

Alara – An Overrated Phenomenon of Radiophobia

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In health care setup, radiological imaging is an important tool in the diagnosis, treatment and prognosis of the disease. Majority of the dental procedures cannot be performed without the conventional radiographs produced by ionizing radiation. Recently With the advent of digital technology, digital imaging has made a tremendous impact on oral health care delivery. Cone Beam Computed Tomography (CBCT) has gained more importance in the recent years due to its advantages like reduction in radiation dose, elimination of chemical processing and multiplanar imaging with accuracy of the anatomical details.

After the discovery of X-Rays by Professor Wilhelm Conrad Roentgen on 8th November 1895, Dr. Wilhelm Rollins published several articles on harmful effects of radiation. Published reports of associated risks and harmful radiation effects led to establishments of strategies for precincts on amount of radiation received by both occupationally exposed individuals & public by International Commission on Radiological Protection (ICRP).¹


Guiding concept is ALARA (As Low As Reasonably Achievable) dose of Radiation. ALARA was based on principle of linear no-threshold (LNT) model, which states that radiation induces harmful effects at any dose. This principle was first employed for the field of nuclear energy and later introduced to all fields of imaging. But there is no scientific evidence for the low radiation dose exposure.^{1,2&3} Since in dentistry low doses of radiation are employed for diagnostic purpose, ALADA (As Low as diagnostically Achievable) is more optimum.

As per the report, people are very well aware of perceived dangers due to radiation exposure in the medical field. Zwank *et al* found that awareness increased from 3 to 25% in duration of 8 years.⁴ More current study

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indicated that just about half of all patients were aware of risks of carcinogenicity by Computed Tomographic scans.⁵ Literature reveals the association between patient's educational level and awareness of potential negative effects from medical imaging.⁶

Despite, lowest mean cumulative doses were observed in dental radiography as per the South Korean study,⁷ unfortunately there is scarcity of Indian studies regarding this issue. Effects of dental diagnostic radiation induce damage merely about one 1-millionth of damage initiated from endogenous production of reactive oxygen species & hydrogen peroxide from aerobic respiration (breathing air).^{8&9}

Recent technologies in imaging and use of digital receptors have reduced the exposure doses and improved image characteristics. Major European bodies do not recommend radiation protective shields for the patients.¹⁰

If million kids receive CT scans, 50% of them will escape unnecessary surgery, 100,000 of them will receive CT guided surgery and 300,000 of them can avoid unnecessary hospital visits,¹¹ nevertheless 100 may have risk of getting cancer.

Following principles of justification, optimization & use of dose constraints, radiation protection committees aim to assess new knowledge on potential health risks & offer guidance as needed to avoid harmful effects without compromising the patient benefits.¹² The ICRP, NCRP and AERB (Atomic Energy Regulatory Board) endure to produce strategic & specific guidance & recommendations for both patient & operator protection criteria (for planned occupational exposures.^{13&14} In fact there are no data to prove that low dose radiation exposures as given by radiographs (X-rays or CT scans) lead to future cancers.^{15,16,17&18}

Sadly, in the present scenario due to radio phobia surrounding medical imaging, oftentimes, it is difficult to convince patient. This can be overcome possibly by convey of its benefits outweigh its risks.¹⁹ Hence the responsibility of the dentist is judicious use of radiographic examination outweighing benefit versus risk by following the measures like justification, optimization, dose limitation.

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