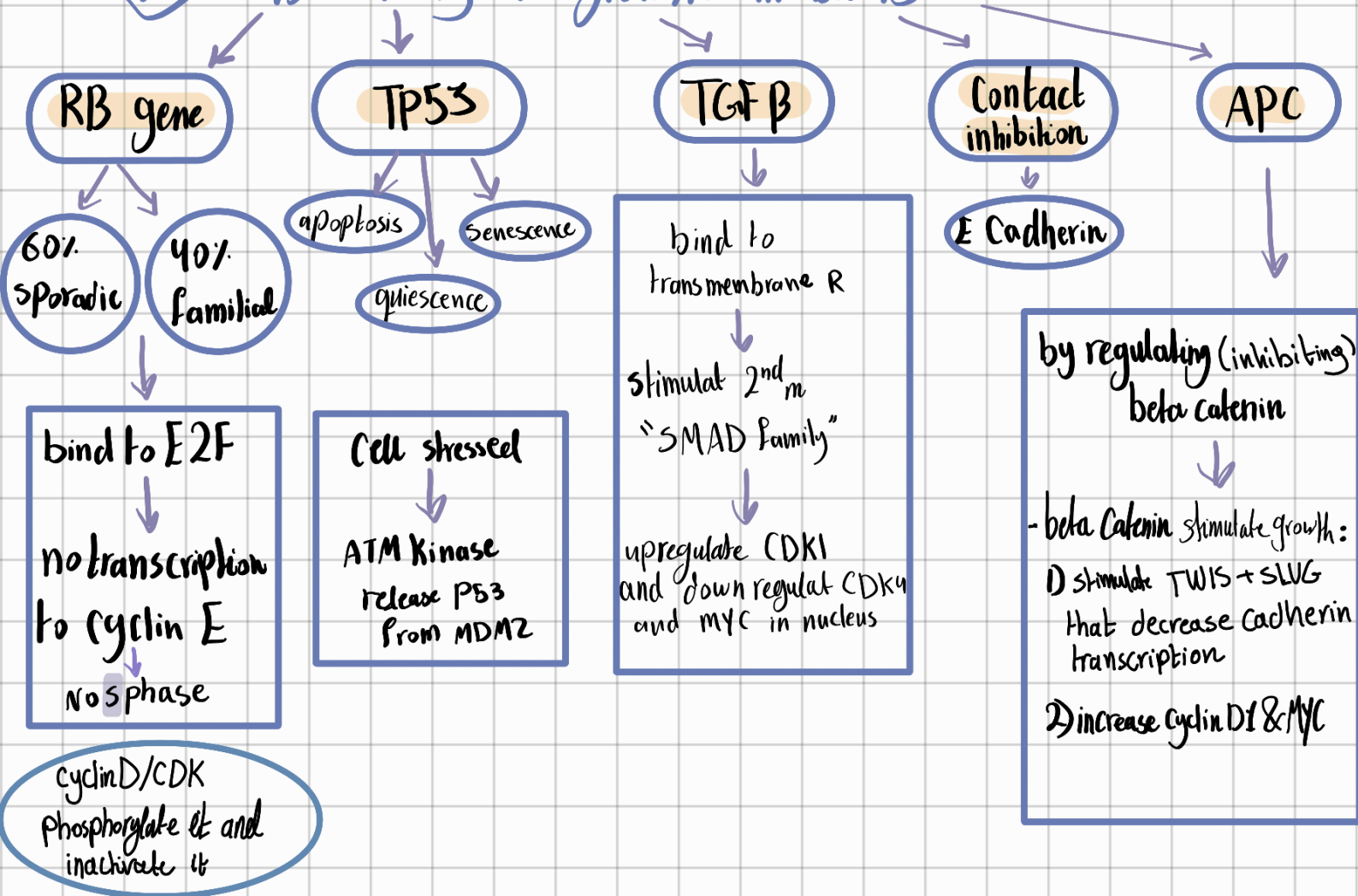


Hallmarks of Cancer:-

① self sufficiency in growth signals:



② insensitivity to growth inhibitors:



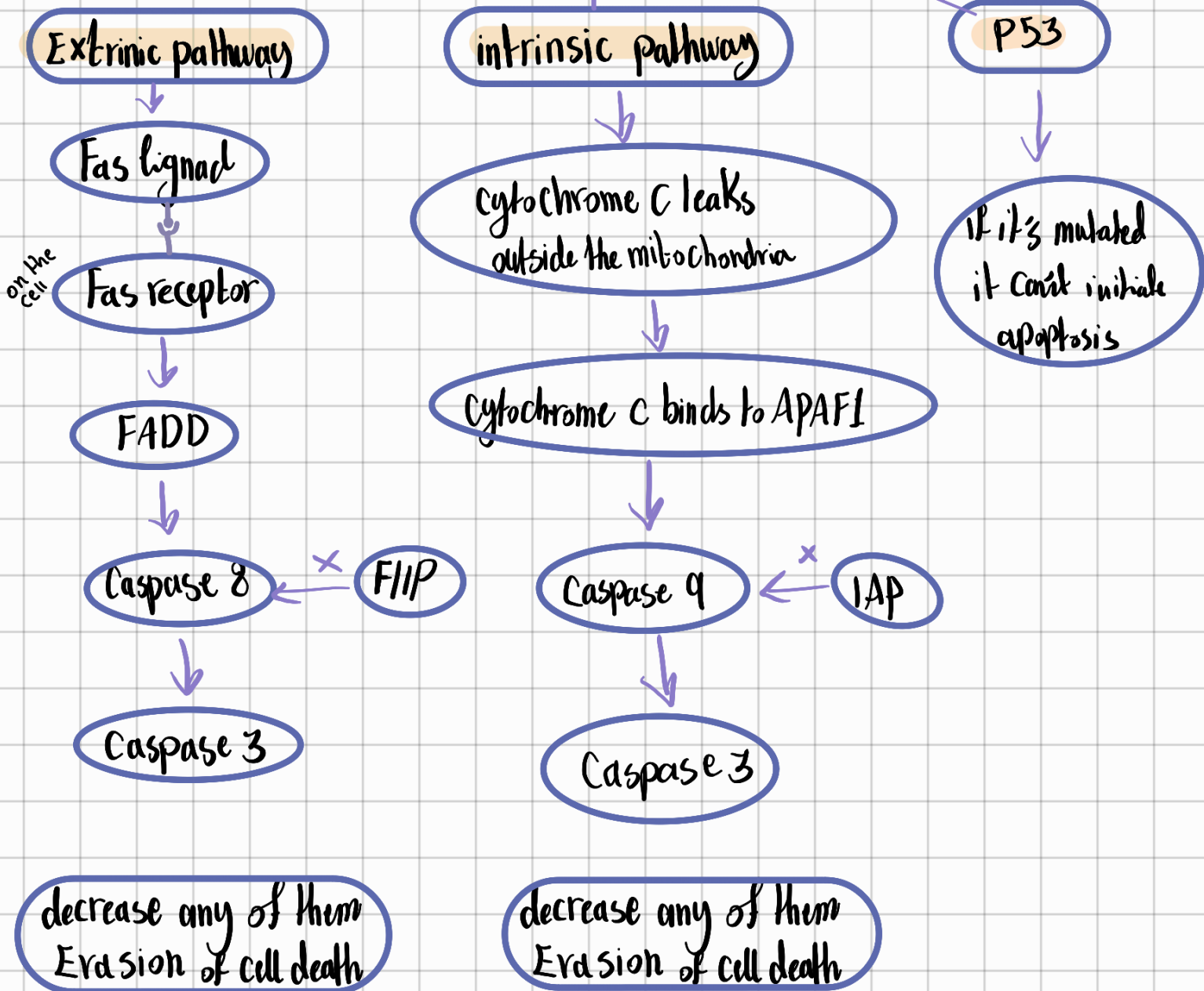
③ limitless replicative potential

Telomeres • stem cells + Germ cells + cancer cells have Telomerase

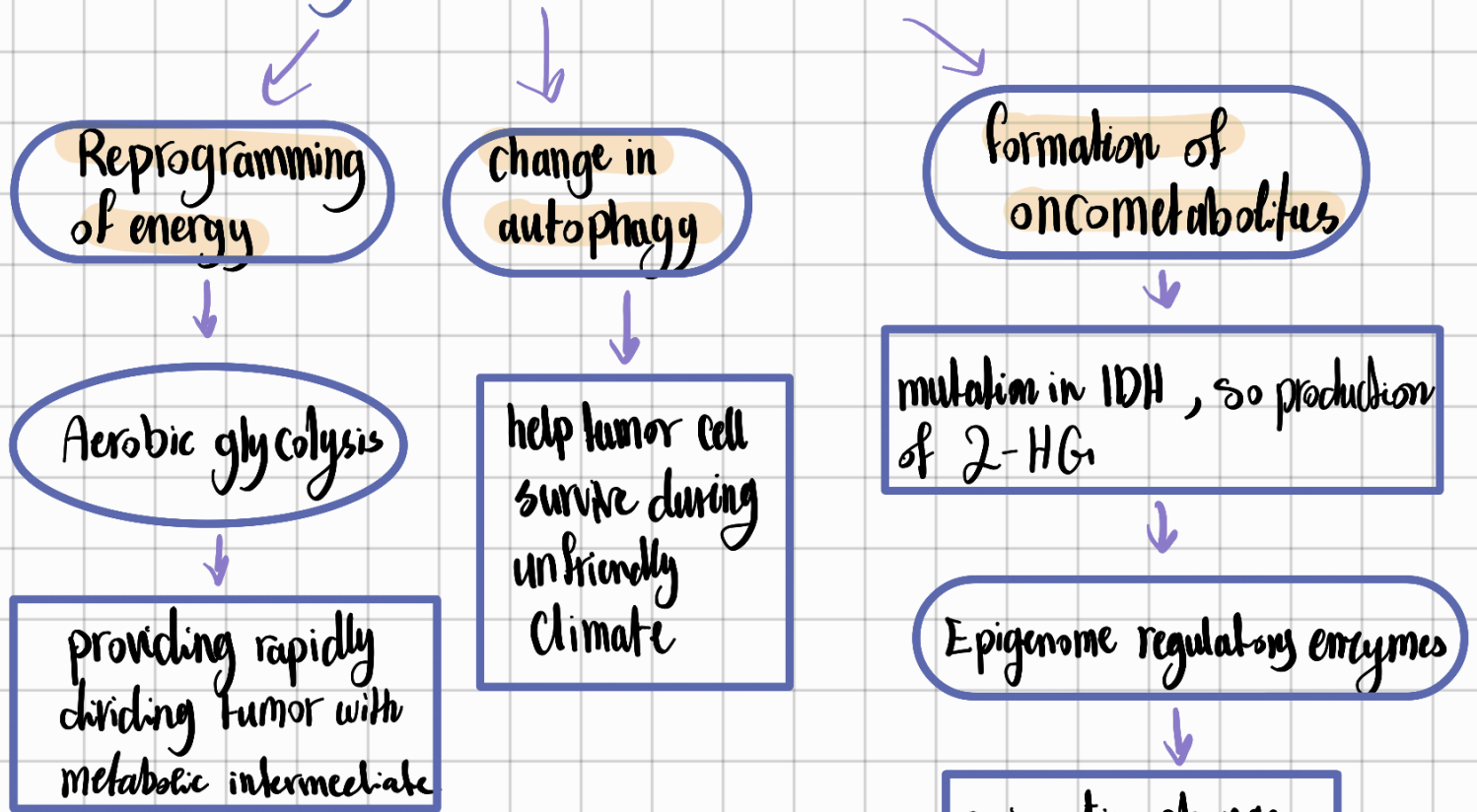
↳ make senescence

avoid senescence

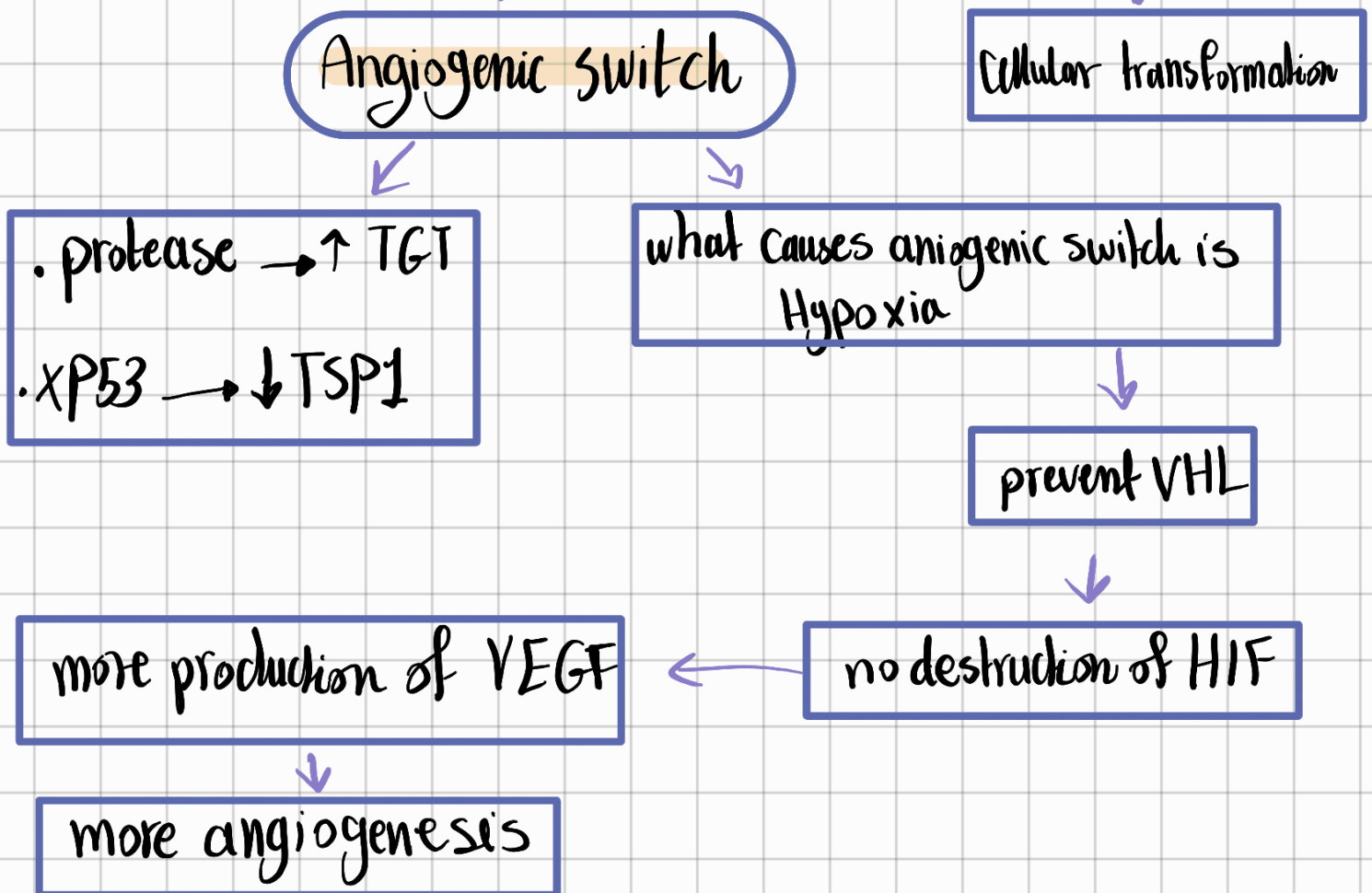
④ Evasion of cell death by evading apoptosis



⑤ Changes in cell metabolism



⑥ Sustained angiogenesis



⑦ Ability to invade and metastasize أختار و حدة

1- invasion of ECM

a- losing of tumor cells:
decrease E cadherin

b- degradation of ECM:
proteases

c- change in attachment:
lose adhesion, but they
evade apoptosis

d- locomotion:
migrate

2- vascular dissemination

• tumor cells circulate in the blood, but
at certain point they must exit
the vessel to tissues.

related to:
a. expression of adhesion molecules
b. " " Chemokines
c. tumor cell must colonize the site

• molecular genetics:

• TWIST and SNAIL/SLUG
↓
• promote EMT

⑧ Evading the immune system

- Anti-tumor mechanism:

1. Cytotoxic T lymphocytes
2. NK cells
3. Macrophage

- Mechanism of evasion IS:

1. Selective growth (subclones)
2. loss expression of MHC
3. downregulation of co-stimulatory
4. Antigen masking
5. Immunosuppression

p53 mutations can cause insensitivity to growth signals, evasion of apoptosis, and reprogramming of energy metabolism: three hallmarks from one mutation!

don't get confused!

p53 gene → TP53 Protein

THANK YOU...

Subject _____

Day _____

Date _____

- RAS → Colon and Pancreatic carcinomas
- Philadelphia chromosomes → CML
- cyclin D → lymphomas
- PDGF → ~~glioblastomas~~ glioblastomas
- RAF → melanomas
- RB gene → Retinoblastoma, osteosarcoma, soft tissue sarcoma
- Li Fraumeni syndrome: sarcoma, breast carcinoma)
- TGF β → Colon, stomach and endometrial cancer
- SMAD4 → Pancreatic cancer
- IDH → gliomas, acute myeloid leukemia, sarcomas
- defective VHL → renal cell carcinoma, ~~Pheochromocytoma~~ Pheochromocytoma
- Tumor dormancy → melanoma, breast, Prostate.
* oncofetal antigens may re-express in colon and liver ~~tumors~~ tumors