

Mutation to protein BRCA1 / BRCA2, involved in HR → ↑ risk for developing breast & ovarian cancer.

(4) Double strand break repair

Caused by - Ionizing radiation
Chemotherapeutic agent like doxorubicin
Oxidative free radicals.

→ 2 system required - (1) Non homologous end joining (NHEJ)

Disadvantage - Error prone & mutagenic

→ (2) Homologous recombination (HR) - less error prone

→ Eukaryotic cell use these 2 mechanism

→ choice depends on phase of cell cycle
exact type of DSB to be repaired

→ During G₀/G₁ phase - NHEJ pathway used

→ During S, G₂ & M phase - HR used

(1) NHEJ → group of proteins

↓
Recognize,
processing

ligation of ends of 2 DNA fragments

Disadvantage → some DNA is lost in processing

- Error prone & mutagenic

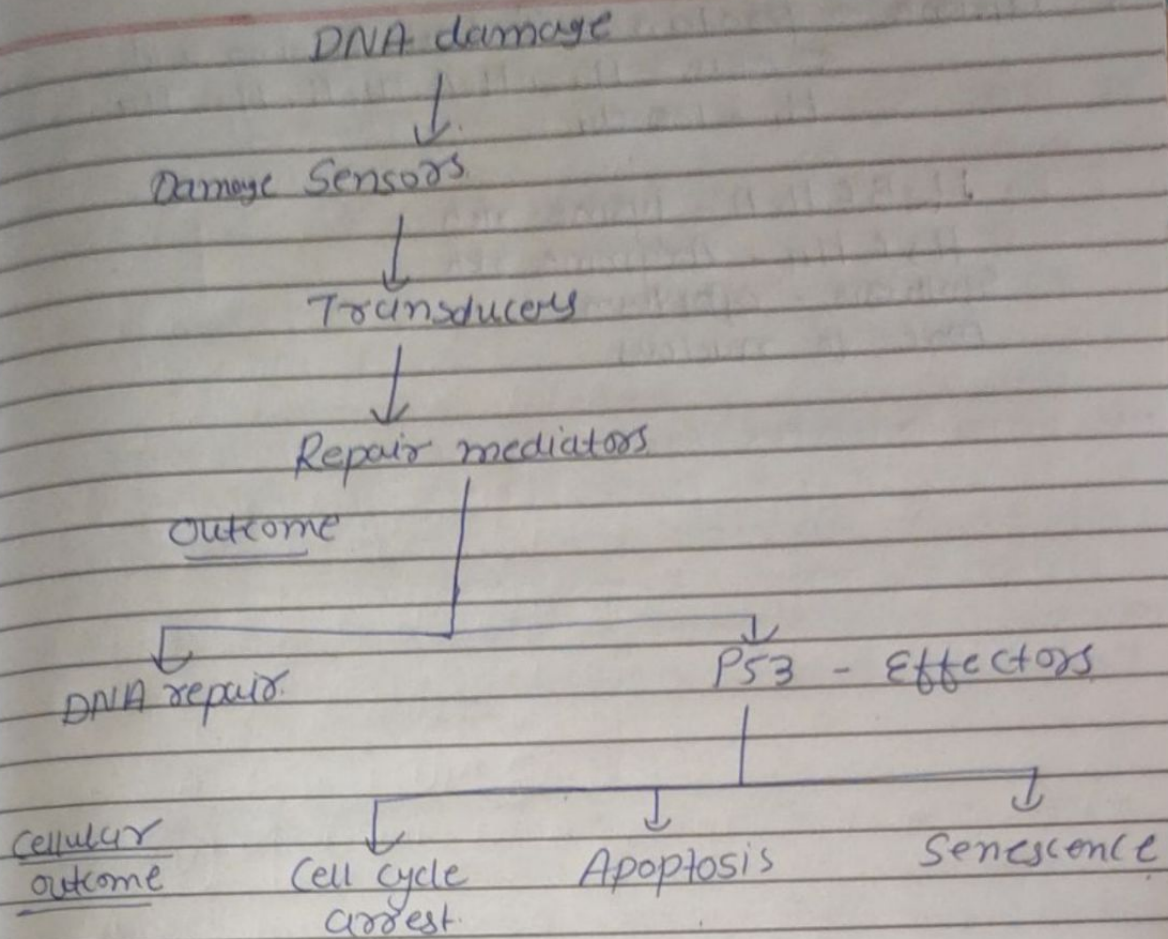
- Defect in NHEJ associated with predisposition to cancer & immunodeficiency syndrome

(2) HR → use enzyme that normally perform genetic recombination between homologous chromosomes during meiosis

Adv. → less error prone than NHEJ

↓
any DNA that was lost is replaced using homologous DNA as a template

- occurs in late S & G₂ of cell cycle



→ Fidelity :-

NHEJ → +

HR → ++

Nucleotide excision repair → +++

Base excision repair → +++

Mismatch repair (MMR) → +++