



Al-Mustaqbal university college  
Radiological Techniques Department

## **The effects of the radiation on the cell components**

By  
Assistant lecturer

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Lecture -9

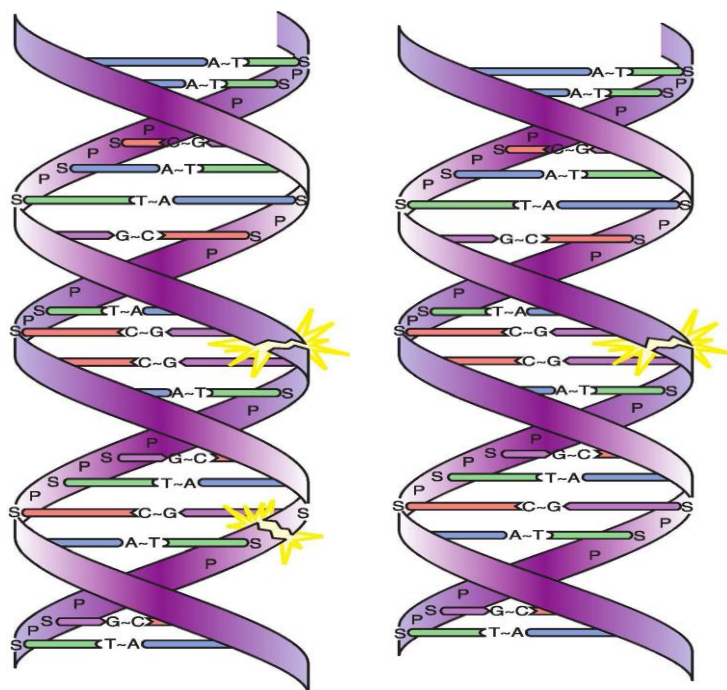
## The effects of the radiation on the cell components

### Genetic Effects:

Radiation causes abnormalities in chromosomes (responsible for the transmission of genetic traits mainly from cell to cell and from generation to generation). Which in turn leads to physical or mental abnormalities in children from birth resulting from exposure of one or both parents to ionizing radiation (perhaps during pregnancy for the mother). In some cases, these genetic abnormalities do not appear until after several generations of radiation exposure, which leads to the difficulty of following them in humans

#### 1. Effect on DNA

- ❖ Single strand break
- ❖ Double strand break
- ❖ Mutation
- ❖ cell death
- ❖ carcinogenesis



## 2. Effect on cytoplasm

- ❖ Increased permeability of plasma membrane to sodium and potassium ions.
- ❖ Swelling and disorganization of mitochondria.
- ❖ Focal cytoplasmic necrosis.

## 3 .Effect on proteins

- ❖ Denaturation.
- ❖ primary structure of the protein is usually not significantly altered
- ❖ secondary and tertiary structures are affected by breakage of hydrogen or disulfide bonds Inactivation of enzymes sometimes occurs.

## 4. Effect on Mitochondria

- ❖ Mitochondria demonstrate
- ❖ Increased permeability
- ❖ swelling
- ❖ Disorganization of the internal cristae

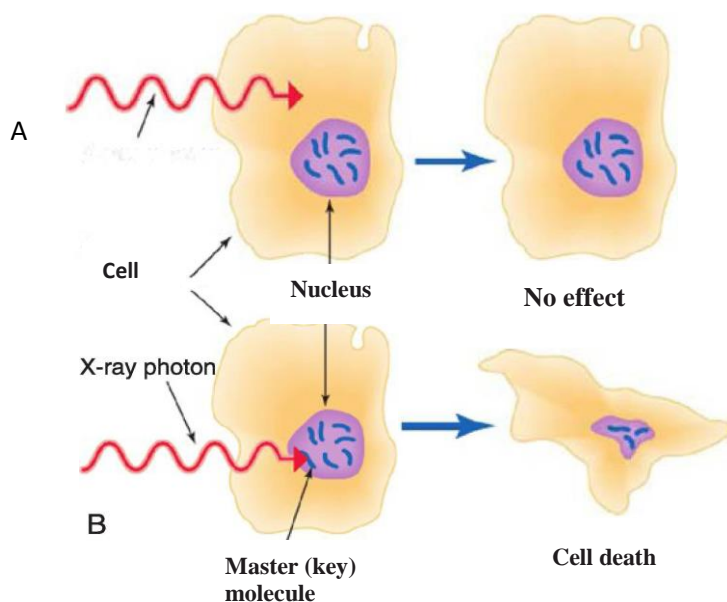
## 5 .Effect on Chromosomes

- ❖ If radiation exposure occurs after DNA synthesis (I.e. G2 or late s) only one arm of the effected chromosome is broken.
- ❖ If radiation occurs before DNA synthesis (G1 or early S) both arms are effected

## 6. Cell Death

Reproductive death in a cell population is loss of the capacity for mitotic division. The three mechanisms of reproductive death are

- ❖ DNA damage,
- ❖ Bystander effect
- ❖ Apoptosis.

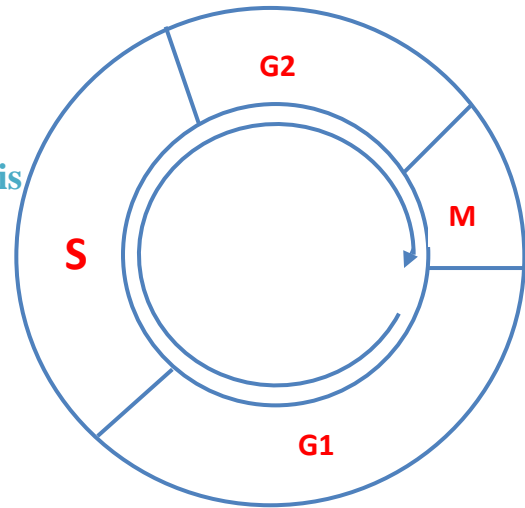


**G1 : Growth**

**S: DNA synthesis**

**G2: Growth and preparation for mitosis**

**M: Mitosis (cell division)**



Cell cycle