

# CHANGES IN IMMUNOGLOBULINS AND LEUCOCYTE COUNTS IN CANCER PATIENTS IN RELATIONS TO RADIOTHERAPY

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## SUMMARY

We have studied the immunoglobulin levels and total leucocyte counts in 21 patients suffering from different types of malignancies. The immunoglobulin levels and total leucocyte counts were performed before and after radiotherapy. A statistically significant elevation in IgG level was observed after radiotherapy. Even in cases of IgA and IgM, a considerable but non-significant elevation was noted. The total leucocyte count showed a significant depletion at the end of radiotherapy in comparison to the pre-irradiation values.

In the recent years, renewed interest has developed in area of radiotherapy in relation to immune system. It is recognised, that ionizing radiation can suppress immune response.<sup>1</sup> This suppression is mainly due to the adverse effect of ionizing radiation on different body system, which leads to death and damage of many cell type in the body and alters the metabolic and humoral functions. Radiation is frequently used as an immuno-suppression in transplantation of organs, including bone marrow. However, the mechanism of immunosuppressive effect of radiation is still unknown<sup>2</sup>. In this paper we are presenting preliminary results obtained from cervical and oral cancer patients.

## Material and Methods

Twenty one patients with different types of malignancies (Oral and Cervix) were studied. Immunoglobulins (IgG, IgM and IgA) were determined by commercially available Tri-Partigen immunodiffusion plates. IgA and IgM were determined by using undiluted serum whereas in the case of IgG, serum were diluted 1:10 with isotonic saline. The observations were carried out after 50 hours for IgG and IgA and after 80 hours for IgM. The immunoglobulins concentrations were read directly from the table supplied by the manufacturers. The results are presented in Table 1 in terms of percentage of pre-irradiation value as well as actual values. The total leucocyte counts were also studied before and after completion of radiotherapy.

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Table 1 : Summary of cases

Sr. No.	Age Yrs.	Sex	Type of malignancies	Stages
1	58	F	Ca Endometrium	III B
2	58	F	Ca Cervix	IV B
3	35	F	Ca Cervix	III B
4	56	F	Ca Cervix	II B
5	43	M	Ca Hypopharynx	IV B
6	45	F	Ca Tongue	III T <sub>3</sub> N <sub>1</sub> M <sub>0</sub>
7	63	F	Ca Cervix	II B
8	85	M	Ca Rt. Cheek	T <sub>2</sub> N <sub>0</sub> M <sub>0</sub>
9	16	F	Dysgerminoma Ovary	III B
10	63	F	Ca Cervix	II B
11	42	M	Ca Tongue	II B
12	69	F	Ca Cervix	II B
13	75	M	Ca Larynx	T <sub>2</sub> N <sub>0</sub> M <sub>0</sub>
14	46	F	Ca Cervix	II B
15	60	M	Left Tonsil	T <sub>3</sub> N <sub>2</sub> M <sub>0</sub>
16	65	M	Ca Floor of Mouth	T <sub>3</sub> N <sub>0</sub> M <sub>0</sub>
17	60	M	Metastatic Lymphnodes	II
18	68	M	Ca Rt. Tonsil	IV T <sub>2</sub> N <sub>3</sub> M <sub>0</sub>
19	55	F	Ca Tongue	IV T <sub>2</sub> N <sub>3</sub> M <sub>0</sub>
20	58	M	Ca Cheek	II
21	23	F	Dysgerminoma Ovary	III

## Results

The results indicate rise in the level of different classes of immunoglobulins after radiotherapy. It was significantly high ( $P > 0.05$ ) in the case of IgG (Table 2). IgA and IgM levels also increased considerably, but not significantly after radiotherapy.

Table 2 : Immunoglobulins and total leucocyte counts in cancer patients before and after radiotherapy

Groups	Total leucocyte count (x10 <sup>9</sup> /l)	IgG (mg/dl)
Before Radiotherapy	10.1 ± 0.572	1344.26 (100%)
After Radiotherapy	8.5 ± 0.487 $P < 0.05$	1683.11 (115.15%) $P < 0.05$



The total leucocyte counts showed a depletion of 15% after radiotherapy (Table 2). The drop was statistically significant. ( $P < 0.05$ ).

## Discussion

The present study indicates a higher level of different types of immunoglobulins i.e., IgG, IgM and IgA after radiotherapy in comparison to their pre-irradiation values. No Significant differences in immunoglobulins levels were observed by Micksche *et al*<sup>3</sup> between the groups before and after radiotherapy. However, patients receiving Vitamin A had higher level of IgG after cessation of therapy when compared to other treatment group.<sup>3</sup> The present results can be correlated with in vitro findings of Wasserman *et al*.<sup>4</sup> They studied in vitro production of immunoglobulins by B lymphocytes co-cultured with T lymphocytes. They observed that when B cells were co-cultured with non-irradiated T cells, the Ig production was less, whereas irradiated T cells increased this Ig synthesis in a spectacular manner. The higher level of different types of immunoglobulins in the present study may be due to both T and B lymphocytes irradiated simultaneously during the course of radiotherapy. Irradiated T lymphocytes may be responsible to activate the B lymphocytes for production of Immunoglobulins<sup>4</sup>. The elevation in the different class of immunoglobulins may be due to defective lymphocyte function as the lymphocytes are regarded as the most radiosensitive cells in the body<sup>5</sup>. In the present study, we have also observed a depletion in leucocyte count after radiotherapy. This is in agreement with our earlier findings in mice.<sup>6,7</sup>

It has also been recognised that radiotherapy reduced the capacity of the lymphocytes to respond to different types of stimulation<sup>4,8,9,10</sup>. It may be concluded that adverse effects of radiation on different subpopulation of lymphocyte are responsible for the elevation of immunoglobulin levels in the blood.

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