

## **Report on a Study “Effect of Cumulative Low Dose Ionizing Radiation on Human Eye Lens”**

This study was undertaken by the Dr.R.Deolalikar, Certifying Surgeon, Occupational Health Center, of the Narora Atomic Power Station, NPCIL, Narora, in response to the letter from the Head RSD, Atomic Energy Regulatory Board, Mumbai, vide letter No.AERB/RSD/2012/9438 DT 27/30 July 2012.

This study was been initiated to determine the Indian Scenario on the subject of cataract vis-à-vis the exposure to cumulative low dose ionizing radiation, and to present the Indian Experience to the International Commission on Radiological Protection in the light of their new recommendations on dose limits for Eye Lens.

This study had commenced under guidance of Dr.D.S.Kathuria, Ophthalmologist & the then Medical Superintendent, Narora Atomic Power Station Hospital, Narora. Dr.D.S.Kathuria is presently the Medical Superintendent of the RR.Site Hospital, Kota, Rajasthan.

This study received complete support and encouragement by the Station Director and the Management of Narora Atomic Power Station, without which it would not have been feasible. The author sincerely thank the Station Director and the complete NAPS management

The author expresses his sincere thanks to Dr.D.S.Kathuria for training him in Slit Lamp Examination of the Eyes, and helping him develop the skills to the level of competence so that this study could be successfully completed. The author also expresses his sincere thanks to all the employees who participated in the study.

The study was critically evaluated and peer reviewed by Dr.P.P.Singh, Dy. Chief Medical Officer and Senior Consultant Dr Mohan Lal Memorial Gandhi Eye Hospital, Aligarh. The certificate of same is attached at the end for reference.

A synopsis of the study is presented below

### **AIM AND OBJECTIVE:**

The aim and objective of this study is to determine the effect of cumulative low dose radiation on the eye lens. Whether there is any epidemiological evidence to relate the effect of cumulative low dose ionizing radiation with occurrence of cataract.

### **DISCUSSION:**

The study was undertaken with the aim of attempting to establish any co-relation between the cumulative low dose ionizing radiation and occurrence of cataract. The study explored all possibilities of trying to establish such a co-relation. However all the tables and charts given here in have demonstrated that there is no definitive relationship with the cumulative dose levels – both external and total with cataract.

It has also been found that age certainly is a contributing factor for the development of cataract. Also the similarity between the camp patients and radiation workers at the Nuclear power plant shows that the employees are at no additional risk factors by virtue of their employment.

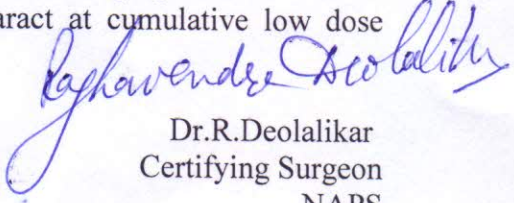
It also has been noted that Right Eye involvement is more than the left. Right eye is also more often than not, the dominant eye. Hence the study postulates the involvement of dominant eye first. The author recommends further studies in this direction.

### **CONCLUSION:**

The study observations do not suggest any demonstrable relationship between the cumulative low dose external and cumulative low dose total ionizing radiation and the occurrence of Cataract of the Human eye lens.

Hence in absence of any such demonstrable relationship the radiation employees of a nuclear power plant do not have any additional risk of developing cataract at cumulative low dose ionizing radiation.

NAPS Narora

  
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SOURCE OF SUPPORT : N.P.C.I.L.

CONFLICT OF INTEREST : NONE

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- Shri N.Nagaich, ED[CC&CP]
- Shri. S.K.Sharma, the then Station Director, NAPS [while the study commenced]
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- Dr.D.S.Kathuria, Ophthalmologist and the then Medical Superintendent, NAPS Hospital – for all support, guidance and training for Slit Lamp Examination
- Dr.Anil Norton, Medical Superintendent, NAPS Hospital
- Dr. P.P.Singh, Senior Consultant, Dr.Mohan Lal Memorial Gandhi Eye Hospital, Aligarh, U.P. for Critical Evaluation and Peer Review.
- Staff Nurse Smt Vandana Norton, Occupational Health Centre, NAPS
- Shri. Ganesh Babu, Helper, Occupational Health Centre, NAPS
- All the employees undergoing the slit lamp examination, without whom the study would not have been completed.
- Entire management of NAPS, NPCIL.

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**Treasurer**  
Dr. Chandrashekhar

**Chief Medical Officer**  
Dr. Razia S. Khan

### CERTIFICATE OF CRITICAL EVALUATION AND PEER REVIEW.

This is to certify that I have critically evaluated the study report entitled "Effect of Cumulative Low Dose Ionizing Radiation on Human Eye Lens" conducted by Dr. Raghavendra Deolalikar, Certifying Surgeon, Occupational Health Centre, Narora Atomic Power Station Hospital and submitted to me for peer review by the Medical Superintendent of Narora Atomic Power Station, Nuclear Power Corporation of India Limited, Department of Atomic Energy, Government of India.

At the outset I congratulate the author, Dr. R. Deolalikar to have undertaken such a vast study on an important topic dealing with the health effects of ionizing radiation on human eye lens. A study of such a large magnitude involving Comparisons based on different age groups, different cumulative external dose, different cumulative total doses. Slit Lamp examinations of over five hundred employees and classifying them again in various age groups and cumulative external and cumulative total doses and their interpretation and discussions makes this study and its results of great importance not only for radiation industry, but also for the practicing ophthalmologists.

The study has been carried out very methodically and the observations clearly demonstrate that there is no definitive relationship between exposure to cumulative low dose ionizing radiation and occurrence of cataract, amongst the employees of a nuclear power plant. Hence there is no additional risk of cataract at the dose levels studies to the employees working in Nuclear Power Plants by virtue of their employment.

The comparison with the age of incidence of patients from surrounding vicinity, operated during the eye camp spanning over Seventeen years (1996 to 2012) and the employees shows comparable results. The pattern is similar to that observed in Ophthalmic practice amongst general public in India.

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The colored plates of the Eye Lens with Cataract and those without the cataract in different age groups and radiation exposure doses will serve as a good photographic data bank for the future studies.

This study is a benchmark study and will be a very important source of reference for post graduate students and researchers of ophthalmology.

I would like to place on record my deep appreciation for the perfectness of study observations and its conclusions and that I was indeed greatly impressed by the work done.

I sincerely wish the author a grant success in future and would be eagerly waiting for more and more such scholarly works from him.

*P. P. Singh*

18/2/2015

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