



STATEMENTS AND SPEECHES

INFORMATION DIVISION
DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA - CANADA

No. 55/13 THE EFFECTS OF RADIATION ON HUMAN HEALTH

A reply tabled by the Minister of National Health and Welfare, Mr. Paul Martin, in answer to an inquiry by Mr. F.A. Enfield, M.P., in the House of Commons, Ottawa, April 4, 1955.

(1) Is any research being carried out by the Department of National Health and Welfare regarding the harmful effect of atomic radiation on humans?

Yes.

Radioactivity, of course, is not a new phenomenon. Since life first appeared on this planet, living beings have been exposed to cosmic and natural radiation. Thus, it is not an essentially new influence which is being considered, but an increase in the intensity of an influence which has never been entirely absent.

It was not until the discovery of radium and X-rays over half a century ago that the possibility emerged that some human beings would be exposed to greater amounts of radiation than naturally occur in the everyday environment. Since that time, scientists have shown a continuing concern for the possible harmful effects of uncontrolled radiation. A system of protection has slowly developed as is manifest by the precautions observed in the use of X-ray and radioactive materials and in the regulations governing the use of isotopes in this country since the war.

Problems associated with radiation have engaged the attention of officers of the Department of National Health and Welfare and of a number of other government agencies for more than ten years.

Experience gained during this period enabled Canada to pioneer in developing a promising advance in the treatment of cancer -- the Cobalt 60 Beam Therapy Unit -- which has since brought new hope to thousands of cancer victims and has received world-wide recognition. Many industrial uses of radio-isotopes have also been developed in Canada, ranging all the way from testing the welds on enormous metal castings to controlling the thickness of paper as it comes through the paper-making machines. These isotopes have also been made available to other countries.

As a result, Canadian scientists have gained first-hand experience in the study of radiation effects and the development of adequate safeguards against them. On March 14 of this year, a reply was tabled which outlined some of the activities carried out by the Department for the safe handling of radioactive materials.

The interest of the Department in radiation, however, pre-dates these more recent developments by several years. For example since 1951 the Department has accepted responsibility for the supervision of the use of radioactive isotopes in university and hospital laboratories and in industrial operations.

In carrying out this responsibility, a film monitoring service is maintained for the protection of persons working with radioactive isotopes. Advice is also provided during the planning stages of radio-isotope laboratories in order that arrangements can be worked out for the safe handling of radioactive materials and for the disposal of radioactive waste in such a manner that there will be no danger of contamination. In addition, it is planned to provide training courses emphasizing the safe use of radiation.

Anticipating an increasing use in this country of radioactive materials for industrial and medical purposes, arrangements were made some time ago to send a senior physicist of the Department to the United Kingdom for special training.

There is at all times continuing consultation between the Department of National Health and Welfare and other government agencies such as the National Research Council, the Defence Research Board, and Atomic Energy of Canada Limited, having an interest in this field.

As a result of all this joint effort, there is every reason to believe that the measures taken in this country for the protection of those persons who are likely to be exposed to radioactive materials are fully as effective as those carried out anywhere.

(2) Is any research being done in respect to radiation effects in Canada resulting from atom bomb tests that have taken place in the United States of America?

Yes. This research is carried out, not with particular reference to experiments being undertaken in any one country, but with reference to the effects of radiation, from whatever source it may come.

(3) Do researchers know anything about the genetic effects on humans of such radiation?

Yes.

The biological effects of increased radiation may be divided into two categories -- the somatic effects, or those which lead to disease in the exposed individual; and the genetic effects, or those which cause changes usually adverse, in his descendants. Any somatic effects which might arise would affect only the generation irradiated but genetic effects would show up in future generations.

As to the somatic effects, it is the opinion of medical scientists that the most important results might be an increase in the incidence of certain malignant conditions, but these usually result from much higher radiation exposures than those which are now being considered.

With regard to the genetic effects, it has been established by experiments on certain rapidly-breeding lower forms of life, such as bacteria, plants, insects and small mammals, that genetic changes can be produced by exposure to radiation.

It is pointed out by geneticists that the characteristics transmitted from parents to offspring are determined by the structure of the genes. Certain genes produce certain characteristics, such as the colour of the eyes and so on. A particular gene may also be related to a physical or mental defect. It so happens that genes are capable of mutating or changing and that all such mutations, being permanent, are carried on in later generations.

In the exposure of experimental animals to radiation, there has been observed an increase in the rate at which these mutations occur. Usually no harmful effect shows up until, at some future time, mating takes place between two animals carrying the same mutated gene. Since a study of genetic changes in humans would inevitably take several generations, the belief that radiation might cause genetic damage in humans is based mainly on the evidence that it does so in other forms of life.

In determining genetic effects on man there are two principal difficulties. First, most mutations will remain hidden until one individual receives the same mutated gene from both parents. Secondly, naturally occurring genes for recessive defects and abnormalities are already numerous in the population. Neither of these naturally occurring mutant genes nor those that might be induced by radiation are likely to produce an effect in the children of the individuals carrying them unless the parents have received the same defect from a common ancestor.

In general, there has been much misunderstanding between the possible hazards to human health arising from weapon trials and those that would result from nuclear warfare, with the result that some of the more sensational statements made on this subject have been confusing.

Since there remain a number of unanswered questions in this field, there is a need for continuing research and investigation into the genetic problem. Increasingly-large numbers of people are being exposed to increasing amounts of radiation because of the wider use of radioactive materials in industry, research and medicine. In addition, there has been a slight, though appreciable increase in radiation all over the world as a result of the weapon tests.

However, the best scientific evidence available, indicates that it is most unlikely that any significant genetic effect would result from the increased radioactivity that has occurred.

Canadian scientific experience in this connection is confirmed by that of research scientists in other countries. For example, in a statement in the British House of Commons on March 22 last, the Minister of Health, the Right Honourable Ian Macleod stressed these points:

- (1) Radiation does produce genetic effects and the radioactivity of the planet has increased slightly as the result of nuclear bomb explosions.
- (2) Present knowledge is insufficient to fix precisely the level of radioactivity above which genetic damage would significantly affect the well-being of populations.
- (3) Research in genetic changes is necessarily and inevitably slow in producing conclusive results.
- (4) It is extremely unlikely that the increase in radioactivity which has appeared up to the present will have any appreciable genetic effect.

While the genetic problem is exceedingly complex, the important factors are known and Canada possesses at the present time the scientific potential to carry on continuing investigations in this field. The Department of National Health and Welfare is pursuing research efforts with a view to the further development of a long-range program for the collection and study of human data that will aid in the assessment of this problem.

The Department is carrying out a systematic and continuing examination of all evidence available in order to ascertain all of the facts in connection with increased radiation. As the program develops further, it will involve, among other things, the constant examination of a variety of materials to determine the level of potentially-dangerous radioactivity.

In furthering this project, full advantage will continue to be taken of the experience of outstanding Canadian scientists who have a particular knowledge of this field and every effort will be made to co-ordinate this long-term study with Canada's over-all public health programme.

The Government is fully aware of the problems posed in the field of public health by atomic developments and will continue to take proper steps to assess progressively the possible hazard to human health of increased radiation background.