

PHYSICS

Better Cancer Treatment May Result From Powerful X-Rays

Super-Radiations Will Affect Cancer Cells Leaving Normal Cells Unharmed Because of Immunity Built by Cosmic Rays

WHEN science is able to produce X-rays of 10,000,000 to 50,000,000 volts, these short wave radiations will pick out with more deadly aim the cancer cells and thus be more effective in the treatment of cancer than the X-rays and radium radiation now used.

This was predicted by Dr. Robert H. Millwee, roentgenologist of the Dallas, Tex., Methodist Hospital, at the American Congress of Radiology in Chicago, upon the basis of a theory as to how the normal, relatively old cells of the body have acquired resistance to X-rays and radium.

Cosmic rays which continually plunge through our bodies are credited by Dr. Millwee with developing a hardiness of the normal cells which allows them to go through a bombardment of X-rays without harm, while the cell "up-starts" that compose the dangerous cancerous growth are damaged because they have not developed this resistance.

Dr. Millwee studied the influence of the age of cells upon their resistance to X-rays and radium.

Resistance Developed

"It seems that since a plant or animal will become acclimated or accustomed to a change in physical surroundings, if the change be brought about slowly enough, that a like tolerance would be produced by short wave radiation, provided the radiation be applied in proper quantity and over a sufficient length of time," Dr. Millwee pointed out.

"There is a vast amount of experimental evidence to show that cells develop a resistance to radium and X-rays," he continued, citing research done by himself and other investigators along this line.

"One of the most convincing arguments in favor of the idea that cells remaining for a long period of time on earth, in an unchanged state, have developed resistance to radiation is the fact that, as a class, unicellular organisms are much more resistant to radium

and X-rays than are the cells of multicellular organisms.

"If cells have developed a resistance to short wave radiation, then it is probably important that we know the type of radiation which has produced this resistance. Since cosmic rays furnish such a large part of the short wave radiation reaching the earth it is quite reasonable that cell resistance is created by these very short wave cosmic rays.

Gamma Ray Effect Different

"We have certain clinical evidence and some experimental evidence that the biologic effect of extremely short Gamma rays is different from that of X-rays now in general use or longer Gamma rays. If the biologic effect is different, then a resistance acquired by one probably does not confer a resistance to the others.

"Therefore," he concluded, "if normal cells have acquired a resistance to cosmic rays which the new cancer cell does not possess, then we may find the answer to the question of why the shorter Gamma rays of radium have a selective action on cancer cells, or seem clinically to produce the maximum ef-

fect upon cancer cells with the minimum injurious effect on normal cells, and we may find that X-rays produced by voltages of ten to fifty million may have even a more desirable selective action on cancer cells than our shorter Gamma rays of radium."

Baby X-Ray

The smallest X-ray tube built in this country, a new development of the General Electric X-Ray Corporation, was demonstrated before the Congress. The new device operates from an ordinary light socket, is shock-proof, and may be used in safety by the layman—a long-sought combination of virtues.

The small set was said to be capable of making photographs of the entire human body and of use in fluoroscopic examinations in industrial plants. Customs inspection of clothing and baggage, post office examination of suspicious packages and race track inspection of horses' ankles are suggested uses. The apparatus is expected to replace more cumbersome equipment now in use.

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VETERINARY MEDICINE

Fright Disease Cured By Vitamin A Feeding

INCREASING the amount of vitamin A in the diet cured dogs of hysteria, H. D. Walston of King's College, Cambridge, England, found.

This ailment, also known as "fright disease," has become increasingly common in both England and America during the last ten years. The afflicted dog,



DWARF AND GIANT

The smallest commercially useful X-ray tube built in this country is contrasted with a mammoth 800,000-volt bulb recently installed for cancer treatment at Mercy Hospital, Chicago. The baby tube is rated at 58,000 volts and uses ten milliamperes. Its designer, J. B. Wantz is pictured on the right.

previously healthy, gets fits of apparent terror followed by more or less depression. Encephalitis has been suggested as a possible cause of the symptoms.

Mr. Walston's investigations, however, indicate as the cause of the complaint vitamin A deficiency, together with proportionately too much of another dietary factor called E-substance, found in dog-biscuits and other cereals.

Fifty cases of dogs suffering from hysteria were investigated, reports Mr. Walston in a communication to *Nature*. Of these, all except one were fed on a diet consisting mostly of cereal; twenty-six of these, continuing on the same diet, remained hysterical, while twenty-eight, the diet of which was changed to contain more vitamin A, recovered.

Science News Letter, October 7, 1933

PHYSICS

Deutons Creating Neutrons Promise to Smash Atoms

Radium Definitely Superseded as Creator of Projectiles For Exploring Secrets of Hearts of Material Particles

TWO PARTICLES recently discovered by science, the neutron and the deuteron, promise to play an important role in atomic disintegration as the result of experiments just made at the California Institute of Technology at Pasadena, Calif.

Radium has been definitely superseded as the most effective generator of neutrons, those neutral particles which since the discovery of their existence two years ago have assumed an increasingly important place in experimental physics. Recently, H. R. Crane, a graduate student, Dr. C. C. Lauritsen and Dr. A. Soltan, an international research fellow from Poland, using the large million-volt X-ray tube developed by Dr. Lauritsen, showed that the hearts of helium atoms or helium ions could be speeded up sufficiently to knock neutrons out of beryllium atoms. In this way they produced twice as many neutrons as any radioactive source ever did.

Now they have tried deutons, the hearts of the double-weight hydrogen atoms, as the projectiles flung by high voltage at various substances. They were astonished to find that deutons used instead of helium hearts release from beryllium five hundred times as many neutrons as ever before obtained.

Deuteron is the name given to the nucleus of the hydrogen isotope of mass two. The heavy-weight water was sent to Pasadena by Prof. G. N. Lewis of the University of California to see whether the Pasadena workers could cause their deutons to shatter themselves against heavy atoms. They do not. But

when propelled against the light beryllium atom they penetrate the nucleus and apparently turn it into boron. In its exuberance the newly born boron nucleus kicks out a neutron with ten million volts energy.

Elated over their results, the physicists tried the deutons on lithium. It yielded neutrons even more copiously than beryllium. Helium is the byproduct in this case.

With such powerful means of producing neutrons of varying energy it will be easy to disintegrate atoms in relatively large numbers. The neutron is the ideal tool for this purpose. It insinuates itself into any nucleus with great ease and then treacherously splits it open. The contriving physicist watches this scandal and gains much wisdom therefrom.

Science News Letter, October 7, 1933

GENERAL SCIENCE

U. S. Science Advisory Board Answers Queries For Officials

PRESIDENT Roosevelt's Science Advisory Board now has six committees of experts to work on questions referred to it by governmental agencies, President Karl T. Compton, chairman of the board, has announced.

As the actual problems upon which cabinet officers and other officials have sought the advice of this Board are pressing and of a confidential nature, Dr. Compton did not discuss details.

RADIOLOGY

Blue Skin Reaction May Help Solve X-Ray Mystery

A NEW reaction to X-rays, discovered by Dr. J. C. Mottram, Director of the Research Laboratory at the Mount Vernon Cancer Hospital, London, may help to solve the long-standing mystery of what happens in living tissues after they have been X-rayed but before any recognizable changes occur. Dr. Mottram's research is described in *Nature*.

"If, during the afternoon the skin of a rat be exposed through a small hole in a lead screen to approximately a U. S. D. of X-rays, and immediately afterwards a solution of Pyrrol blue be inoculated into the circulation, then the next morning there will be seen," he says, "a blue mark on the skin precisely corresponding to the hole in the lead screen."

He thinks this indicates that the X-rayed capillary blood vessels have been altered so that the dye passes through them more readily than through normal capillaries.

The special importance of this observation lies in the fact that the reaction occurs within 24 hours after the application of the X-rays. Only three other instances of biological change within comparatively few hours after exposure to X-rays have as yet been known, and none of them are easy to determine.

"It is to be hoped," concludes Dr. Mottram, "that this new reaction with Pyrrol blue, when fully exploited, will elucidate some of the hidden changes which occur during the latent period."

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"Three general types of problems are under consideration," Dr. Compton said. "The first are questions of proper organization, or functioning, or program of the scientific and technical services of the government on which the advice of the Board has been specifically requested.

"The second are similar matters which have otherwise come before the Board, and which need attention in order that