

One may ask why it is necessary to carry out these studies in human beings rather than in a laboratory animal. A very good example of this is a study which we carried out on/amino acids involving the excretion of blocks of protein in the urine and subsequently the study of deoxycytadine.

A number of papers in the literature suggested that with after radiation given to the whole body of animals there would be an increased urinary excretion of amino acids and that this effect was solely due to radiation. If so, it would suggest a tissue destructive element due to radiation either upon the cancer itself or upon the normal tissues of the body which were simultaneously being irradiated. When this problem was explored in detail by our pre and post radiation studies including episodes of sham irradiation it was found that the amino acid excretion was frequently as high pre irradiation as post radiation suggesting that this phenomenon was in good part due to nervousness and stress rather than an effect of the radiation. Therefore, it was possible to abandon this line of investigation.

Another similar experience stemmed from the observation that in animals was that there was a marked excretion of a substance known as deoxycytadine which is one of the important constituents of DNA, human as well as animal. Since it is generally thought that the most effective site of the action of radiation either on the ill cell or on the normal cell is the nucleus of the cell, we believe that we can identify this substance, deoxycytadine, and in this way not only have a dosimeter a measure of effective radiation but also could determine some important aspects of the metabolism of cancer cells and normal cells.

After two very encouraging studies in two patients this process no longer seems to be of value in the cancer patient or the cancer patient after irradiation, primarily because a certain enzyme

in the blood stream seems to destroy deoxycytadine and break it into smaller components before it is excreted in the urine. One positive aspect of this investigation was that it seems in certain cases with burns the excretion of deoxycytadine is not interfered with by any blood enzyme and we investiaging further the possibility of measurement of this substance in the urine to determine the total insult to the body from severe burns. It is for these reasons that we are particularly interested in studying many of these problems in the human being where these studies can be carried out successfully and especially where the patient would be receiving treatment regardless of whether the laboratory studies were being carried out.

Results

It is always difficult to know the effectiveness of treatment of far advanced cancer since there are few studies in the literature whose data can be utilized.

One group for which data is available is advanced cancer of colon and rectum. ^{Twenty five} ~~Twenty~~ such patients have been treated here. ^{of which 17 had metastases to the colon}

These cases were compared with a series of 61 cases of colon and rectal cancer ^{with} _A treated with systemic fluorouracil reported by Rapoport and Burleson (Surgery, Gynecology and Obstetrics 130:773, 1970). The median survival time of their patients was 8.5 months and the median survival time of our patients was 8.0 months (mean survival 11.2 months). Thus our patients have done as well and both groups have survived longer than a similar group for whom no therapy was given.

In the treatment of Ewing's tumor, a highly malignant tumor of bone, the local tumor in bone can be controlled by high dose radiation therapy. Some radiotherapists have recommended the use of whole body radiation to control the usually occurring metastases to distant bones. We have followed this method in 4 cases. One patient with metastatic tumor already present in his lungs survived for 20 months and died of his disease. Three other children with no evidence of tumor spread but with the same ominous prognosis have survived to date for periods of 32, 25 and 12 months following treatment. To date each appears to be free of recurrent disease. Four patients with far advanced neoplasm have survived for periods of more than four years although with such small numbers it is difficult to say that survival from any mode of treatment was responsible. Another four patients survived from 1-4 years after treatment. The sum of the evidence from the cases of carcinoma of the colon and rectum, Ewing's tumor and the miscellaneous tumors

tumors of long survival indicate that this method of treatment even with the small number of cases available is a safe method and can prolong life. It must be emphasized that complete evaluation requires a longer study period and a larger series of cases.

A useful technique developed as a part of this study is the withdrawal of some bone marrow from the patient immediately prior to treatment with intravenous infusion immediately after treatment. This technique has prevented the marked fall in white cells, red cells and platelets previously found after whole body irradiation doses of 150 rad or more. Since the patient who has received a post-treatment transfusion of his own marrow is no longer susceptible to infection and bleeding during the 40 days after treatment, he need not have the prolonged hospitalization that had

been required previously.

All of our data continues to be available to responsible investigators and as in the past they will be presented fully to the scientific world as they become available.

Prepared by:

Eugene L. Saenger, M.D.
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Supplementary material

One might question the advisability of applying so intensive a method of study and treatment to patients whose disease is beyond apparent cure. Our psychiatric studies have been somewhat unique in this regard in demonstrating the importance of anxiety, fear and hope in these patients. Once hope is removed from them their course is a downward one.

For many years I treated a variety of cancers in children with uniformly poor results. As certain chemotherapeutic agents were developed and utilized with better methods of applying radiation, we have seen the gradual improvement in cancer survival in these children first going through a period of increased months and then a period of increased years.

One can say from these experiences in the successful treatment of relatively far advanced malignancies in children that increased attention should now be paid to the use of these modalities in the treatment of far advanced cancers in the adults. Each few months of increased survival is a step towards better control of diseases which in the past were thought to be incurable.

This is a possible argument in regard to allegations concerning our use of low I.Q. patients for experimental purposes without their having a complete understanding of what is being done.

The general educational level of the General Hospital has been set forth and represents a schooling of about 6.5 years and an average I.Q. of about 85. The patients in this study had this treatment recommended to them because they were in the hospital in which we as physicians worked. Treatments of this kind are being recommended to General Hospital patients daily. The possible consequences of many medical treatments, some of which are in an investigative phase in our institution, may or may not be more hazardous than the ones utilized here. In any event, review of our data by the Research Committee and others have indicated that these treatments have contributed to the care and well being of many of the patients in this group, all of whom were seriously and potentially fatally ill.

One could realistically argue that new treatments should be confined only to persons with high I.Q. and only later transferred to patients whose I.Q. was somewhat lower. Under these circumstances it is possible that some of the patients treated here would have received less relief and prolongation of life, than actually we have been able to demonstrate. One would be as justified in questioning some of the clinical trials such as the Rubeola vaccines where some questions always arise as to possible deleterious effects of these agents in circumstances where healthy individuals below the age of consent are used.

The general educational level of General Hospitals represents an average schooling of 6-5 years and an average I.Q. of 85. These patients had the treatment recommended because they were in the hospital where we as physicians practice. Treatments similar to this are being recommended daily to General Hospital patients. Consequences of these treatments some of which are investigative may or may not be more hazardous than the one utilized here. Review of our data by the Research Committee and others have indicated that these treatments have contributed materially to the care and well being of these patients with far advanced care.

One could argue that new treatments should be offered only to the well educated persons with presumably higher I.Q. and only later transferred to the less fortunate. Under such circumstances it is quite likely that the patients treated here would have experienced more suffering and less prolongation of life.