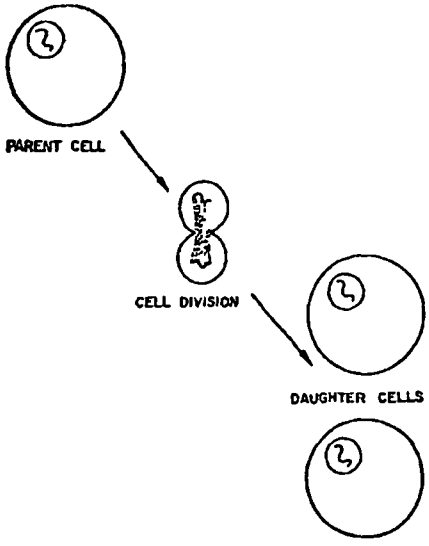

Fig 42-4a. Normal cell division

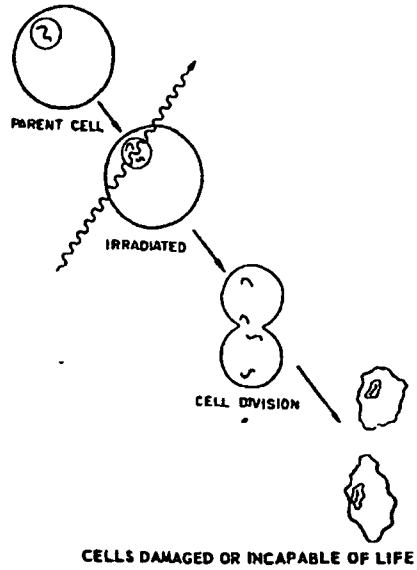

Fig. 42-4b. Damage or death of cells following division of irradiated parent cell.

proportion of about one nitrogen atom to twenty oxygen, to five carbon, and to forty-five hydrogen atoms It is therefore important to study the effects of radiation on water and on materials of a composition which resemble human tissue

Irradiation of water produces large numbers of free electrons which have been ejected from the parent atoms, leaving positive ions In this process of ionization, there is dissociation of the water molecule and the release of oxidizing agents In the human body, there may be changes of structure of organic molecules and changes in the biochemical processes. Some of these same changes may be occurring independently of the radiation, so the mechanisms are complex and are being studied intensively

Types of injuries

The accumulation of knowledge of the effects of radiation on man was begun in 1895 when Roentgen discovered the X-ray Radiation from uranium was discovered by Becquerel in 1898 Alpha, beta, and gamma rays were discovered shortly thereafter, and the neutron was discovered in 1930. Injurious effects were experienced by these early workers in nuclear science As radiation was applied to man for healing purposes, effects such as skin redness, dermatitis, and skin cancer were noted, as were loss of hair and eye inflammation It was found that the incidence of cancer and of certain blood diseases was higher among radiologists than would be expected for a chance distribution in the population studied

The pool of health experience data was obtained from (1) early radiation workers, (2) medical personnel who routinely administered radiation for diagnostic and therapeutic purposes, (3) patients who were treated with radiation, and finally, (4) a group of workers who painted dials with luminous paints containing radium It became apparent that exposure to ionizing radiation was associated with a higher-than-normal incidence of certain diseases, such as skin, lung, and other cancers, of bone damage, and of cataracts It appeared also that there was some life shortening

Relating dosage to damage

Extensive work was done in an attempt