

# THE DANGER TO REPRODUCTION.

## NEW EPOCH IN RADIOGRAPHY.

(By OUR MEDICAL CORRESPONDENT.)

It does not seem to be understood as yet that the sad death of Dr. Ironside Bruce constitutes, in respect of its cause, a crisis in X-ray medicine the possibility of which had scarcely been dreamed of.

The whole situation has undergone a change. This is no mere question of dermatitis—the old danger with its chances of becoming epitheliomatous (cancerous)—it is a question which reaches down to the very basis of cellular life, to the so-called “nuclear chromation,” that mysterious substance on which heredity itself depends.

Let us put the matter, which is of enormous importance in view of the problem of cancer, in another way. As is well known, both X-rays and radium emit three kinds of waves. In the case of radium these are called respectively “alpha,” “beta,” and “gamma,” and the same terms are used now by many in connexion with X-rays. The “alpha” rays have a long wave-length and are commonly spoken of as “soft,” by which is meant that they have a low penetrating power—i.e., they can be screened off very easily by the use of metal plates or lead-rubber aprons and gloves, or lead glass. The “gamma” rays, on the other hand, have a short wave-length and are spoken of as being “hard”—in other words, they can penetrate deeply and are not easily screened off.

In the early days of radiological work a great many people suffered from “burns” by the rays, a smaller number developed a definite dermatitis (i.e., inflammation of the skin), and a few were found to have fallen victim to the cancerous growth of the skin known as epitheliomata. All these three conditions—the burns, the inflammation, and the cancers—belonged to the same series. Thus the burn came first, on the seat of it the inflammation developed, and on the seat of that the cancer made its appearance. The number of cases which “went on” to cancer was relatively very small.

Naturally a great deal of public attention was attracted by the matter and efforts were made to discover the cause. It was soon found that the offending rays were the “soft” ones—the alpha and beta rays. The late Dr. Jean Clunet, of Paris, one of the greatest of radiologists, went so far as to lay it down at that early date that the soft rays stimulated reproduction in the body cell (e.g., cancer) while the hard rays hindered it. The soft rays, so to speak, induced a delirium of youth and growth, the hard a chill of unproductive old age.

This view was borne out by the work on the treatment of tumours and cancers. Cancer, as is well known, is a kind of rebellion of a group of body cells against the general “law of the body.” The rebels refuse to obey central direction which would make some of them brain cells without any reproductive power and others muscle cells with but little of this power. Like a hive of bees every one of which will be queen they begin to reproduce and to nourish themselves as for reproduction. Growth, irregular, active, disastrous is the result.

### EFFECT ON GROWTH.

The gamma, or hard rays, put a stop to this growth just as the alpha and beta, or softer rays excite it. Thus the problem of the protection of the radiographer appeared to be simple. He could easily shut out the soft rays—the most dangerous ones—and yet have all the hard rays—the “non-dangerous”—for his work. When he was taking photographs a softer ray was best, but he could protect himself against it; when giving treatments he wanted the hardest ray available, an X-ray approximating in the shortness of its wave length to the gamma ray of radium.

All seemed well. Dermatitis and burns tended to disappear and with them cancers. But another factor of quite another kind had not been appreciated at its full significance. Most X-ray workers of the early days are childless. The death of the reproductive cells was not caused by the soft rays. It was caused by the hard ones. Thus it was not only the cells of tumours and of cancers which could be injured. The more active the reproductive power of any cell the more sensitive that cell to the hard rays.

The idea—the dangerous nature of which was largely missed so far as the radiographer himself was concerned—was fully appreciated so far as the treatment of the patient went.

“At last,” cried radiologists all over the world, “we possess a means of checking reproduction. Our hard rays are lethal to body cells in exact proportion to their tendencies either to reproduce or to nourish themselves—i.e., to grow.”

The vista was and is dazzling. For the tissues of the body could actually be classified as “more or less radio-sensitive” or “more or less radio-resistant.” Not only that, but tissues vary in their sensitivity at various times—reproductive cells when active are more vulnerable by the hard rays than when passive, secretory and digestive cells follow the same rule. Tumours, too, vary in degrees of sensitivity. The fast-growing cancers are much more vulnerable than those of slow growth.

The demand went up for new apparatus capable of producing harder and harder rays, rays as hard as the radium “gamma” ray. The demand was supplied. The work of treatment advanced and more and more enthusiasm was evinced by the workers.

And now has come the catastrophe. The hard rays have a deadliness all their own, for in the healthy human body there are vital tissues of high radio-sensitivity. A worse thing than the old-time burns and inflammations: a new danger more insidious, more immediate and far more catastrophic.

The cells of the human bone marrow are enormously reproductive. There the elements of the blood itself are prepared in continuous process. In those vital laboratories life itself is brought to birth day by day. The hard rays penetrating the bony walls of these recesses, so carefully protected by Nature, can bring that alchemy of life to a standstill.

The matter stands there to-day. It is a new problem utterly unlike the old one. For we must have these hard rays. In a sense a new epoch is revealed, an epoch the dangers of which only serve to light up its amazing possibilities.

# X-RAY TUBES.

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## TO THE EDITOR OF THE TIMES.

Sir,—All connected with the medical and X-ray world are unanimous in expressing sincere and deep regret at the death of Dr. Ironside Bruce. The loss to science and the medical profession of such a distinguished specialist is one which will be deeply felt.

Most of the reports which have been published attributed his death to exposure to X-rays, and in particular to the "new" tubes, actually mentioned by name as the "Coolidge" tube. It is stated that Dr. Bruce first worked with this tube in October last, but it has been in use in this country since its evolution in 1912 by scores of radiologists without dire effects; while in the United States it has been almost universal for several years past. The "Coolidge" tube does not produce a more penetrating ray, the latter being dependent on the energizing voltage, and the quality of the X-rays emitted do not materially differ from those obtained from the old gas tubes. The intrinsic merit of the "Coolidge" tubes lies in the control of the ray, and not in its characteristics. Since its introduction, we have never failed to draw attention to the necessity for adequate protection from the primary and secondary rays, and we attach a copy of the wording of a label [reproduced below] which has been consistently sent out to the distributors of X-ray tubes whom we supply. We are quite sure that the manufacturers of the accessory apparatus essential for operating the tube are fully alive to the necessity for every possible precaution to the operator and the patient, and we also feel sure that such an experienced radiologist as Dr. Ironside Bruce fully understood the nature of the tube he was using.

Yours faithfully,

J. N. STEPHENS, Manager, Wiring Supplies  
Sales.

# X-RAY MARTYR.

## DR. IRONSIDE BRUCE DEAD.

### DANGERS OF NEW TUBES.

(By Our Medical Correspondent.)

The dangers to which physicians making use of X-rays in their daily practice expose themselves receive a new and tragic illustration in the death of Dr. Ironside Bruce, radiologist to Charing Cross Hospital.

Not only so, but it would appear that the new X-ray tubes possess powers of penetration, and so of injury, far in excess of those which characterized the early forms, and that Dr. Bruce has fallen victim to a destruction of the blood—so-called aplastic pernicious anaemia—occasioned by frequent exposure to the gamma rays which these tubes emit. In other words, the protective measures devised against the older tubes are inadequate when used against the newer, the rays from which are not stopped by the screens.

Dr. Bruce's death thus calls attention to a danger which would seem to be present everywhere, and to which no doubt many other workers are now exposed. It has been known for some time that radium is capable of producing these effects by interfering with the regeneration of the red blood corpuscles in bone marrow. Several radium workers have died of this condition. An X-ray worker in Italy is also reported to have died.

### BRILLIANT RESEARCHES.

When the tubes of higher penetrating power were introduced, Dr. Bruce was among the first to obtain them. Indeed, the writer had a long discussion with him on the subject before these tubes had come into general employment. Dr. Bruce believed then that the improvements obtained would greatly enlarge the usefulness of the X-rays, more especially in the treatment of malignant growths and blood diseases. His hopes have been in a measure fulfilled, and his own work on the anaemias remains as a memorial to his industry and imagination.

Unhappily, what seems to have occurred in other directions has occurred in this one also: the effect of a few doses of the rays and the effect of many doses are different. In his zeal to help others, this brilliant young physician has sacrificed his own life. The end, too, came, it would seem, with startling suddenness. It was not until last January that Dr. Bruce fell ill, and it was not until a few weeks ago that the real nature of his disease was understood. Every kind of effort—including a transfusion of blood from a willing donor—was then exhausted to save him.

Ironside Bruce's place in radiological medicine is a very high one. He occupied a position in the front rank, and his researches were of the most brilliant kind. His martyrdom holds a quality of inspiration.

He was the son of Dr. William Bruce, of Dingwall, and was born in 1876. He graduated at Aberdeen University in 1900, and served in the South African War.