

GENERAL SCIENCE

Cancer Treatment of Future May Include Jets of Water

Academicians at Spring Meeting Also Hear Reports In Fields of Physics, Chemistry and Psychology

A JET of water under pressure of 15,000 pounds per square inch, issuing from a tiny hole, may become part of cancer treatment in the future. This method of painlessly forcing water through the skin instead of using a hypodermic needle injection was reported by Drs. G. Failla and T. R. Folsom, Memorial Hospital, New York City, at the meeting of the National Academy of Sciences in Washington.

Cancer yields more readily to X-ray treatment when distilled water has been injected to drown the cancer, as it were, after X-ray bombardment, Dr. Failla has previously shown.

The idea of using a very fine, high-pressure jet of water came from reports of the injuries suffered by workers with high-pressure oils. The injuries were at a considerable depth from the surface of the body. The oil, emerging in a fine stream from a tiny hole, penetrated the body without the worker being aware of it. The method may be used, Dr. Failla suggested, not only for getting distilled water into tumors in conjunction with X-ray treatment but also for injecting radioactive substances into the tissues.

The water jets penetrate the skin an inch or more, preliminary tests have shown. Skin offers considerable resistance to the jet as compared with other substances. The jet can penetrate raw potatoes, for example, to a depth of three or more inches.

Although the water jet can be used to introduce liquids into human tissues, Dr. Failla says no "distinct superiority of the jet over the needle method" has appeared so far.

Science News Letter, April 27, 1940

Hazard to Neutron Workers

SCIENTISTS pioneering with neutron rays, new tool of physics and new experimental weapon against leukemia and cancer, face the danger which injured and killed many early X-ray and radium workers before the dangers of these healing rays were discovered.

The danger to the neutron ray workers appeared in reports presented before the National Academy of Sciences.

A dosage of as little as one-hundredth of an "n" per day of fast neutrons ("n" being the measure of a neutron dosage unit as "r" is the measure of an X-ray dosage unit) "may be unsafe if the exposure continues over a period of about ten years," Dr. Robley D. Evans, Massachusetts Institute of Technology, has calculated.

Scientists have been working with neutrons for seven or eight years, which brings them close to the danger line estimated by Dr. Evans. Although they had the experience of the early X-ray martyrs to warn them, it is possible that in the exciting period of atom-smashing with the cyclotrons and other investigations

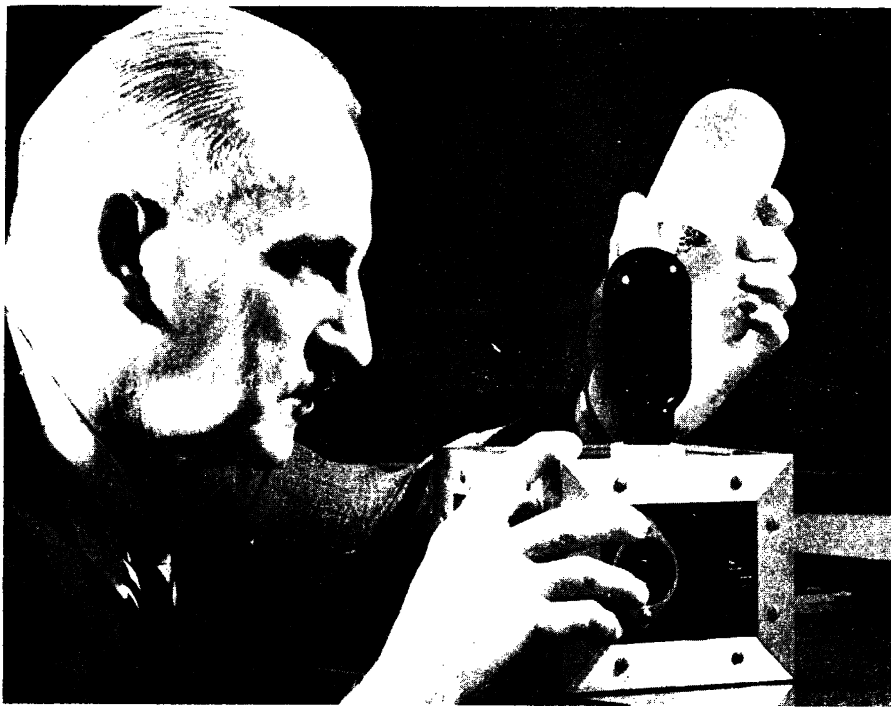
using neutron rays, they may have neglected to take all precautions.

Tolerance of animals to neutron rays cannot be used as an absolute guide for human experience, Dr. Evans pointed out, because "the relative radiation sensitivities are entirely unknown for small doses."

Neutrons produce their effects on living tissues by the secondary recoil rays which they produce in the body by collision with hydrogen, carbon, nitrogen, oxygen and other atoms, Dr. Evans explained. The effect of the neutron recoil rays is closer to that of alpha rays from radium than to any other radiation which has been studied extensively with regard to its effect on living tissues.

The effect of alpha rays on human tissues is known from study of victims of chronic radium poisoning, as in the cases of the girls who painted luminous watch dials, and of the radium mine workers who got lung cancer from inhaling radon. Using facts available from studies of these persons, Dr. Evans arrived at his figure of the limit of safety for exposure to neutron rays.

"In modern laboratories accurate data on the dosage received by each worker should be part of the routine operating records. Only when such data have been



DARK LIGHT IN COLOR

The glass shell for this ultraviolet lamp has been treated chemically to turn the invisible light to visible color. Examining the new development is Dr. Phillips Thomas, of the Westinghouse Research Laboratories.

accumulated over a long period of time can we make any positive statements on safe working dosages. Statistics on the dosage, health, and blood analysis of laboratory workers and controls should be accumulated and compiled," declared Dr. Evans.

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Heat Through Cheek

NOVELISTS used to turn a whole battery of thermal adjectives loose on the cheeks of their heroines: "glowing," "flushed," "hot," were only the beginning of their catalog. Just how much heat a cheek can actually handle has at last been made the subject of scientific measurement, in tests reported by Dr. C. Hawley Cartwright, John Daniel and Alex Petrauskas of the Massachusetts Institute of Technology.

The three scientists, to be sure, were not interested especially in cheeks as such. They wanted to know about the ability of human flesh generally to transmit and reflect infra-red (heat) rays. A cheek is the handiest living tissue screen available, because it is of a convenient thickness (about one centimeter) and because it is easy to put a ray source on one side and small measuring instruments on the other.

In the tests it was found that the cheek reflects about half of all visible red rays falling upon it. From there on down into the invisible infra-red region, reflection decreases as more and more of the rays pass through skin and flesh. Greatest transmission was found at the long wavelength of 11,000 Angstrom units; from there transmission dropped off again, reaching zero at 13,500 Angstroms.

In the course of the experiments it was shown that the radiations from a tungsten lamp equipped with a water filter could pass through the cheek until a temperature rise of three degrees Fahrenheit occurred before the human guinea pig undergoing the test felt any external discomfort.

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Cosmic Ray Maximum

ROBOT balloon flights which carried an ionization chamber to heights of 15.5 miles have disclosed that after correction for the effects of variations in the earth's magnetic field, the maximum of cosmic ray intensity in the upper air comes in the springtime, Dr. William P. Jesse of the University of Chicago told the meeting.

Dr. Jesse, one of the group of scien-

tists who have been extensively investigating the nature of cosmic rays under the direction of Nobelist Arthur Compton at Chicago, said that more work will be needed before it can be proved that the spring maximum in cosmic ray intensity is a true seasonal effect.

The unmanned balloon flights were primarily directed to determine whether cosmic ray intensities at the top of the atmosphere varied with time. Changes of more than 15% were observed which appear to follow the "world-wide" variations previously reported by other investigators from ground stations. It appears that the 15% changes at the top of the atmosphere are due to a large extent to intensity changes in the magnetic field surrounding the earth.

Dr. Jesse also reported on recent work by other Chicago cosmic ray researchers. He said that Drs. Marcel Schein and E. O. Wollan have studied the production of mesotrons at high altitudes. They found, Dr. Jesse declared, that mesotrons began to be generated in a lead block carried aloft when an altitude of about 4 miles was reached.

Dr. G. Herzog, also of the University of Chicago, has investigated slow mesotrons with a Wilson cloud chamber apparatus to take pictures of their tracks up to altitudes of 29,000 feet in airplane flights, Dr. Jesse also disclosed.

At sea level and moderate altitudes slow mesotrons (meaning weak in energy) are very rare because they are absorbed in the earth's atmosphere and only a very few tracks have been observed in cloud chambers on the ground. Dr. Herzog, however, obtained 12 tracks of mesotrons in some 230 photographs taken at high altitudes during a three-hour flight.

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New K Vitamins Better

BBETTER results in checking dangerous bleeding with vitamin K are promised by new, synthetic K vitamins announced by Drs. E. A. Doisy, S. B. Binkley, S. A. Thayer, R. W. McKee and D. Richert, of St. Louis University.

The new anti-bleeding chemicals related to vitamin K can be dissolved in water, whereas natural vitamin K compounds cannot. This means that the natural K vitamins must be taken by mouth, but sometimes the patients needing the vitamin most are so sick they cannot take anything by mouth. The new, water-soluble K vitamins can be injected by hypodermic needle in such cases.

The natural vitamin K₁ has previously been isolated and synthesized by Dr.

Doisy and associates and they told also about the chemical structure of another natural anti-bleeding compound, vitamin K₂.

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People Feel Same Pain

YOU may think you are more sensitive to pain than your neighbor, or less sensitive to it, but actual measurements show that the degree of sensitivity is very nearly alike for most persons.

Like normal body temperature, pulse and breathing rates, the pain threshold in man is relatively stable, Drs. George A. Schumacher, Harold G. Wolff and Helen Goodell, New York Hospital and Cornell University Medical College, reported.

Whether a person complains of the pain of a burned finger or says nothing about it depends not so much on the actual amount of pain as on his experience and attitude, they discovered from pain tests of more than 100 persons. The group included persons of both sexes, different ages, education and social experience.

The amount of light radiation which, focused for three seconds on the surface of the forehead, would just produce pain was determined for each of these 100 or more men and women. For 91 out of 100, the variation in the pain threshold was within 8% of the average. Greatest variation was only 16%. That means no one is more than 16% more or less sensitive to pain than the average person, and that most people are more or less sensitive than the average by only 8% or less.

Each person tested was asked to express an opinion about his or her own pain sensitivity. Most of them had mistaken ideas on this point. With few exceptions, there was no relation between how sensitive or insensitive to pain he thought he was and how he measured in the tests.

The wide individual variations in reaction to pain—tears, curses or stoic silence—are in contrast to the uniformity in the pain threshold and seem to depend on individual experience and attitude.

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Later reports of the National Academy of Sciences meeting, with pictures, will appear in next week's issue of SCIENCE NEWS LETTER.

During the World War, the United States airplane industry turned out more than 23,000 planes and 30,000 engines.