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September 25, 1957

To: Members, Committee on Pathologic Effects of Radiation.

From: Chairman, Subcommittee on Acute and Long-Term Hematologic Effects of Atomic Radiation.

Subject: 1. Minutes of our June and September meeting.
2. Minutes of open meeting with representatives of various specialty groups.

From perusal of the minutes and from some of the correspondence you can readily see that some people were stimulated to attempt investigation of potential hazards. I suppose we need to keep the fires burning. It is not too clear to me how this should be done.

I would appreciate any comments you may have.

E. P. Cronkite, M. D.

BPC:sw

Enclosures:

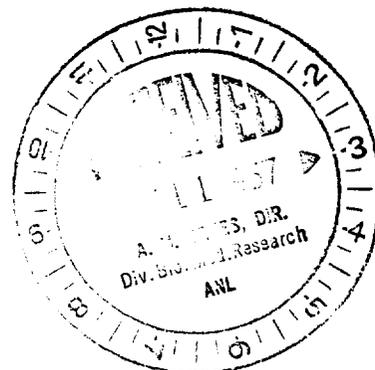
1. Minutes of closed meeting of June.
2. Minutes of open meeting of June.
3. Minutes of 23 September meeting.

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BOX No. 5

FOLDER Accute + Long Term
Hematological Effects



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Report of the meeting of the Subcommittee on Acute and Chronic Effects of Atomic Radiation of the Committee on Pathologic Effects of Atomic Radiation of the National Academy of Sciences. Meeting held 15 June 1957 at the Brookhaven National Laboratory, Upton, Long Island, New York. Report made from notes taken by V. P. Bond. A closed session was held initially at which only members of the subcommittee were present. This included Drs. Cronkite, Moore, Valentine, Bond, Moloney, LeRoy, Brecher and Nickson.

Cronkite: It was suggested by Dr. Warren that the committee should remain functional with its present membership for two years, at which a process of orderly rotation should be initiated.

Moore: I am for rotation.

LeRoy: I would like to know the function of the committee. Two years ago it was organized to discuss fallout, presumably because facts have been concealed from the public.

Cronkite: That was not the origin of the committee. It arose through the efforts of prominent lay people primarily who felt an impartial analysis to be desirable.

LeRoy: The fallout from weapons testing has been shown to be quite low, and there is no point in continuing debating this issue. The function of the committee should be to aid the medical profession, particularly, with regard to the hazards from exposure to x radiation and diagnosis.

Bond: I don't think that fallout is out of the picture at least in the minds of the public. With increased use of nuclear energy for peacetime uses, with weapons testing the potential dangers from this source should continue and be under close scrutiny.

Cronkite: The title of the previous report states pathologic effects of atomic radiation not xray etc.

Moore: Surveys should be made of groups who live in atmospheres where the radiation levels are quite different. We should suggest for instance that people living at high altitudes where the cosmic radiation is greater should be studied.

Nickson: Dr. Bugher has indicated that in India a study is underway of individuals living in the monazite sands area where the radiation is of the order of 100 r per generation. Similarly in Brazil, and here consanguineous marriages are frequent.

Moloney: The strain of the human beings would probably make the difference, and we need data in the United States.

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Cronkite: We must get on with the business of the meeting. Does everyone agree to serve at least another year. (Everyone did agree.) Then we will start rotation next year. We will not do it alphabetically; perhaps by drawing lots.

Bond: The method of rotation should depend upon what function it is concluded the committee should serve.

Nickson: The article by Lewis has received considerable attention. How can we refute such an article?

Cronkite: It is not worth while to refute.

LeRoy: It is the duty of the physician to evaluate this type of thing.

Nickson: We can't combat emotions with facts.

Moore: I would like to comment on Paulings petition, since I was one of the signers. The petition was gotten up under false pretenses. Initially it was a petition stating that since now there are only three countries that had nuclear weapons, and many more in the future who will have them, now is the time to begin taking steps to abolish testing and nuclear war. It was after this petition was signed that the additional propaganda relating to how many would be killed by fallout and etc., was put into the petition. There is a good deal of resentment among the signers of the petition because of the way it was handled.

Cronkite: Can you give us a copy of the first petition for our records?

Moore: Yes, I will furnish it.

LeRoy: We should keep our perspective. The fallout situation is the least of the radiation hazards. Should we, the committee, continue to study radioactive fallout particularly when many other groups are studying the hazards for instance the National Committee on Radiation Protection and other groups.

Nickson: The committee on Radiation Protection does a good job in analysing the hazard, however there is a serious lack as far as dissemination of the information is concerned. The recommendations of the committee simply are not followed, and it is easy to show where there are flagrant violations of the recommended procedures.

LeRoy: What can the committee do to correct the situation?

Nickson: What is needed is individuals to go to the actual institutions and to lecture. I am not sure that this is a committee function. It is a problem in education.

Valentine: There is a big question of partial body versus total body radiation effects here. Dental xrays for instance are partial body radiation.

Cronkite: It seems to me one function of the Committee is to point out areas of investigation that would result in, or aid in evaluating the hazard from low level radiation.

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Bond: I think the composition of this committee should be kept in mind. Other groups as the Commission on Radiation Protection is composed mainly of physicists and radiobiologists. This committee is composed of physicians and presumably should be able to evaluate the hazard from a medical standpoint.

LeRoy: The committee should function to evaluate current concepts of the hazards. This type of evaluation should deal effectively with articles like the Lewis article. The committee should have an evaluation function, and such an honest evaluation should refute the numbers game that people like Lewis indulge in.

Cronkite: Then the committee will have two functions a) An evaluative one concerned primarily with the effects of radiation on the blood and b) recommendation. The committee should recommend fields in which profitable investigation should be carried out. It appears to me that the Lewis article in Science could not be refuted effectively by rebuttal written in Science. A well thought out annual report of the committee would more effectively deal with such articles.

Brecher: Should not the committee confine itself to things like leukemia and the ageing process.

Nickson: If we enlarge the function of the committee do we not have to get permission from the parent committee.

Valentine: Should we expand? There is enough to handle in hematology alone.

LeRoy: We would have to get the consent of the parent committee if we expand the function?

Bond: This committee is not qualified to evaluate ageing. We should stick to effects specifically related to hematology and subjects connected with it.

Nickson: There is a gap in that ageing effects are not being specifically studied by any group. Should we not recommend to the parent committee that a subcommittee be established to study this?

Cronkite: We should evaluate, recommend, and also recommend who should implement our recommendations.

Moore: We can't initiate the actual work connected with our recommendations. We can report to the parent committee and recommend who might do the work, however, we should not be involved in actually doing it.

Moloney: Any sort of a study of this nature because of the low order of effects, would require a national, perhaps an international participation. Any sort of a study would be a large job.

LeRoy: There are many groups who would be willing to support such studies. The Rockefeller Institution, The Committees on Medical Education of Public Health would be willing to do that. What is needed is a private group not connected with government

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Also, I am not sure it applies in this case but I would like to remind you that Dr. Low-Beer, several years ago in studying the effects of I^{131} on blood counts, found a marked change three years after iodine administration. This he reported in the literature. He then had a statistician go over the data who found that the sharp changes in the hemalogical picture coincided with the time his laboratory personnel were changed. This did not prove, but strongly suggests, that the changes were not due to I^{131} , but the technique. With regard to what Dr. Miller said and what Snell and Neil showed on the Kure controls near Hiroshima, they used a method of pairing. They paired after the fact, which amounts essentially to juggling data. I went back to the original data and with proper pairing, or better yet, by using all of the data, the changes that they reported do not exist. There was no difference in the controls. This does not mean pairing is not a valid procedure. It can be done before or after the fact if a strict random approach is used. However, I see no point in pairing after the fact. There is no point in throwing away additional data. Also with regard to the impaired vision in children. I hate to see isolated percentages; we need the numbers of children. Then we can see the significance of possible differences. Also with regard to the blood counts in children in Japan. I was there and saw the children, unused to riding in automobiles, arrive at the top of the winding road to the ABCC, vomit before they went in for the blood counts. This obviously would affect them. Another point is that the counts were done frequently in the winter time when the Japanese hover over their charcoal fires. The carbon monoxide in the blood at this time undoubtedly would change the blood counts.*

LeRoy: We have come to this meeting to obtain information on the reaction of physicians to the problem of effects of radiation. It has shown that the radiations from use of reactors for power and from fallout are insignificant. It is the

*This needs to be proved in respect to leukocytes and platelets. Editor's comments.

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disorders such as purpura and leukemia. This increase amounts to a factor of 10 and the reason for it is not clear. Attempts have been made to study the effects of drugs and this sort of thing on the incidence of these disorders; however, no answers are available as yet.

Dr. Ruby, American Academy of Dermatology: A number of children have been exposed to large doses of radiation for *Taenia Capita*. A study of these individuals might shed light on the long-term effects of radiation. Dermatologists are making an effort to evaluate what radiation may be doing. Children who have been irradiated are being studied. An attempt is being made to relate the dose received to the skin to that received by the gonads. It appears that the gonadal dose, by using cones, is extremely small, of the order of millirads. Apparently fractionation of dose does make a difference. We frequently give 300 r in 4 sessions, weekly intervals, and we have observed no leukemias. We use 50 to 100 kvp x-radiation with a half value layer of approximately .7 millimeter of aluminum.

Powell: We all will agree that articles such as the Lewis article are bad; however, we can't disprove what is stated in that article. All we can say is that Lewis has not proved what he purports to have proved. So until such time as we can say that what he says is not true, it seems incumbent upon us to assume that what he says is true, and make every effort to reduce dosage exposure to a minimum. Thus, such procedures as altering filtration and using cones to reduce exposure should be employed. It is quite apparent that additional fundamental data on this problem are needed. Many study groups are available and it is quite apparent that we need further study on animals. However, in addition we do need further data on human beings. It can be argued, of course, that we don't have data on drugs and other injurious agents; however, this is beside the point. It is, of course, agreed that things like air pollution is bad, and every effort should be made to get rid of it. But in something like radiation incurred in diagnostic procedures, we must weigh the good against the bad, and we certainly should not abolish the use of x-ray because of unfounded fears of the potential effects. It is true that the public

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reaction as a result of the articles that have appeared recently have been greater than we feel are warranted or justified by the degree of exposure that has been incurred. The average man apparently thinks that the risk involved has been underestimated, and what we see is a hyper-reaction. It is hoped that in the future this will level off to its proper perspective.

A comment with regard to the data that Conard presented. He stated that there was apparently no reduction in life span in the Marshallese exposed. If I recall the data of Blair, it would appear that the degree of life shortening with this dose would be of the order of two or three years. I do not believe he would be able to pick this up at this short-time interval following exposure.

Robbins: It seems to me that in the discussion there has been a good deal of confusion between the effects of total-body and partial-body irradiation. Radiologists are well aware that the quantitative effects of these two types of radiation are quite different. With regard to genetic effects, again this problem of whole body versus partial body comes in. As far as the actual risk concerned with exposure to diagnostic radiation, the radiologists have been aware of these for some time and taken precautions to reduce the amount of exposure.

Bond: We realize of course, that there is a difference between whole-body and partial-body exposure. But we must remember the data of Court-Brown, in which it has been clearly shown that leukemia can result as a result of partial-body irradiation.

Robbins: A large series of patients have received large doses as a result of testicular tumors. These patients receive large doses of radiation to the marrow.

Bond: Have these patients been studied carefully so that you can definitely state that leukemia has not resulted?

Robbins: To my knowledge they have not been studied carefully.

Arneson: We have observed at Brooke General Hospital, patients exposed to radiation who have testicular tumors showed considerable fluctuation in the white-blood cell count. The same is observed with cancers of the cervix. Can this fluctuation be explained? 0016980

Cronkite: Yes the fluctuation can be explained; however, I don't think we should go into this at this time because of the shortage of time. I would be glad to go into this with you after the meeting.

Cross: The general practitioners in this country treat over 80% of the total illness of the population. They also have in their hands a large percentage of new x-ray machines that are being used. These individuals then should be well-versed in the hazards of radiation and in the proper use of x-irradiation. Education is needed and a good deal of effort will have to be put forth in this direction. It is a mistake to disseminate this information only to the large medical centers. It must be disseminated to the lowest medical groups, that is, to the county medical societies in the rural areas.

Cronkite: I would like to emphasize that the function of this committee is not a police function, and that we have no governmental connections. It is our function to help interpret data.

Nelson: With regard to the use of x-ray in dental practice, approximately 60,000 x-ray machines are in the hands of dentists. Over-exposures have occurred, of course, and it has been necessary to pursue a course of education. In the past few years we have had a motion picture produced indicating clearly the hazards of radiation, and this picture has been well received and has actually won awards. I suggest this as a means of disseminating this information. We, of course, will admit that over-exposures have occurred because the x-ray machines have not been collimated or properly filtered, and proper shielding has not been employed. However, we are taking steps to correct the situation; in other words, we are getting our house in order.

Henshaw: Have eye defects been reported as a result of dental x-rays?

Nelson: This has not been studied. No evidence as yet has appeared that this is the case. I would like to know what dose of radiation is cataractogenic.

Miller: Approximately 200 roentgens will result in cataracts. The effect is cumulative.

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Robbins: Here again I think confusion exists. You speak of 200 r being delivered with dental films. I would like to point out that this is in several exposures, that is multiple port exposures. We were adding the several exposures which cannot be done properly.

Curtis: I am chairman of the Public Health Service Radiation Study Section. We are now looking into this large area of the effects of radiation ^{on human beings} and are willing to support research along these lines. We will welcome any suggestions from those present as to how to pursue this.

Feldmann: The American Tuberculosis Association has been pursuing, as you well know, a vigorous course in which annual x-rays are recommended. This is preventive medicine and has paid off in uncovering a number of lesions that would not otherwise have been detected in the early stages. The big question is whether or not the benefits to be derived from this override the potential hazards from exposure to radiation. We do not have the answer to this question. A good deal of additional information is required before we can settle the point.

LeRoy: How valuable has the program turned out to be to date?

Feldmann: I can't give you an accurate answer on that. ~~As~~ I say, a large number of cases have been uncovered in the early stages that would otherwise would not have been diagnosed.

Powell: If you ~~want~~ to use standard x-ray plates instead of the photoroentgenograms, you could reduce the x-ray exposure by a factor of 20, that is, standard 14 x 17 films would result in considerably less exposure.

Feldmann: It simply is not practical to use 14 x 17 films. It is either photoroentgenograms or no such program.

The meeting terminated at this point. Dr. Kligerman added a couple of comments after the termination of the meeting.

1. He asked that the National Academy of Sciences Committee seriously reconsider their thoughts on the problem of recording exposure dose of each individual. He feels that this procedure is highly impractical and has no merit.

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2. He stated that the State of New York has taken very active steps to investigate the degree of exposure that is occurring as a result of diagnostic x-ray and is inaugurating a program of education to reduce the amount of exposure. They are actually going into the rural areas calibrating x-ray machines and actually finding out how much x-ray is being delivered with the routine procedures. In addition, they are organizing a program of education in which the rural areas will be visited and education regarding the value of coning, selective filtration, etc. in reducing dosage will be promulgated.

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