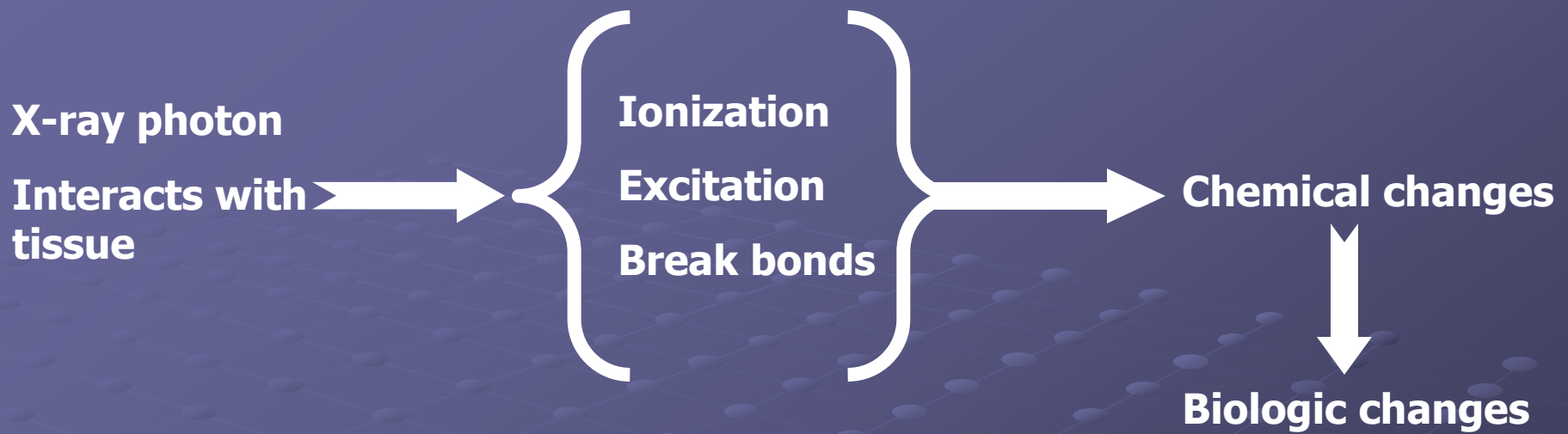


# *Radiation Biology*

*Dr. Sana'a Al-Qasab*



# *Biologic Damage*

*Dr. Sana'a Al-Qasab*

X-ray photons  
interact with  
water in cells

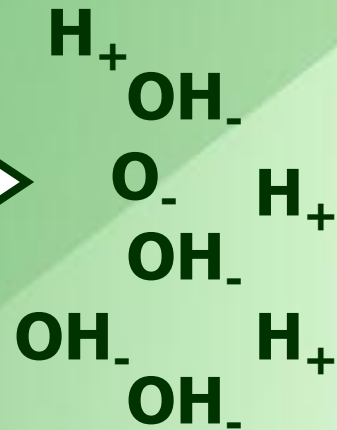
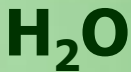
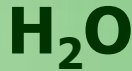
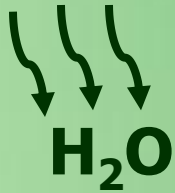


Ionization occur



Resulting in free  
radical formation

X-ray photons



*Free radicals formations*

*Dr. Sana'a Al-Qasab*

Free radicals  $\longrightarrow$  Combine to form  $\longrightarrow$  Toxins such as  $\text{H}_2\text{O}_2$   
(hydrogen peroxide)



*Combination of free radicals with each other*

*Dr. Sana'a Al-Qasab*

# Relative radiosensitivities of adult cell types

Level of sensitivity	Cell type
Highest	Erythroblasts and other stem cells of hematopoietic tissue Intestinal crypts of lieberkuhn Basal epidermal and gastric gland cells Spermatogonia Granulose cells of ovarian follicles Lymphocytes
High	Spermatocytes Ovocytes
Intermediate	Endothelium Fibroblasts Salivary gland acinar cells
Low	Salivary gland duct cells Liver Kidney Pancreas Adrenal gland Thyroid gland Pituitary gland
Lowest	Neurons Muscle cells Erythrocytes spermatozoa

# *Relative radiosensitivities of tissues and organs*

<b>Relative sensitivity</b>	<b>Tissue/organ</b>
<b>Highest</b>	Lymphoid Tissue Bone Marrow Gonads Intestinal Epithelium
<b>High</b>	Skin Cornea Gastrointestinal Tract, Including Oral Mucosa
<b>Intermediate</b>	Connective Tissue Fine Vasculature Growing Cartilage And Bone
<b>Low</b>	Mature Cartilage And Bone Kidney Liver Adult Thyroid Gland Salivary Gland
<b>Lowest</b>	Muscle Nerves Central Nervous System

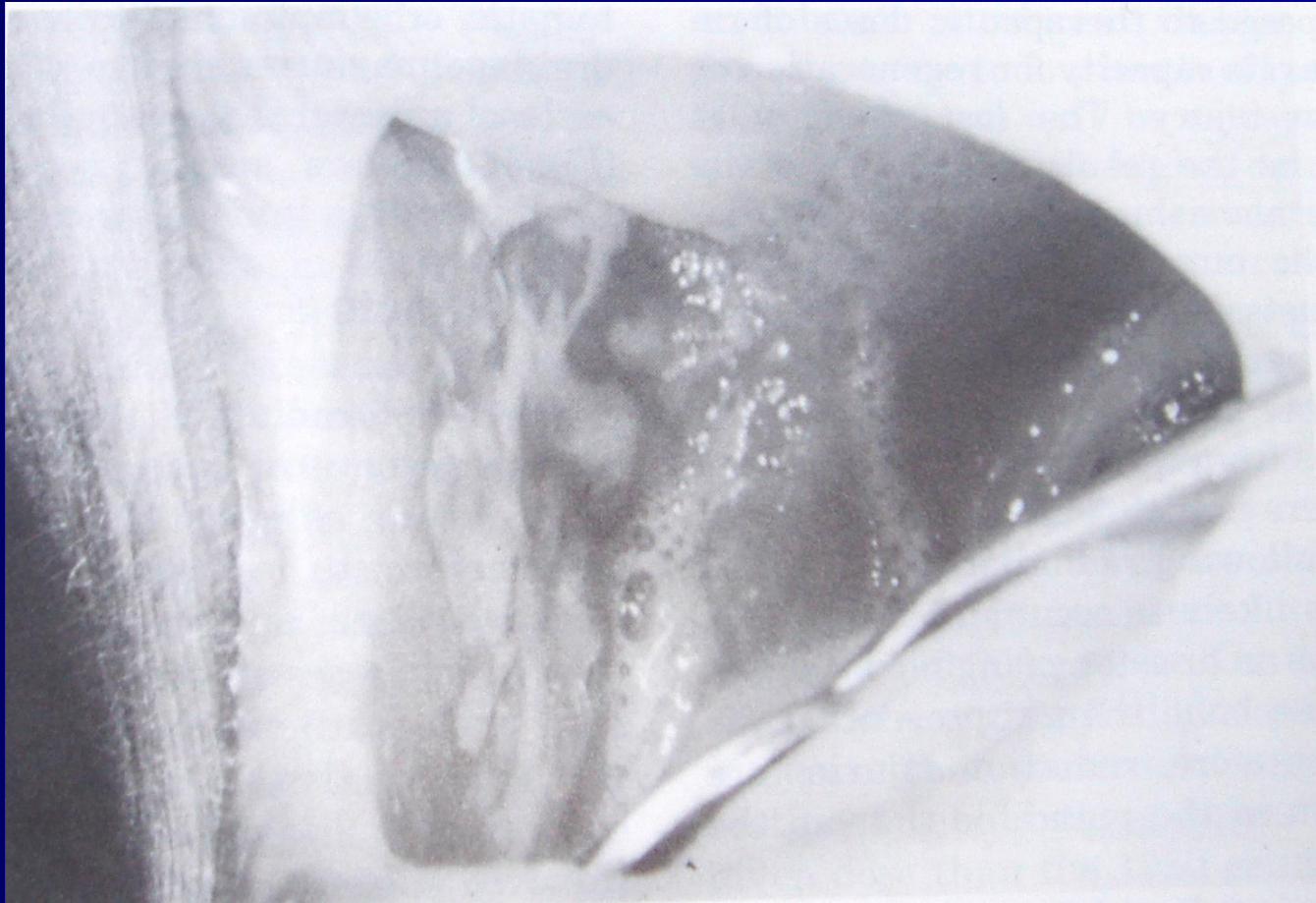
*Dr. Sana'a Al-Qasab*

# *Tissue And Radiation Effect*

<b>Tissue or organ</b>	<b>Radiation effect</b>
<b>Hematopoietic (blood – forming)</b>	<b>Leukemia</b>
<b>Reproductive (ova, sperm)</b>	<b>Mutations</b>
<b>Thyroid</b>	<b>Carcinoma</b>
<b>Skin</b>	<b>Carcinoma</b>
<b>Eyes</b>	<b>Cataracts</b>

*Dr. Sana'a Al-Qasab*

# *Oral ulcerations of radiation-induced mucositis*



*Dr. Sana'a Al-Qasab*





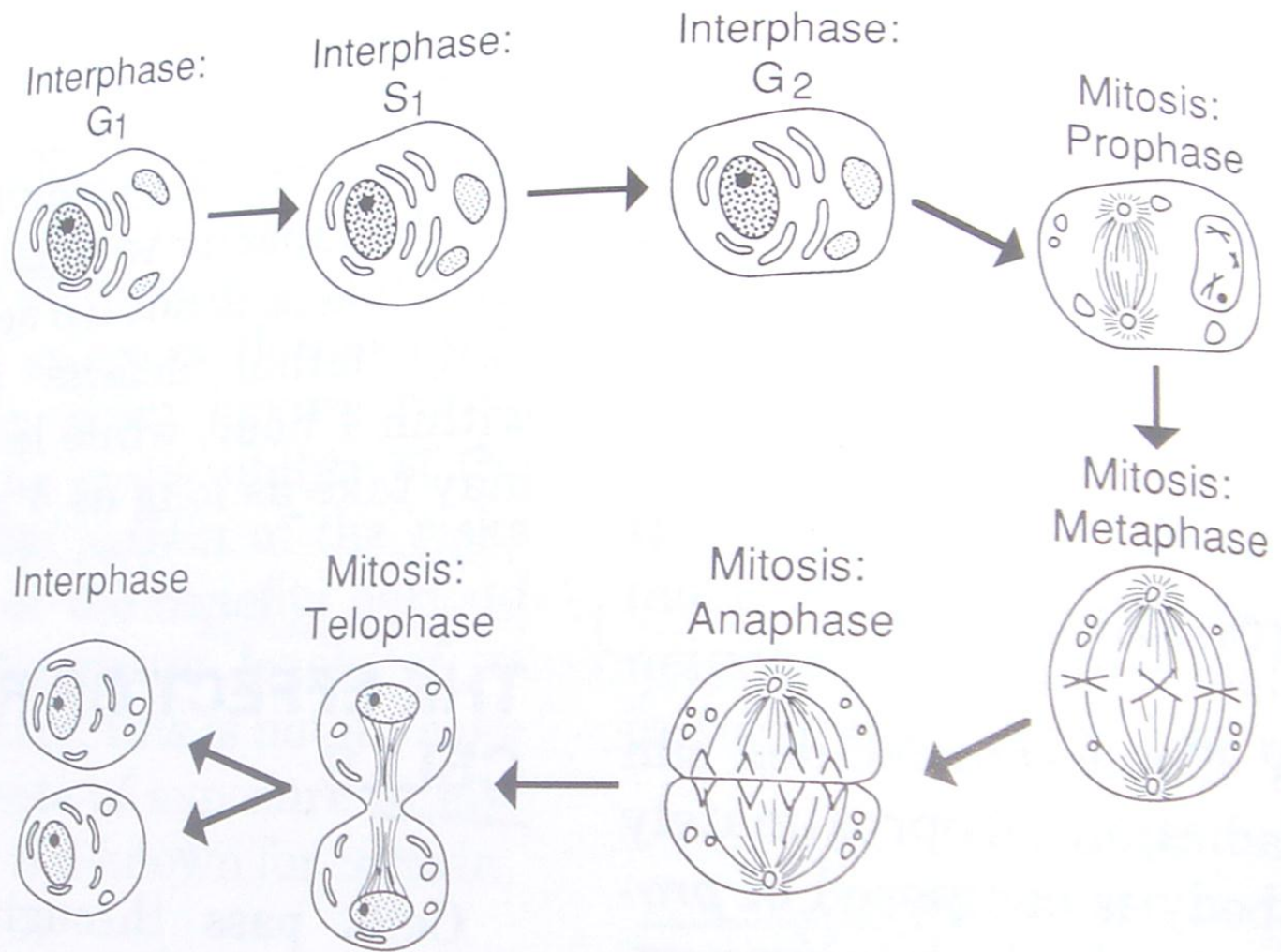
*The effects of xerostomia following radiation therapy*

*Dr. Sana'a Al-Qasab*



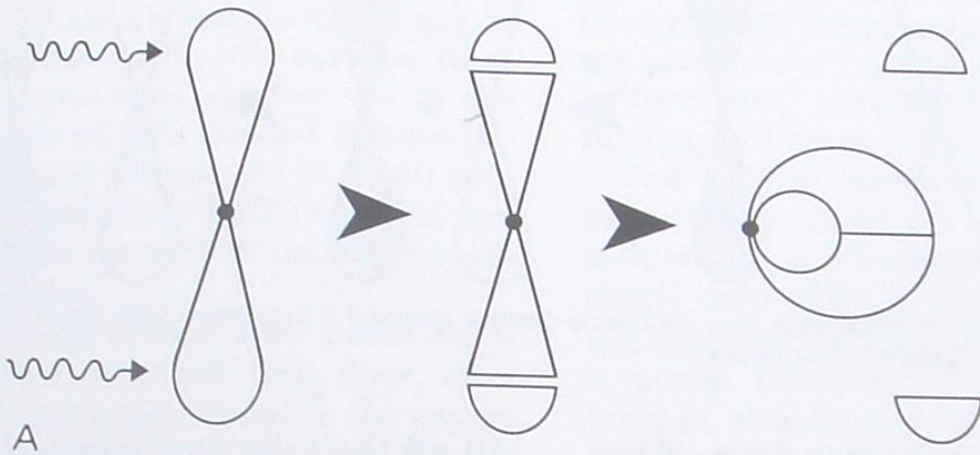
# *Osteoradionecrosis*

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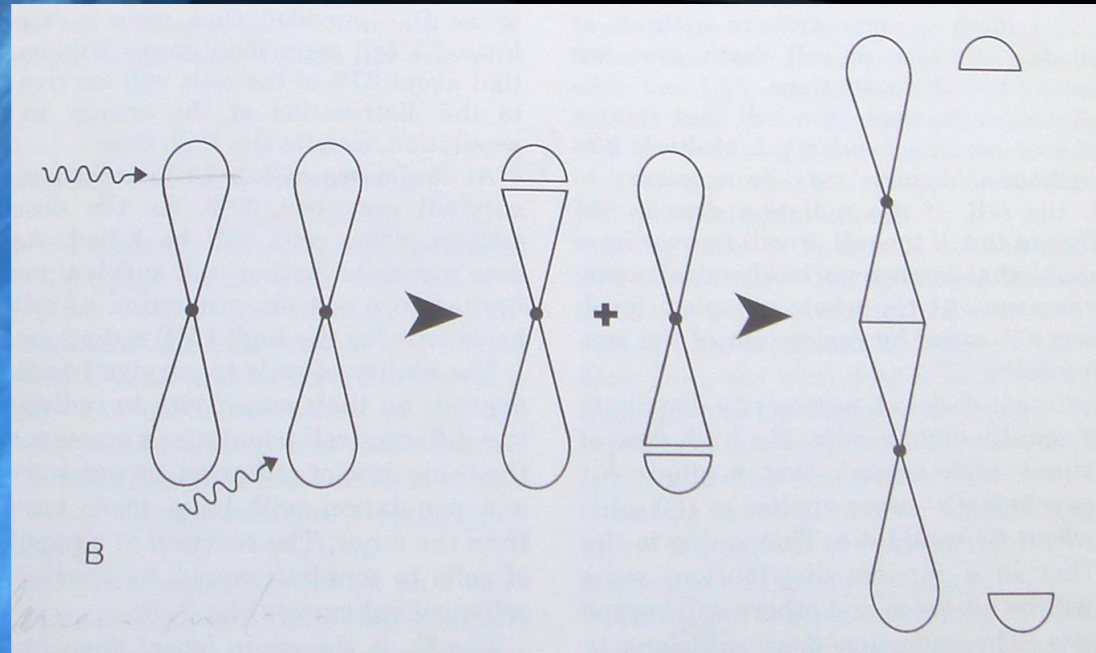


# *Normal Mitosis*

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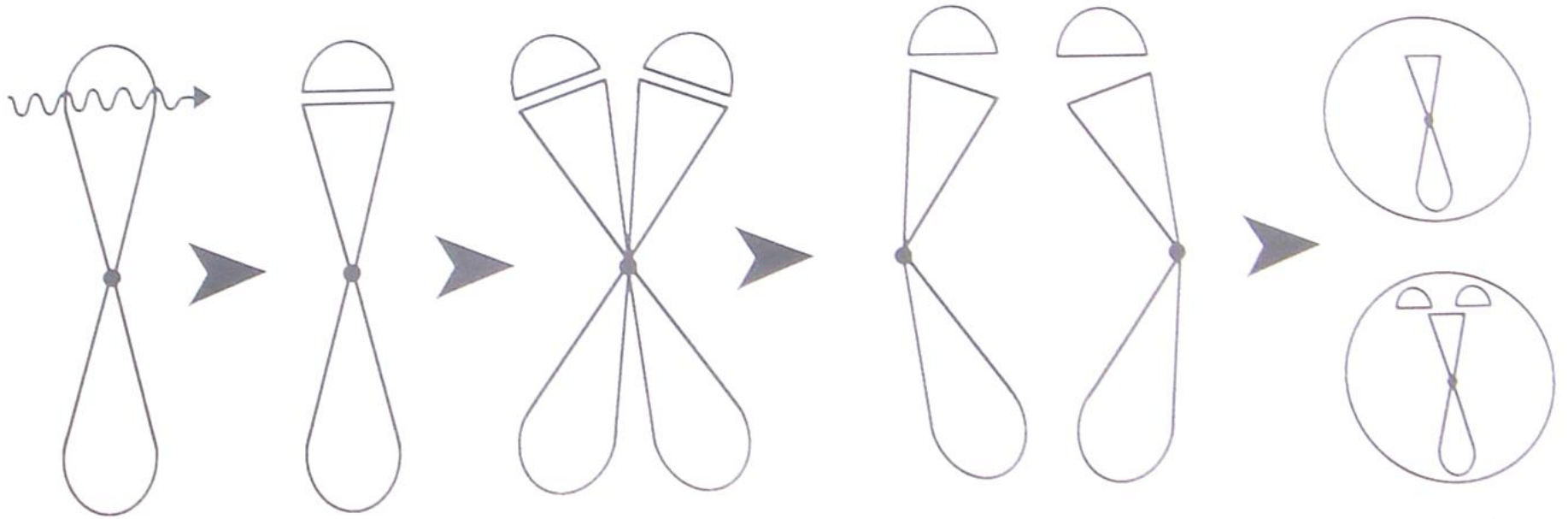


*Irradiation may lead to breaks in chromosomes arms, be broken ends may stick together resulting in a misshapen chromosome*

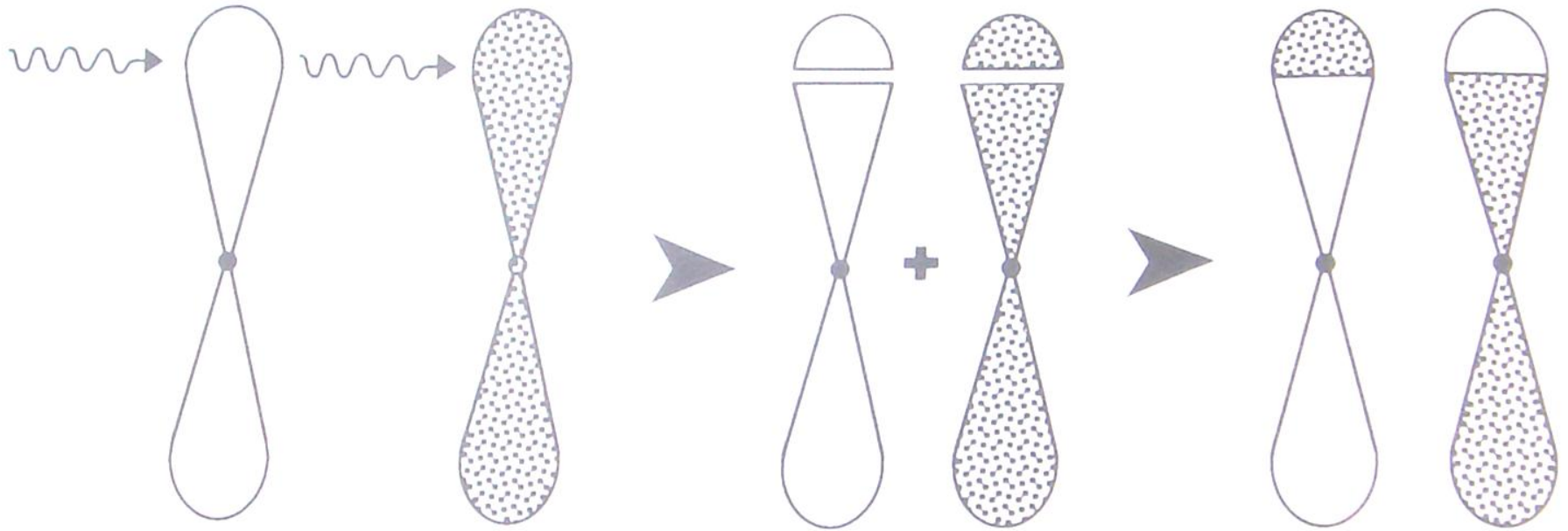


*Two chromosomes may become joined at there damaged ends*

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*Dr. Sana'a Al-Qasab*



*Two different chromosomes may exchange genetic material*

*Dr. Sana'a Al-Qasab*