326 US Atomic Energy Commission
REPOSITORY
COLLECTION Division of Biology Med.
BOX No. 1
FOLDER 11

712104

FLASH BURN SECTION

The task of this project is the analysis of the characteristics of thermal burns from nuclear weapons.

This required the development of suitable laboratory sources of intense thermal radiation, the construction of shutters to control the time of exposure or to simulate the bomb pulse, the design of radiometric instruments to measure the thermal flux and the fabrication of reflectometers to measure and deduct this ineffective portion of the thermal pulse.

Then the dose-response, i. e., the effective thermal flux times exposure time was determined on bare skin in about 3000 burns and its modification by ambient temperature and wavelength was measured. These dose-response studies have been basic to all subsequent laboratory work and to casualty prediction both civil and military.

The validity of our laboratory data has been confirmed by observations in the field and correlation between pig burns and human burns has been established.

Next, the protective effect of skin creams, clothing and fabric shields has been studied both in the laboratory and the field. These and other studies are being continued. The work now in progress is as follows:

1. Histologic and histochemical studies of healing burns.
2. Relationship of pulse shape and exposure time to depth of damage.
3. Effect of fabric spacing in one and two layer clothing assemblies.
4. Pathology of sub-fabric burns.
5. Effect of thickness of a protective cream layer.
6. Tissue temperatures during burning.
7. Chemical changes in blood from a burned area.
8. Field calorimeter.

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SHORTENING OF LIFE-SPAN BY RADIATION

H. A. Blair

It is becoming well established that whole-body exposure to penetrating ionizing radiation leads to shortening of life span. Partial body exposures to external sources have received little study but internally deposited radioactive materials which usually have a partial body distribution also shorten life. The simplest assumption to make to account for these phenomena is that radiation injury is only partially reversible and that the irreversible portion constitutes wholly or partly a form of premature ageing. In the rodent, shortening of life is about 1% per 100 r from divided doses and is an increasing function of dose with single doses in excess of 100 r which may attain levels as high as 40% to 50% for survivors of a single LD_{50} dose (about 700 r).

Irreversible injury is measurable in at least one additional way as a decrease of LD_{50}. Animals which have been exposed to radiation and allowed to recover as fully as they will succumb to lower doses of radiation than do those not previously exposed.

There is some evidence that irreversible injury has the same effect on life span independently of the age at which it is sustained. This indicates that it is a state which once laid down does not spontaneously decrease or develop. If it could be changed by some agent a method would be provided for altering this form of ageing and its variations could be studied in young animals as changes in LD_{50}. Any way of decreasing the irreversibility of injury when it is being laid down subsequently would, of course, have a direct bearing on permissible exposure.

The present experimental indications regarding irreversible injury and shortening of life-span will be reviewed and the major areas in which data are deficient pointed out.

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