NCRP 145  Radiation Protection in Dentistry
- A Challenge for the Dental Profession

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Abstract: This paper summarizes the major recommendations from the National Council on Radiation Protection and Measurements [NCRP] Report 145 that will have the greatest impact on how the practicing dentist and dental radiology laboratories take radiographs. It critically analyzes some of the underlying rationale used to justify the recommendations and provides evidence challenging the necessity of implementing many of the reports recommendations as unwarranted. Evidence from Report No. 145 is used to demonstrate that dentistry presently satisfies the "As Low As Reasonably Achievable [ALARA] principle".

Introduction:
The National Council on Radiation Protection's [NCRP] published in Dec. 2003, Report No. 145, "Radiation Protection in Dentistry" has the potential to change the practice of dental radiography in the United States. The report represents an "advisory opinion" from the NCRP on minimizing radiation risks to patients and dental personnel from dental diagnostic radiographic procedures. NCRP Report No. 145 replaces the previous NCRP Report No. 35, "Dental X-ray Protection²." NCRP No. 145 is described as a "stand-alone" document providing guidance to dentists and auxiliaries, qualified experts, x-ray equipment designers/manufacturers, and service personnel. In attempting to serve these various communities of interest, portions of the report are so complex that it is unlikely that dentists will benefit from them; a specific example, Appendix F, "Shielding Design for Dental Facilities" would appear to be something every clinician should have a clear understanding of. But clearly this appendix is not meant for dentists, but to serve as a resource for the "qualified expert." This is regrettable since NCRP No. 35 was able to express the same concepts in a much more understandable fashion. The extensive use of appendices [A-G] by the report, provides a lot of background information supporting the report's numerous recommendations and there is an extensive glossary of terms to help with the technical vocabulary.

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President’s Message

Presidents Message December 2010

The time has come for my last “Presidents Message”. It has been a wild two years at the helm of this organization. As I look back I am amazed at the roller coaster that these two years have been.

The low point being the rapid onset of the recession and the effect on our national economy. This affects us all; families unsure about their income do not sign contracts and have orthodontics on their children or themselves. Adult patients delay getting implants or their doctors attempt to save cost by not having a competent CBCT scan prior to implant surgery.

The high points of the two years were our two continuing conventions. Portland was an information packed meeting in one of the most beautiful cities I have ever had the good fortune to spend some time in.

Most recently our joint meeting with the American Academy of Oral Radiology in San Diego was very successful. I heard many positive comments from our members about the caliber of the meeting and how they enjoyed being immersed in oral radiology continuing education that really challenged their powers of observation as x-ray technicians.

The San Diego meeting was truly a two-way street. Our members Craig Dial and Matt Kroona both made presentations that helped show the AAOMR some of the depth of knowledge and technique our membership has or strives to possess.

If you skipped the last meeting or two it is time that you invest in your future in this field of dental imaging. The meetings are economically priced and held in reasonably priced hotels. Yes you can probably find cheaper CE units but not ones that directly relate to your imaging career.

Through thick and thin the Board of Directors were along for the ride, providing their insights and opinions. Thankfully they are a group of insightful and independent thinkers and felt free to disagree. The honesty of their input and the energy they have invested in our organization are invaluable beyond my explanation.
NCRP Report No. 145 states its guiding principle is to minimize exposure to patients, staff and public through the application of the principle of ALARA. The report interprets the principle of ALARA as extending to "...further reduction of doses that are already below regulatory limits..." [Emphasis mine] and "...may be extended to patients for whom no regulatory limits exist." The dose limits do not apply to diagnostic or therapeutic exposure of the patient in the healing arts. The report encourages: "...all reasonable efforts should be made to reduce or eliminate avoidable radiation exposure..." Report No. 145 does not become involved in discussing what "reasonable efforts to reduce or eliminate avoidable radiation exposure" might involve, but clearly the intent of the report’s 109 recommendations is to eliminate all avoidable radiation exposure, no matter how small or trivial.

In standard NCRP terminology, "shall and shall not" statements indicate adherence to the recommendation is necessary to meet accepted standards of protection; "should and should not" statements are used to indicate prudent practice. In classic understated fashion the report "makes a number of recommendations for the dentist" to achieve the reports defined ALARA goals. NCRP No. 145 then proceeds to make 64 "shall" recommendations, 24 "shall not" recommendations, 15 "should" and 6 "should not" recommendations [total 109], making this a highly prescriptive document, whose intent is almost guaranteed to radically change the way dental radiography is practiced on a daily basis. In contrast, the previous NCRP Report No. 35 only included 30 shall statements, 6 shall not statements and 22 should statements [total 58]

NCRP No. 145 clearly establishes the guidelines for "best practices" in dental radiography, as well as the ultimate extension of the ALARA concept to every facet of dental radiography. The report’s recommendations will require dentistry and dental x-ray laboratories to evaluate how dental radiography is currently practiced and at the same time work to identify what "all reasonable efforts" really means. The second question to be answered is equally relevant: "Is there currently a significant risk to public health and safety from dental radiography to merit extending the ALARA concept to the extent recommended by NCRP No. 145?"

To argue against extending ALARA to its ultimate limits appears somewhat like arguing against motherhood and apple pie. However, evidence will be presented to demonstrate that Report 145 provides a skewed analysis of present knowledge of radiation risks and radiation biology in order to justify their extreme interpretation of the ALARA principle. As we move into an era of "evidence based dentistry" governing methods of treatment, and decision making, we need to seriously ask: "What is the evidence supporting the need to implement all of the recommendations found in report No. 145 and does the evidence provided really require that all recommendations be followed to fulfill the principle of ALARA?"

Summary of Key Recommendations of NCRP Report No. 145, Radiation Protection in Dentistry

"Dentists shall use x-ray equipment and procedures in a manner that ensures compliance with both the recommendations in this report and the requirements of their state or political jurisdictions. When there are discrepancies between these recommendations and legal requirements, the more rigorous shall take precedence [p. 6]."

Impact on dentistry: Report No. 145 recommendations are currently “more rigorous” than most states and political jurisdictions, thus compliance with their recommendations would appear to be mandatory.

The Dentists Role in Radiation Protection
- **Shall** establish a radiation protection program
- **Shall** seek guidance from a qualified expert
- **Shall** prescribe all radiographic examinations
- **Shall** conduct a clinical history and physical exam and determine health benefit to patient from the radiographic procedure
- **Shall** obtain guidance from a qualified expert [facility design & radiation protection]

Role of Dental Auxiliaries
- **Shall** be qualified and credentialed to take radiograph

Dentists Role in Patient Protection
- **Shall** make an effort to obtain recent radiographs from patient’s previous dentist
- **Shall** take radiographs only if indicated after an evaluation of clinical history, physical exam or laboratory findings
- **Shall** limit radiographic examinations of symptomatic patients to those required for diagnosis and treatment of current disease
- **Shall not** expose radiographs for administrative purposes

Cont. on page 4
Radiation Protection in Dentistry

Practice of Intraoral Dental Radiography

- **X-ray equipment** shall meet government standards
- **X-ray units** shall not have a kVp of less than 50 kVp or higher than 100 kVp
- **Position Indicating Devices/cones** shall be open ended and attenuate scattered radiation
- **Source to image receptor distance** shall not be less than 20 cm (8”)
- **Rectangular collimation** shall be routinely used for periapical radiography

• **Shall not use** image receptors slower than ANSI speed group E
• Occupationally exposed personnel shall not restrain uncooperative patients

Public who restrain patients or hold image receptors during exposure shall be provided with shielding, e.g. lead aprons, gloves

**Extraoral Radiography**

- **Shall** use fastest imaging system consistent with imaging task

**Shall use** high speed [400 or greater] rare-earth screen-film systems

**Panoramic Radiography**

**Shall** use high speed [400 or greater] rare-earth screen-film systems or digital systems of equivalent or greater speed

**Cephalometric Radiography**

- **Shall** use fastest screen-film systems compatible with imaging requirements
- **Shall** place soft tissue/profile filters at x-ray source NOT image receptor

**Shall** collimate beam to area of clinical interest

**Film Processing**

- **Shall** use time-temperature processing or equivalent

**Shall not use** sight development

**Digital Imaging**

**Shall use** minimum patient dose

**Interpretation**

For maximum diagnostic yield: quiet atmosphere, free from distractions, masked viewbox, opaque film mounts, variable illumination viewbox, reduced room lighting, use a magnifier

**Leaded aprons and Thyroid Collars**

- **Shall not** be required if all NCRP 145 recommendations are rigorously followed

**Shall provide** thyroid collars for children

**Shielding Design for Dental Facilities**

- New and remodeled dental facilities **shall** be designed by a qualified expert
- Shielding **shall** be increased if conventional building structure is inadequate
- Shielding **shall** be determined by calculation and survey measurements
- New offices **shall** provide protective barriers for operators
- Barriers **shall** maintain visual contact and communication with patients
- In the absence of barriers the operator **shall** remain 2 meters [6 feet 8 inches] from tubehead during exposure

If the operator cannot stand 2 meters [6 feet 8 inches] from tubehead a barrier **shall** be provided

**Personal Dosimeters**

**Shall be provided** for known pregnant-occupationally exposed personnel

**Protection of the Public**

- **Shall** treat a patient in a room during diagnostic exposure as a member of the public

**Shall design** new dental facilities so that public will not receive in excess of 1 mSv annually

**Quality Assurance**

- **Shall** develop a written protocol for periodic quality assurance for each x-ray machine, image receptor system, and processor or darkroom
- **Shall have** a radiation protection survey for each new dental x-ray installation
- **Shall perform** resurveys of x-ray units no less than once every four years
- **Shall resurvey** x-ray units after any change in the installation, workload, or operating conditions that might significantly increase occupational exposure or public exposure
- **Shall evaluate** daily: darkroom chemistry and processor
- A Challenge for the Dental Profession

- Shall evaluate each type of film for fog and artifacts monthly and each time a new box or batch of film is opened
- Shall discard or return to vendor excessively fogged film
- Shall visually evaluate screen-film cassettes after any accident, or at 6 month intervals
- Shall replace or repair defective screen-film cassettes
- Shall evaluate each darkroom and daylight loader monthly
- Shall visually inspect leaded aprons and thyroid collars monthly for defects
- Shall maintain a log of all Quality Assurance procedures

The log shall contain: date, procedure, results & corrective action if any

Training
Dentist shall provide training in radiation protection for all dental personnel

Role of Equipment Design
This section of Report No. 145 includes 14 shall, 1 should not, 2 should, 2 should not statements and will not be enumerated

NCRP Report No. 145 includes the following "Should" recommendations as an indication of prudent practice procedures.

- Dental facilities, x-ray equipment performance and operating procedures should be established to maintain patient, occupational and public exposures as low as reasonably achievable, economic and social factors being taken into account [the ALARA principle].
- Dentist should use selection criteria to determine the extent of radiographic examination of asymptomatic patients
- X-ray equipment should conform to international standards
- kVp of x-ray units should not be less than 60 kVp
- kVp of x-ray units should not be more than 80 kVp
- Source to image receptor distance should not be less than 40 cm [16”]
- The rectangular beam should not exceed the dimensions of the image receptor by more than 2% of the source-to-image receptor distance
- A rectangular beam should be used for interproximal radiography when feasible
- Should use a lead apron IF NCRP No. 145 recommendations are not implemented
- Should provide a thyroid collar for adults when it will not interfere with radiographic procedures
- Personal dosimeters should be provided if personnel are likely to receive an effective dose of 1 mSv annually
- Should perform a fluoroscopic examination of lead aprons and thyroid collars annually
- Accrediting agencies should re-examine adequacy of their criteria for undergraduate education
- Dentist and Auxiliaries should regularly attend continuing education courses in dental radiology and radiation protection

A critical look at NCRP Report No. 145’s analysis of radiation biology and risk assessment used to justify recommendations.

Report No. 145, figure 2.1, illustrates that the average annual effective dose equivalent to the U.S. population is 3.57 mSv. The concept of "effective dose" represents an estimate of the potential total body risk of developing cancer or genetic effects from a specified dose of radiation, regardless of whether the radiation is delivered to a local area or the whole body. Of the 3.57 mSv, 82% [2.94 mSv] is derived from "natural" sources called background radiation and an estimated 11% [0.39 mSv] derived from diagnostic "medical" exposures. Report No. 145 indicates that an estimated 1% of effective dose associated with diagnostic medical radiography may be attributed to dentistry [page 8]. The data therefore present two opportunities for comparing potential carcinogenic and genetic radiation risks as seen in Table 1 below.

From the above data, if one attempts to use estimated "average annual doses" from all sources as an estimate of potential cancer and genetic harm, dental diagnostic radiation exposures are 97-100X lower than medical diagnostic procedures and 735 - 800X lower than background. NCRP No. 145 concludes based upon the above: "Thus, dental radiation is a minor contributor to total population burden. However, appropriate measures are necessary to maintain dental radiation exposures ALARA." [NCRP, No. 145, p8] Based upon its own evidence, NCRP figure 2.1 provides direct evidence that dental radiographic exposures do not present a public health risk of any significant merit and that dentistry may already be using sufficiently "appropriate measures" to keep public health risks well below those of other sources of population exposure, e.g., medical diagnostic, medical nuclear medicine and consumer product exposures.

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Evidence presented in NCRP No. 145 indicates that dental occupational exposures are approximately 250X to 500X lower than currently established Annual Dose Limits and 25X to 50X lower than present Non-occupational/Public dose limits and 5X lower than our colleagues in the healing arts and 29X lower than annual background radiation. The evidence suggests that at 250-500X less than present annual dose limits for occupationally exposed persons, dentistry already appears to be "well below acceptable dose limits." Yet, NCRP Report No. 145 makes the following recommendation: "The dentist...shall establish a radiation protection program as outlined above. The dentist shall seek guidance of a qualified expert in this activity." The radiation protection program the report describes consists of seven specific activities to be performed by the dentist/radiation safety officer. No evidence is provided to demonstrate why a qualified expert with special expertise is required. The seven elements of the proposed radiation protection program are well-identified in the report. The special guidance of the qualified expert could easily be performed by consulting an appropriate journal article, or by participation in a continuing education course.

Three of the biggest recommendations for "change" promoted in NCRP, No. 145 are their recommendations that: 1) dentists shall not use any film or digital imaging system slower than ANSI Speed Group E films for intraoral radiography, 2) shall use rectangular collimation, and 3) shall use high-speed [400 or greater] rare earth screen-film systems, or digital-imaging systems of equivalent or greater speed. Of all of the reports recommendations, these three elements have the potential to reduce patient somatic [cheek & head] exposures by at least 50% if E/F film is used, 45-95% [depending on anatomic location] if rectangular collimation is used and 75% if the faster screen-film combinations are used for panoramic and cephalometric radiographs instead of slower 100 speed screen-film combinations. It is because of these significant somatic dose reductions, along with the corresponding reduction in scattered radiation, that the report indicates that the lead apron will no longer be required to prevent reproductive organ exposure. All three recommendations are very attractive applications of the ALARA principle; the reduction in somatic exposure to the patient is clearly a major benefit, and there is clearly a reduction in the effective dose equivalent to the individual patient. However, the overall public health benefit of these three recommendations, in terms of additional reduced cancers, genetic defects, etc. derivable from applying these concepts is less clear.

The dental effective dose equivalent to patients, as presented in Table 1, indicates that dentistry's effective dose equivalent is already 735 - 800X lower than background. The expected reduction in patient dose, if the recommendations proposed in the report are implemented, requires asking the question: "Is there evidence to demonstrate that a further reduction in dental effective dose equivalent from the present 800X down to >1600X lower than background will have a measurable effect on the public health of U.S. citizens?" Are we not already at a level of population exposure where we can say 50% - 80% of "nothing" is still nothing? NCRP Report No. 121* states: "...for radiation protection purposes, it is prudent to assume the effect per unit dose in the low-dose region following single acute exposures or low-dose fractions is a linear response... Genetic effects may result from a gene mutation, or a chromosome aberration... It is conceptually possible, but with a vanishingly small probability, [emphasis mine] that any of these effects could result from the passage of a single charged particle, causing damage to DNA that could be expressed as a mutation or small deletion..." The evidence would suggest that at 800X lower than background radiation we are already within the "vanishingly small probability" realm.

The recommendation relating to rectangular collimation specifically includes a "shall" statement for periapical radiographs but leaves the use of rectangular collimation for interproximal/bitewing radiographs at the discretion of the clinician.

As an indication of prudent practice, Report No. 145 recommends that for the rectangular collimating device: "Each dimension of the beam, measured in the plane of the image receptor, should not exceed the dimension of the image receptor by more than two percent of the source-to-image receptor distance." The impact of this recommendation will significantly influence the practice of dental radiography because it would potentially require the use of a separate BID for each size film used in the practice or use a specific device made by a limited number of manufacturers. Strict enforcement of the 2% source-image receptor distance would create a situation where the dentist would have to purchase separate BID’s, or beam collimating image receptor holders for each size image receptor used in the office. Is it really practical, and necessary from a public health perspective, to require such restrictive limitation of the beam of radiation simply to extend the con-
cept of ALARA? Where is the evidence to demonstrate a meritorious reduction in cancer and genetic risk sufficient to justify the recommenda-
tion other than it produces a lower somatic and effective dose?

In implementing a rather draconian extension of the ALARA concept to the practice of dental radiography, Report No. 145 has chosen to ignore two previous NCRP Reports 67, No. 91 and No. 93. Report No. 91 establishes the concept of the Negligible Individual Risk Level [NIRL]. NIRL is defined as a "level of average annual excess risk of fatal health effects attributable to irradiation, below which further effort to reduce radiation exposure to the individual is unwarranted. The NIRL is regarded as trivial compared to the risk of fatality associated with ordinary, normal societal activities and can, therefore, be dismissed from consideration...Such levels, at or below the NIRL, are not required to be considered for purposes of radiation protection...THE NIRL is regarded as a threshold below which the control of radiation sources and limitation of exposures, i.e., efforts to reduce risk further would be deliberately and specifically curtailed...[emphasis mine]", p 43.

Report No. 91 also states "In the radiation protection field, the need for a reasonably negligible risk level to avoid excessive control actions and expenditures to reduce individual risk has long been recognized", p. 44. Report 91 then identifies six criteria relevant to gage the smallness or triviality of risk which when considered together offer degrees of reasonableness and perspective that "tend to minimize subjective aspects of judgment. "Smallness of risk is considered in relation to: 1) magnitude of dose, 2) difficulty in detection and measurement of dose and health effect, 3) natural risk for the same health effects, 4) estimated risk for the mean and variance of natural background radiation exposure levels, 5) risks to which people are accustomed; and 6) perception of and behavioral response to risk levels," p. 44. The NIRL is established as an annual dose equivalent increment of about 0.01 mSv which is about 1% of the average natural background radiation exposure excluding radon for continuous or repeated exposure. Table 3 compares the NIRL to background and dental average effective dose equivalent.

Table 2 provides a comparison of effective doses associated with dental occupational exposures with those of medicine and dose limits associated with occupationally and non-occupationally/public exposure.

Table 3 compares the current estimated public health risk/detriment to the U.S. public from dental diagnostic radiographic procedures to the NIRL. NCRP No. 93 subsequently recognizes the "trivial" nature of the dental effective dose equivalent in contributing to calculating a "collective effective dose equivalent" [a measure of the radiation detriment to the entire U.S. population] by stating: "Dental examinations have been omitted since they are estimated to contribute less than 0.01 mSv (1 mrem) to the total average annual effective dose equivalent," p. 46.

NCRP No. 145 presents a stronger association between the risk of dental radiographic exposures than the actual data merits. Specifically: "A few epidemiological studies have demonstrated associations between dental x-ray exposure and cancer (e.g., Graham et al., 1966; Preston-Martin et al., 1988)"*, p 45) and "Epidemiological studies have shown associations between diagnostic exposure (including dental) and leukemia (Graham et al., 1966, p 58)," and "An association of both brain and meningeal tumors with dental x-ray has been identified, but statistical significance is marginal (Preston-Martin et al., 1989), p61). The Graham et al 8, reference actually reported NO association with cancer [leukemia] and dental radiographs when considered as a separate element. "The risks for individuals receiving radiation to the chest only, extremities only, and teeth only revealed nothing of interest, Table 16," [p. 364]. It was only when dental x-rays were combined with "other x-ray procedures" that a statistically significant association was identified among children 6 months to 12 months of age. In the Graham et al article, the relative risk from dental exposure alone was 1.38 & 1.42 and not statistically significant; when radiographic exposure to "other sites" were added, the relative risk rose to statistical significance at 3.2 & 2.8 for the two groups of children studied. The Preston-Martin et al 10, statistically significant association between dental radiographs and parotid cancer only occurred at levels of parotid doses of 0.5 Gy and higher attributable to exposures during the 1920’s to 1940’s when beams were poorly filtered and collimated and film speeds very slow, resulting in high patient doses. There was no statistically significant
NCRP Report 145's Appendix B, "Risk Assessment" includes a detailed evaluation of stochastic and deterministic radiation effects to major organ systems associated with high doses of radiation. A nice feature of this appendix is that at the end of each topic, the specific contribution of dental radiography to the organ is presented in such a way that it is easy for the reader to compare the low dental dose with the minimum dose associated with the risk of detrimental effects. In every instance the dental dose is reported as being well below [182X to 200,000X lower] the minimum dose associated with detrimental effects as expressed in %risk/Sv.

Throughout NCRP Report No. 145 there is an ever-present theme presented relating to the uncertainty of potential radiation risks associated with the low levels of dental diagnostic radiographic procedures necessitating that all of the report's ALARA recommendations be followed. The report fails to include any significant arguments or comparisons to suggest that present effective doses from dentistry may not actually place patients at any additional risk for developing detrimental effects of any kind. For example, Billen\textsuperscript{11} estimates that there are about 8,000 "spontaneous DNA lesions" created by thermal and oxidative insult every hour, or roughly 70,000,000 per year! Billen points out that intra-nuclear repair processes completely repair this damage without difficulty. He estimates that a 10 mSv absorbed dose would create an additional 100 DNA damaging events. We damage without difficulty. He estimates that a 10 mSv absorbed dose with NCRP Report No. 145's Table 6.1 showing the highest effective dose using D speed film and 70 Long round D @ 0.15 mSv E @ 0.076 mSv.

Table 4: A comparison of effective dental doses with Natural Background Radiation

<table>
<thead>
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<th>kVp</th>
<th>Beam</th>
<th>Film Speed @ Effective Dose/ FMX</th>
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<td>Elevated Background, Ramsar, Iran\textsuperscript{14}</td>
<td>= 260 mSv/yr or 0.71 mSv/day</td>
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Table 4 provides a comparison of the dental effective doses from three radiographic procedures using D & E speed film with normal and elevated background levels.

NCRP Report No. 145 has chosen to perpetuate the concept of endless extrapolation of radiation risks from high levels of exposure down to the very small doses associated with patient exposure to dental diagnostic exposures and dental occupational exposures. The report consistently cites the "uncertainty of risks" associated with low doses of radiation exposure, without seriously considering an alternative hypothesis, i.e., that all dental radiation risks are currently so low that further consideration to reducing them may not be justified. For example, Hofman and Katz\textsuperscript{16} estimate the statistical probability of 10 mSv of low-LET radiations inducing cancer is about 10\textsuperscript{-15}, or one chance in a million billion! For anatomic structures like the thyroid gland receiving about 0.4 mSv/FMX, the statistical probability for thyroid cancer would be one chance in about 100 million billion. Walinder\textsuperscript{17} has concluded: "In recent years, we have obtained a growing insight that the difference between them [normal and cancer cells] is not an either-or effect but rather a quantitative one, and that the formation of a cancer cell, as well as its development to a macroscopic tumor, depends on a series of unpredictable events which occur within a heterogeneous human population." Trosko\textsuperscript{18} suggests that cancer consists of as many as five or more discrete steps and that low level ionizing radiation exposures are currently viewed as "a rather poor 'initiator and complete car-

Table 5: A comparison of the dental effective doses with Natural Background Radiation

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Table 5 provides a comparison of the dental effective doses from three radiographic procedures using D & E speed film with normal and elevated background levels.
NCRP Report No. 145 makes a valiant, if not schizophrenic, attempt to walk a tightrope of using the uncertainty of low dose radiation risks to assert the extension of the ALARA principle while at the same time clearly making statements intended to down-play the risks. Such statements include, but are not limited to the following: "However, it is not clear that radiation in doses required for dental radiography presents any risk. Neither is it clear that these small doses are free of risk." [p.1] "Actual fatal cancer risk for radiation may be more, less, or even zero". [p.5] "These data suggest that dental personnel are not expected to receive occupational exposures greater than the recommended threshold for monitoring of 1 mSv/yr." [p.29] "There is no conclusive proof that the radiation exposure from [dental] x-rays is harmful." [p.45] "If a substantial risk existed it would have been identified and reported. It seems reasonable to conclude that radiation related risks to dental patients and dental x-ray equipment operators are numerically very small and may be zero." [p.45] "These doses are much smaller than the minimum doses for which coefficients of risk per unit dose can be meaningfully applied. They are numerically equal to the unavoidable natural environmental exposure received in a few hours to a few days by the average American." [p.45]

NCRP Report No. 145 suggests that dentists should perform fluoroscopic examination of their lead aprons annually. The evidence supporting this recommendation as a prudent practice is not specified, other than the fact that cracks might appear which could allow minute amounts of scattered radiation to penetrate the lap area in random locations. Such a suggestion might be appropriate for the old leaded aprons made from lead impregnated rubber which were brittle and could not be folded without fear of developing stress fractures; however, modern leaded aprons constructed from multiple layers of flexible lead impregnated vinyl should make fluoroscopic examination annually irrelevant and unnecessary for dentistry.

NCRP Report No. 145 states in the introduction: "Office design, equipment, and procedures that minimize patient exposure will also reduce exposure to the operator and the public. Additional measures, however, may be required to ensure that doses to operators and the public are within limits established by regulatory bodies. Doses to all should be kept as low as reasonably achievable, with economic and social factors being taken into account (i.e., the ALARA Principle) (NCRP, 1990)." (p.1). The U.S. Dept. of Energy states: "The ALARA process is a decision-making tool with the goal to maximize the total benefits of the radiological protection provisions for the DOE activity that is likely to expose members of the public to ionizing radiation. This occurs when the cost of radiological protection plus the cost of the detriment are minimal. The procedure for attaining the minimal cost condition is called "optimization." The acceptable cost to reduce the collective dose to a population of exposed persons falls within a range of $500 to $2,500 per person-rem² [1 rem = 10 mSv]. The collective effective dose from dental radiographic procedures is presently estimated to be 0.004 mSv/yr. The expenditure of $500 to $2,500 to reduce the collective dose that is presently 735X lower than annual background radiation levels; and 2,500X lower than the 10 mSv collective dose reduction goal is clearly unjustifiable by the imaginary and immeasurable gain in potential benefit.

NCRP Report No. 145 emphasizes the desirability of incorporating a more consistent and strict application of radiographic selection criteria and the incorporation of certain quality assurance procedures, the use of faster image receptors, time-temperature processing, proper interpretation strategies. Such recommendations have merit and certainly deserve appropriate consideration for incorporation into the practice to reduce patient exposures and maintain the highest diagnostic quality radiographs.

Conclusions
This paper attempts to analyze some of the factual information presented in NCRP Report No. 145, and compares this data in ways that clearly place the public health and occupational risks associated with dental radiography into a clear perspective through comparison of the reported doses attributable to patient and occupational exposures in dentistry with current dose limits and background radiation. In every instance, the effective dose to patients and occupational exposures are many, many times lower than background or the relevant dose limits governing occupational and public exposure. This paper also discusses specific recommendations from Report No. 145 which appear to lack credibly supporting evidence, or a significant failure to perceive the impact of their own recommendation; examples include fluoroscopy of lead aprons annually and the specification that rectangular collimated beams not exceed source to image receptor distances by 2% resulting
in the potential to have a separate BID or rectangular beam collimating film holder set for each image receptor size in use.

There are several positive benefits to be derived from incorporating some of the reports recommendations into dental radiography practices that should be emphasized. The consistent application of radiographic selection criteria in the prescription of radiographic examinations, the use of faster image receptors and screen/film combinations, along with closer attention to principles of radiographic quality assurance will provide dentists with high quality diagnostic images along with reduced patient dose.

Data provided in Report No. 145 is used as evidence to indicate that dental radiography in the U.S. is already ALARA and that the expenditure of additional financial resources to achieve an even greater level of ALARA is probably unjustified and unmerited since present risks are already immeasurable, undetectable and do not jeopardize the public health. Indeed, two previous NCRP reports have already drawn this conclusion: NCRP Report 107: "It is tempting to conclude that further occupational exposure reduction in dentistry may not be cost-effective." NCRP Report 93 recognizes the "trivial" nature of the dental effective dose equivalent in contributing to calculating a collective effective dose equivalent by stating: "Dental examinations have been omitted since they are estimated to contribute less than 0.01 mSv (1 mrem) to the total average annual effective dose equivalent."

The scientific principle used to undergird NCRP Report No. 145 is the assumption that radiation risks may be extrapolated indefinitely in a linear fashion from high doses to very low doses, the linear non-threshold theory [LNT]. Polycove cites Dr. L.S. Taylor, past president of the National Council on Radiation Protection, as describing the linear extrapolation from high doses to very low doses in the calculation of collective doses as: "deeply immoral uses of our scientific heritage" [p366]. Bond, et al writing in opposition to the LNT: "The above arguments also appear to have destroyed rather completely the interpretations of and impressions from the linear hypothesis - that 'low level' irradiation should be of major personal or public health concern, a factor that has induced an almost pathological fear of low level irradiation in a major segment of the general population...It appears to be more sophistry than science, and reminiscent of the 'angels on the head of a pin' debates, to argue about whether a small amount of radiation energy can cause an excess malignancy...one excess cancer cannot affect significantly a public health problem of the magnitude of cancer." Additionally, Kellerer and Nekolla appear to make a plea for a common sense approach to low dose radiation risk estimation when they state: "There is however, less agreement on the potential health effects of small doses. Such effects cannot be assessed in epidemiological investigations, nor can they be reliably inferred from cell studies or animal experiments... Speculative as such unobservable phenomena are, they cannot be ruled out -- but common sense can ignore them." Abel Gonzales, as recently as Sept. 2004 has stated: "For purposes of radiation protection, however, the non-threshold concept at doses below background doses is not relevant. It is applicable only for doses above the prevalent background dose that is unavoidably incurred... Therefore, the discussion on whether smaller absolute dose, say some microsievert per year, would be able to induce health effects, or whether the dose-response relationship is LNT at such small doses is an interesting academic question but meaningless for practical radiation protection purposes."

Finally, NCRP Report No. 145 represents an "advisory opinion" on minimizing radiation risks to patients, the dentist and dental staff from dental diagnostic radiographic procedures. NCRP Reports are frequently used by various federal and state entities to establish rules and regulations; as a result it is critically important for dentists and dental x-ray technicians to understand what the NCRP has recommended for the practice of dental radiography because many of the 109 recommendations could, in the near future, become regulations and laws. Report No. 145 clearly places each dentist and x-ray technician, laboratory at a crossroad for decision-making. Every dentist and dental x-ray laboratory is encouraged to obtain a copy of the report and along with the information presented in this paper decide to either support, or not support, the incorporation of Report No. 145's many recommendations into State, Federal, OSHA, EPA and DOE regulations governing the practice of dental radiography. If you support the document's recommendations, then work actively for their incorporation into your State's practice act. On the other hand, if you do not support incorporating some or all of the recommendations in your State, then be vigilant and work with your legislative and State Board representatives and public health officials to see that they are not incorporated into the rules and regulations governing the practice of dental radiography. A failure to act on your convictions will permit someone else to decide how you will practice dental radiography in the future. The choice is ours.

Bibliography:


19. ADA Survey Center’s “Distribution of Dentists in the United States By Region and State, 2001” – American Dental Association, 211 E. Chicago Ave., Chicago, IL.


Curriculum Vitae for:

John W. Preece, DDS, MS

Office Address: University of Texas Health Science Center
Dental School
Mail Code 7919
7703 Floyd Curl Drive
San Antonio, Texas, 78229-3900
Office Telephone: (210) 567-3374
Cell: (210) 383-5750
E-mail: preece@uthscsa.edu

Education
Post-Doctoral: M.S. Univ. of Alabama, School of Dentistry, Birmingham, (1970)
Undergraduate: Univ. of California, Riverside (no degree)

Present Academic Appointment:
Clinical Professor, non-tenure part time: University of Texas Health Science Center, School of Dentistry, Dept. of Dental Diagnostic Sciences (2008 – present)
Retired from full time position 8/31/08 Professor with tenure: University of Texas Health Science Center, School of Dentistry, Department of Dental Diagnostic Sciences (1978 to 2008)

Professor, non-tenure: School of Allied Health Sciences, Dental Hygiene Department
Dental Laboratory Technology Department

Previous faculty appointments:
University of North Carolina, School of Dentistry (1970-75), Northwestern University Dental School (1967)

Previous Administrative appointments:
Interim Chairman, Dept. of Dental Diagnostic Sciences, Dental School, March 2000 - April 2002
Associate Dean, School of Allied Health Sciences, UTHSCSA (1984-1999)
Interim Dean, School of Allied Health Sciences, UTHSCSA (May 1986 - Sept. 1987)
Acting Director, Physical Therapy Program, School of Allied Health Sciences, UTHSCSA (1984 - 1985)
Coordinator of Dental Auxiliary Training, School of Allied Health Sciences, UTHSCSA (1977 - 1991)
Preece, CV, page 2 of 2

Professional Certification
Diplomate, American Board of Oral and Maxillofacial Radiology (1982)
Fellow, American Academy of Dental Radiology (1976 - by examination)

Professional Memberships:
International Association of Dento-Maxillo-Facial Radiology
American Board of Oral & Maxillofacial Radiology
American Academy of Oral & Maxillofacial Radiology (AAOMR)
American Dental Association

Licensed to practice dentistry:
California, Illinois (inactive), Texas

Current positions held:
• Reviewer for the Radiology Section, Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics Journal
• Consultant, ADA Commission on Dental Accreditation for allied programs Member

Former positions held:
ADA Continuing Education Recognition Program Committee [CERP]
• Texas State Board of Dental Examiners Test Construction Committee for the Dental Assisting Radiology Certifying Examination (1987 - 1998)
• Editor, American Academy of Dental Radiology (AADR) (1980 - 1988)
• Committee on Dental Auxiliary Education, AADR - authored approved curriculum guidelines (1974-1988)
• Secretary / Chairman-Elect / Chairman, Radiology Section, AADS (1973-1975)

Honors:
Distinguished Teaching Professor – Univ. of Texas System, 9/1/2010
Professor Emeritus, Univ. Texas Health Science Center at San Antonio 9/1/08
Professor of the year, Austin Community College Dental Hygiene Class of 2005
Elected to Mu Nu Chapter of Omicron Kappa Upsilon Dental Honor Society (1996 to present)
Minnie S. Piper - Professor of the Year - Teaching Excellence
• Fellow, American College of Dentists (1977)
• Teacher Appreciation Awards (1978, 1979)
• Dental Auxiliary Teacher Education, teaching excellence award (1975)

Scholarly works: 7 chapters in books; 23 journal articles; 60+ invited presentations
Co-author of 2nd edition of Principles of Dental Imaging, Olaf E. Langland and Robert P. Langlais, John W. Preece, Lippincott Williams & Wilkins, Pub., April, 2002

Teaching Activities: dental hygiene radiography course; freshman dental student radiography course, sophomore radiology course, radiographic skills development seminars for freshmen and sophomore dental students, post-doctoral endodontic radiology course, basic and advanced radiation biology courses, continuing dental education courses, faculty in-service training programs, invited presentations.

Hobbies: Photography & Glass Fusing
A recent New York Times article was critical of the use of cone-beam imaging in orthodontic diagnostic records, especially in children. The article also questioned the training of the operators of this equipment.

There is no way that a single newspaper article can possibly cover all the aspects of the proper use and diagnostic efficacy of this wonderful technology.

The American Association of Dental Maxillofacial Radiographic Technicians (AADMRT) is dedicated to the continuing education of technicians involved in the field of dental radiography. Technicians who attend our continuing education programs continue to expand their knowledge and skills using this and other technologies. In addition, the meetings allow a chance to bond and form mentoring relationships with others in the organization who have similar equipment or software.

From day one of our training as dental x-ray imaging technicians we are taught to always consider the ALARA (As Low as Reasonably Achievable) Principal. In other words, we are to make the best and most diagnostically accurate image with the least radiation exposure possible. This training is applied hundreds of times per week as we decide the appropriate exposure factors for a given procedure based on the patient age and frame size. It is so much a part of the image making process that we do it without thinking ALARA when we first approach each patient.

According to a leading exposure study, a cone beam scan of the dental structures is nearly 50% less than a full mouth series if the dentist is using “D” speed film. The statistics that I have seen is that the D speed film is still in use. Cone-beam imaging allows the dental structures to be viewed from different directions and angles all from a single scan.Orthodontists can compare and measure structures that have until now defied standard imaging techniques usage by 70% of dental offices still using film.

It is our experience that the patients referred to our centers for cone-beam imaging have significant indications for use of this technology. These are not scans taken as a matter of routine.

Most orthodontic records are still taken using conventional imaging techniques and many centers are fully digital. Those centers that are still film based are using high speed films for the lowest patient exposure possible, and in most cases these exposures are very similar to current digital technology.

Dan Halpert, President AADMRT

I welcome the timely report of the New York Times that indicates a need for selection criteria for all radiographic procedures, especially CBCT on children. The goal should be to follow the ALARA principle. Some practitioners have evidently forgotten this principle. Radiographs should be prescribed based upon professional judgment, following history taking and clinical evaluation of the patient, rather than taken as a mere routine.

What matters is that the appropriate images are made for the task at hand... i.e. that professional judgment has determined that the very small risk involved from the imaging procedure is outweighed by the health benefit to the patient. No image that is not diagnostically beneficial should be made irrespective of how small the dose. No image should be made as a routine without individualized selection. That applies to CBCT, but also to panoramic, 2D cephalometric images and even individual periapical radiographs.

Alan G. Farman BDS, PhD, MBA, DSc, Diplomate ABOMR

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Univ. Louisville School of Dentistry: SUHD
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Happy New Year! Welcome back!

I hope all of you enjoyed a few days off for the holidays.

I had the privilege of seeing many of you at the AAOMR/AADMRT Fall Joint Sessions. I really enjoyed the joint meeting. At first I was a little apprehensive with the two groups joining as one meeting, but I found it to be very interesting and the members of AAOMR were very welcoming. I would love to see our groups join again in the future.

I would like to extend a congratulations to three new AADMRT Board of Directors. They are Cherie Berry, Nancie Grabow and Jeannie Robles. I appreciate your time and dedication to AADMRT. We will be needing four positions filled for next year, so if any of you are interested in running for the Board of Directors, please contact Nancie.

Ron Thatcher will be taking over this year as our President. He has one year left on his term and he has graciously volunteered to lead us during his final leg. I know that he will do a wonderful job since he has had the last three years following in Dan Halpert’s footsteps.

Ron and Tony Giacobazzi will be hosting our Spring Seminar this year in Berkeley, and they are going to have a fantastic lineup of speakers that you will be hearing about soon. We will be getting the registration packages in the mail in the next month or so.

To Dan, thank you on behalf of AADMRT for your wonderful job as our leader the last three years. There have been many challenges during your reign, including the changing of our treasurer, the change over in the State of California, eliminating our school, and the chasing down of X-ray labs that are non-compliant with the law. Dan has agreed to continue with pursuing non-compliant x-ray laboratories holding a special committee position for AADMRT. He will keep us informed on his pursuit.

I recently went to Reno, to look at the Atlantic Casino Resort Spa where our Fall Convention will be hosted by n/Sequence. I meet with our convention chairs, Daniel Llopp and Rebecca Lynch. They both are very excited about hosting our convention, and they will give us a full report in our next newsletter. Rebecca and I took a tour of the Hotel and we found it to be very nice. I think all of you will really enjoy the facility. The staterooms are really nice on all levels. The hotel is close to the airport with a courtesy airport shuttle. It has a full spa, 2 pools, a workout room, and many restaurants, including a Sushi bar. The casino is spotless- I mean, it is the cleanest Casino that I have ever been in. The convention rooms are great. The dates have been changed to October 6th and 7th 2011.

Diane Yamamoto and Krista Scheers have graciously agreed to host our 2012 Spring Seminar somewhere down in Southern CA. So look forward to updates on this meeting. I am sure they will put on an awesome seminar.

I have been asked to add a recipe corner to our newsletter, So please look through your favorite recipes and send them to me to be publish.

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** Editors View 

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**A TRIBUTE TO LIZ TANCREDI-QUALTIER:** Liz has retired from Imaging Sciences

Although this is a special time for Liz, it is a difficult time for all of us who personally know her. She has always been our “go to” girl and it feels a little scary knowing that she will no longer be there for us. What ever, when ever, whom ever, we needed – anything; or just a person to talk too, it was always Liz who came to the front line to support our group in every way.

From the Commcat advancing to the i-Cat, the personal relationship which has developed over the many years is one cherished by many of our group members, without a doubt!

Thank you Liz from all of us and please know that we respect, admire, and appreciate you for all of your hard work and support throughout the many years.

I read somewhere that retirement is when you stop living at work and begin working at living.

We are all very happy for you and hope that you will occasionally stop by one of our group’s seminars just to say “hi” on your way to “begin working at living”.

May you enjoy the many years ahead of you with your new family and quoting Craig Dial, as we all agree; “You will be sorely missed by all of us here at the AADMRT”!

Your friend, Diane Yamamoto
Our Friday Continuing Education Program began with Dr. Christos Angelopoulos presenting “Diagnostic Ultrasound in Head and Neck Imaging”. Diagnostic Ultrasound is an imaging modality that uses a device known as a “transducer” which produces sound waves and collects their reflections from the various tissue interfaces. This is a real-time tomographic imaging that is limited to the area of interest at any plane using sound waves. Dr. Angelopoulos introduced us to anatomical structures of the neck and face and their appearance in ultra-sound images. Ultrasound is an excellent tool for diagnosis of the salivary gland disease, thyroid gland disease, secular stenosis and the staging of head and neck lymphadenopathy.

The second presenters were introducing the concept of acquiring new knowledge by linking prior knowledge. An example would be that most students have taken biology, chemistry, and physics and that incorporating this knowledge will help with the diagnosis. The titles of the short presentations were Photons Don’t Care—A conceptual approach to radiation safety. The Role of Basic Science in Clinical Reasoning from Perception to Cognition (and everything in between). CBCT Imaging in Oral Radiology and Basic Science Curriculum. This presentation was very entertaining as well as enlightening. Every day is a school day, I always say.

The Friday afternoon sessions: Submitted by Marcelle Jones

Dr. Sharon Brooks shared her life story with us in “Words from Your Big Sister”. Not only is she an accomplished oral maxillofacial radiologist, but also a generous and kind person. Her advice of “don’t say NO too often”, is helpful in our personal and professional lives.

Dr. Charles Hildebolt discussed the archeological findings in 2004 of the “Hobbit” or Homo floresiensis. Apparently, there is great controversy in determining whether this find is a new species or a modern human suffering from pathology such as microcephaly or dwarfism. 3D CT scans have been used to refute this theory.
The good news is that everybody adapts. There have been some studies showing the relationships of estrogen among those it affects women of childbearing age 20-40 years old. TMJ growth. As most of us know, TMJ suffers are mostly women and among those it affects women of childbearing age 20-40 years old.

Bone is a very dynamic structure; Dr. Hatcher explained to us the various nature of the bone and trabeculae, the joint is significantly “loaded”. The jaw is built like an I-beam and thus the stress distribution. Biomechanics: Stress=Force/Area. Mandibular growth mirrors TMJ growth. As most of us know, TMJ suffers are mostly women and among those it affects women of childbearing age 20-40 years old.

There have been some studies showing the relationships of estrogen and relaxin on the joints. The good news is that everybody adapts.
Many thanks to the Vendors that AADMRT Fall Joint Sessions:

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E-Woo-Vatech
Image works-Newtom
Imaging Sciences-i-CAT
JRAD
Kodak Carestream Dental Systems
RLM
Future Events

Spring Seminar 2011
Held at the Doubletree
On April 2nd.
Hosted by Tony Giacobazzi and
Ron Thatcher

The Doubletree Hotel and Executive Meeting Center
200 Marina Blvd.
Berkeley, CA 94710
Phone: 510-548-7920
Fax: 510-848-1491

Fall Convention 2011
Held at the Atlantis on Oct. 7th-8th
Hosted by Daniel Llopp and
Rebecca Lynch

The Atlantis Casino Resort Spa-Reno
3800 South Virginia St.
Reno, NV. 89502
Phone: 775-825-4700/800-723-6500
AtlantisCasino.com

Fall Convention 2012
Held at the Depot Minneapolis Hotel
On Oct. 6-7.
Hosted by Nancie Grabow and
Annette Nelson

The Depot Minneapolis ~ A Renaissance Hotel
225 South Third Avenue
Minneapolis, MN 55401
Phone: 612-375-1700
Fax: 612-758-7814

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The Board of Directors meeting was held at the Kona Kai hotel
In San Diego, CA on November 20th 2010
Merry Hampton, Executive Secretary submits:

Members Present,
Dan Halpert—President
Ron Thatcher—Vice President
Helen Tran—Advertising
Dr. Dania Tamimi—Bi-Laws
Judy Hurt—Nominee/Membership 2011
Board of Directors not present: Dawn Harrat—2010 Membership and Dr. William Bateman—Recruitment

Nominee Committee: Judy Hurt reporting—3 members running for the Board of Directors for 2011. All three will be starting their positions next year. The three new Board Members will be Cherie Berry, Jeannie Robles and Nancie Grabow. Cherie Berry will be taking over Advertising before the year ends.

Membership Committee: Merry Hampton reporting for Dawn Harrat—130 current members for 2010. Fees will remain the same for 2011. The $90.00 annual fee remains the same, early registration remains $75.00 if paid by Dec. 31 the prior year. Membership has been passed on to Judy Hurt for 2011.

Advertising Committee: Helen Tran reporting—She has compiled all of her contacts and has forwarded them to Cherie Berry, She has helped Cherie during the fall sessions to continue with the vendors and companies to advertise in the Newsletter.

Recruitment Committee: Dr. William Bateman does not have a new report, but will continue to make contact with possible AADMRT members and will follow-up with any non-returning AADMRT members after the Membership chair has finished her mass mailing.

Bi-Law Committee: Dr. Dania Tamimi reporting—no new changes to report.

New Business:
Dan Halpert will set up a booth at the Spring Seminar 2011 to take pictures of members who wish to have an updated photograph in the AADMRT directory.

Spring Seminar for 2012 will be held in Southern California. The Seminar chairs are Diane Yamamoto and Krista Scheers. Place and date still needs to be determined.

Dan Halpert will be working on a package to send to members in regards to compiling information about non-compliant laboratories running a business in the Dental x-ray field. He will present this to the Board of Directors first, and clear it with our legal advisor, prior to sending it out to our members.
A letter to the editor:

The New Year is a time to reflect on the past while formulating hopes and dreams for the future. Upon hearing the news that Liz Qualtier was retiring from Imaging Sciences International, I was flooded with memories of the early 90s when Hank Tancredi and Arun Singh had an idea of building a better multi-directional tomography machine. Their idea was called the CommCAT, and those first machines were actually multi-directional machine available called the Tomax.

My Quint Sectograph linear tomography machine was already 10 years old and I knew my dental imaging center needed state-of-the-art technology to stay competitive. It seemed most of the dental imaging centers were purchasing the Tomax. Do I go with the existing company—or take my chances with this new company called Imaging Sciences International (ISI)? The Tomax sales rep did not hesitate to inform me that the stepper motors in the CommCAT were inferior and would not last (he was wrong). Also, ISI was a new company—who knew if it would even survive? Then what? This was a huge decision; choosing the wrong company could potentially ruin my business. I conducted my research by visiting offices that had each machine. I asked plenty of questions. I simply could not afford to make a mistake!

Business decisions should be based on analyses comprised of hard facts, feasibility studies—and lots of spreadsheets. None of these were of any use as each company had positive and negative points. With no obvious “winner,” I based my decision solely on an emotion, which is considered business suicide. I picked Imaging Sciences International. Why? At the time, the entire ISI organization was composed of just a few people: Hank, Alan, Arun, John, and Ed. (Liz and Stephanie joined the company soon after.) My gut told me that ISI was a family. Since my personal experience is that families stick together, I knew that ISI would always provide the necessary support. Time proved my decision was correct.

Forward 10 years to fall 2003. The new game in town is called “cone beam computed tomography” (CBCT), and the first machine to production is the 8-bit NewTom from a company called Quantitative Radiology based in Verona, Italy. Not wanting to get trampled by technology, I visited Craig Dial at DDI in Sacramento for advice. Craig was thorough in explaining the virtues of CBCT technology and I was convinced this was exactly what I needed. I went home and enthusiastically prepared my office space for the new unit! I had my pen in hand about to sign the contract… and the phone rang. It was Arun Singh of ISI saying he heard that I was set to purchase the NewTom. He asked me to wait until the annual AADMRT meeting, which incidentally was to be held at ISI headquarters in Hatfield, Pennsylvania. Arun said ISI would have a working prototype CBCT unit on display, and felt I should see their machine before I made my purchase. Based on the extraordinary service and support provided for the CommCAT, I had no qualms about waiting a bit longer.

After seeing the demonstration of the 12-bit i-CAT, I knew it was exactly what I wanted. But wait. The unit on display was only a working prototype. It could be years before it was available for purchase, and I simply could not afford to wait. Arun assured me that within one year they would have the i-CAT on the market. In March of 2004, I had the very second production i-CAT in the entire world; Don Croall in San Jose had number one.

Don and I were essentially the initial beta testers. Did it have issues? Of course, what new technology doesn’t? We had a steep learning curve but with Hank, Arun, John, Liz and everyone else at ISI, we were able to overcome every obstacle. Soon others saw the virtues of ISI’s CBCT scanner, and many became members of the growing i-CAT family.

The i-CAT became a grand slam for ISI. Just like any family, ISI grew and those initial visionaries knew it would take a major dental equipment manufacturer to take it to the next level. In 2007 they sold the company to Danaher. Before I had even finished my payments, ISI had the newest generation 14-bit Platinum i-CAT on the market!

With Liz’s retirement in December, Ed is the only remaining member of the original ISI family. He readily admits that the others could never be replaced. However, he has assured me that he is committed to maintaining the personal customer service we’ve enjoyed all these years. To that end, he has assembled a staff of knowledgeable personnel to meet the demands of the growing company.

Sadly, many dental imaging centers did not survive the tough economic climate of the past few years. If it were not for my i-CAT, my dental imaging center might too have become another statistic of the bad economy. I’ve heard the same from other i-CAT users, and we must all be thankful to those pioneering ISI people for their years of dedication and commitment.

I’m told that Liz is enjoying being retired (for now) and having fun watching her son play ice hockey (he is only 5 years old!); John is racing cars (lucky guy); Stephanie is in real estate; Alan started a new business; Hank is a consultant; and Arun is building a home in South Carolina.

My financial planner advised me to stay healthy because according to his numbers, it’s going to be a real long time before I can retire. …think I better go check my lotto numbers! Happy New Year!

Now where did I leave my lotto tickets????

Enjoy the ride of life!

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CBCT: AN ENDODONTIST'S PERSPECTIVE

Dr. Peter Chase
DENTISTRY, MEDICINE AND MUSCULOSKELETAL PROBLEMS INVOLVING THE JAW

Dr. Jasmine Gorton
ORTHODONTICS AND CBCT

Dr. Donald Linck
DISTRACTION OSTEOGENESIS - A NEW PARADIGM

Jerry Peck - DXLT
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2011 MEMBERSHIP APPLICATION

Please complete the following information for our membership and mailing records:

Send mail to Home____ Lab/Off. ____ Address (Please check one)

Last Name, First: ____________________________________________
E-Mail: ______________________________________________________
Home phone: (___) ____________________________________________
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Are you a board member? Yes / No Were you before? Yes / No
Are you interested in becoming one? Yes / No
Are you a retired XT? Yes / No

2011 Annual Membership dues: $ 90.00 Dues are valid until the end of the year-Dec. 31st 2011

Send check or money order, (must be in U.S. Dollars), payable to AADMRT and submit with this application.

AADMRT
c/o Judy Hurt
Bakersfield Radiographic
2920 F. St. B-2
Bakersfield, CA 93301

Judy Hurt Bakersfield Radiographic, 2920 F. St. #B-2, Bakersfield, CA 94903
membership@aadmrt.com
### Upcoming Events

**2011**
- Spring Seminar: Southern CA
- Fall Convention: Minneapolis, MN, Oct. 5-6.

**2012**
- Spring Seminar: Southern CA
- Fall Convention: Minneapolis, MN, Oct. 5-6.

**2013**
- TBA

### Newsletter Deadlines

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To submit an article, please contact editor@AADMRT.com

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