Abstract

Computer Programs (ALARA) for Calculation of Diagnostic Radiation Dose

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Diagnostic radiography such as computed tomography (CT), general radiography, and dental radiography are important tools used to diagnose disease or injury. With the increased public interest in aging and health promotion along with the development of medical technology, the number of radiographic medical examinations has risen. Therefore, at the national level, management of patient dose by diagnostic radiography has emerged as critical. The Korea Centers for Disease Control and Prevention (KCDC) developed ALARA-CT, ALARA-GR, and ALARA-DR programs, which can calculate patient dose for diagnostic radiography. This article reviewed radiation doses used for CT, general radiography, and dental radiography and radiation doses used for radiation protection. In addition, patient dose calculation programs developed by the KCDC were reviewed. The developed programs can calculate radiation dose for patients of various ages and for both genders. Also, the programs can be used for various systems with different manufacturers and models and examination setting parameters. The programs are user-friendly and thus can be used by medical staff who do not have specialized knowledge of radiation dose assessments. These programs provide data to facilitate the analysis of evaluation results. The developed programs can be used to manage patient radiation dose for diagnostic radiography and ultimately contribute to reducing radiation exposure. This article's findings indicated that the ALARA program contributed to the reduction of medical radiation exposure by being able to check and manage the patient radiation dose.

Keywords: Medical exposure, Effective dose, Optimization, ALARA

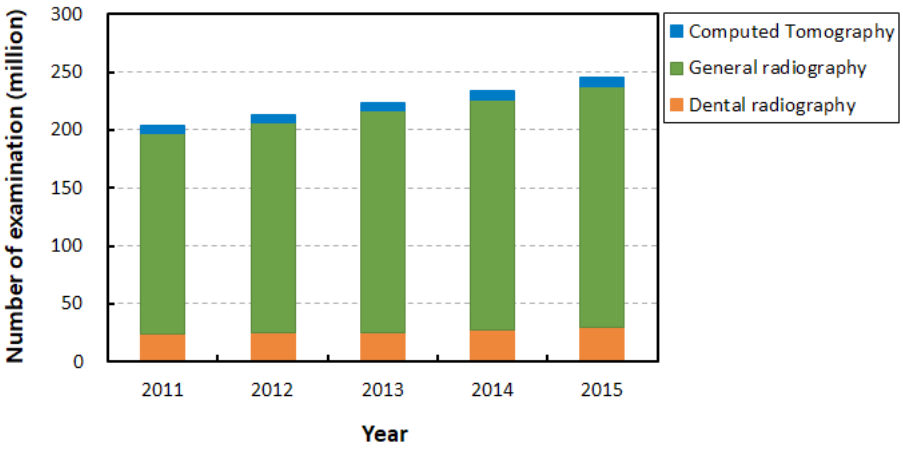


Figure 1. Number of radiographic examinations (CT, general radiography and dental radiography) in Korea

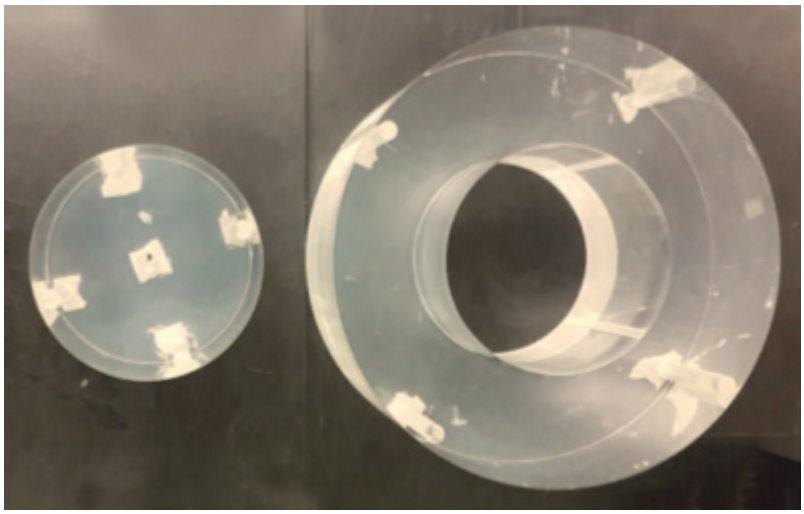


Figure 2. Computed Tomography Dose Index (CTDI) phantom (Head and body parts)

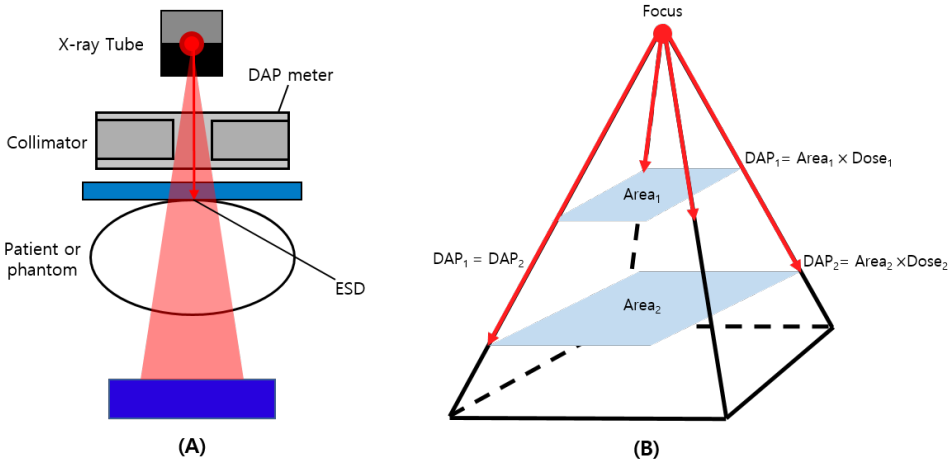
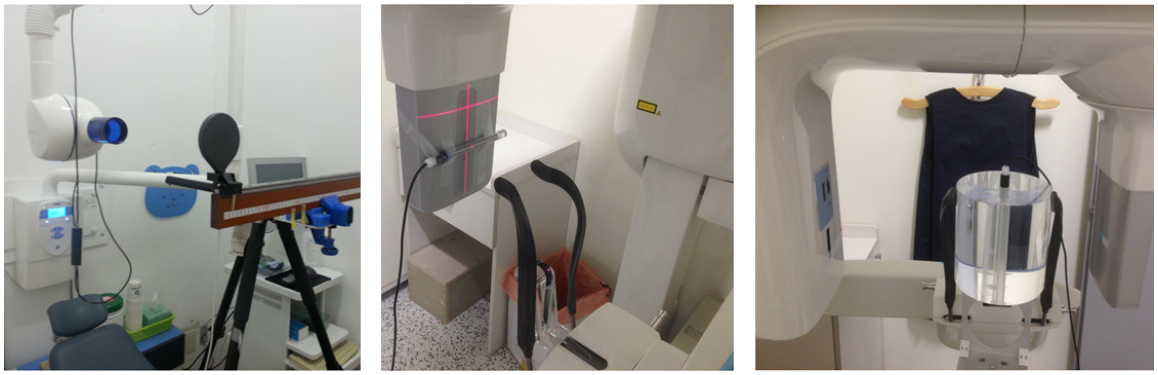


Figure 3. Concepts of radiation dose (A) Entrance surface dose (ESD), (B) Dose-area product (DAP)



(A) (B) (C)

Figure 4. Measurements of (A) Entrance air kerma (EAK) for Intra-oral, (B) dose-width product (DWP) for Panorama, (C) Computed Tomography Dose Index (CTDI) for Cone beam CT (CBCT)

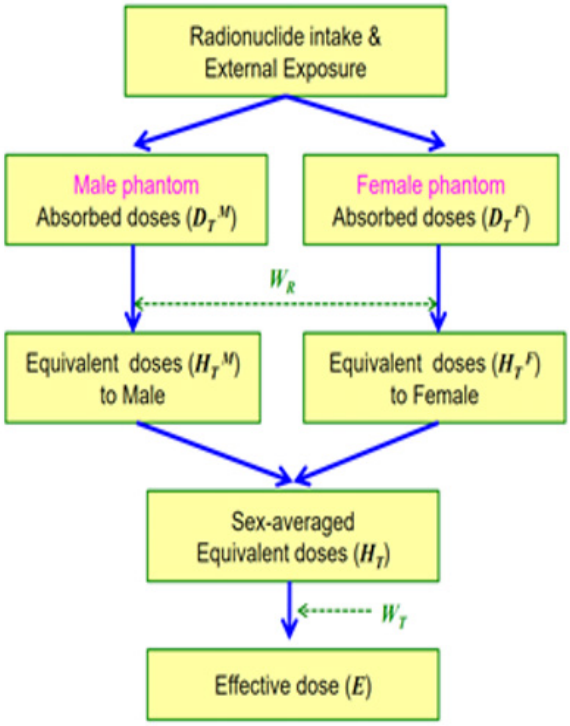


Figure 5. Process in assessment of effective dose presented in International Commission on Radiological Protection (ICRP)

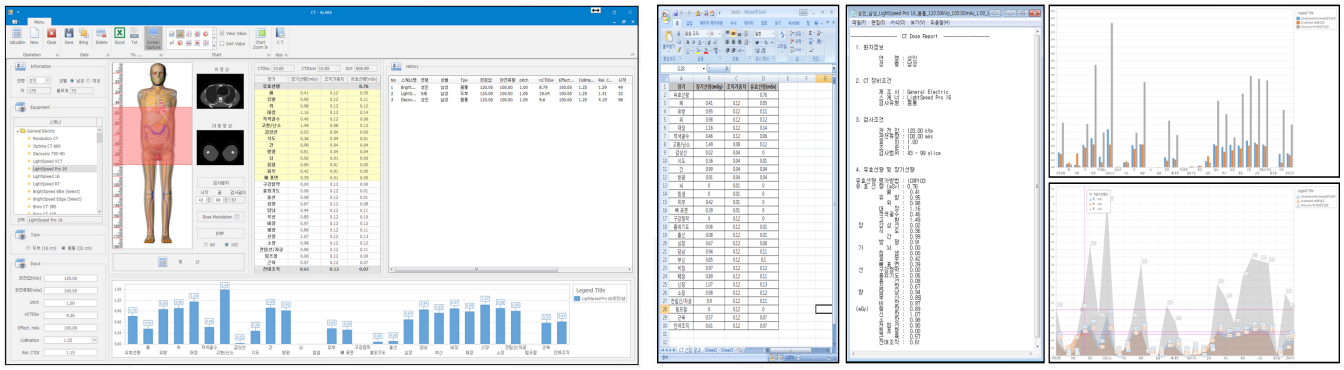


Figure 6. (A) Screen capture and (B) output of ALARA-CT program

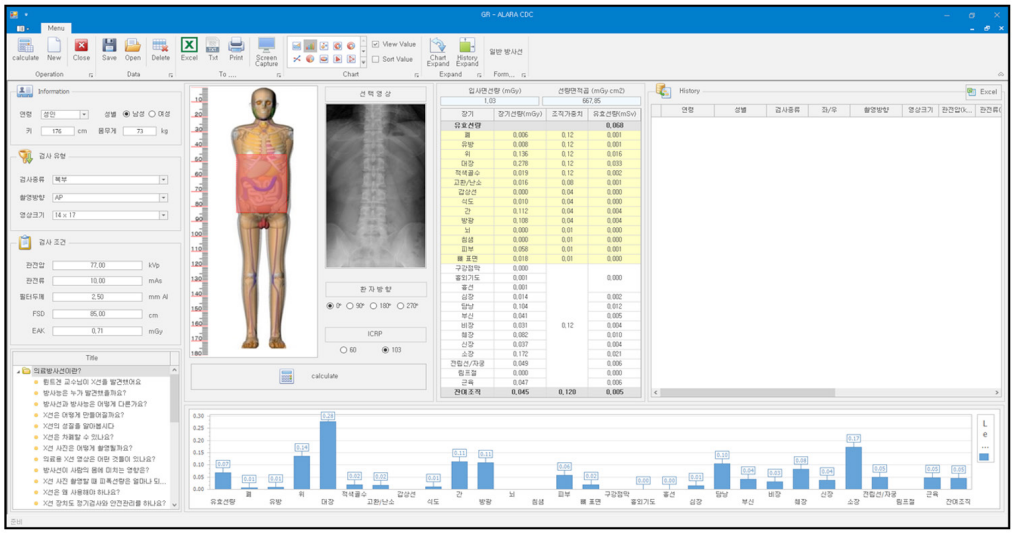


Figure 7. Screen capture of ALARA-GR program

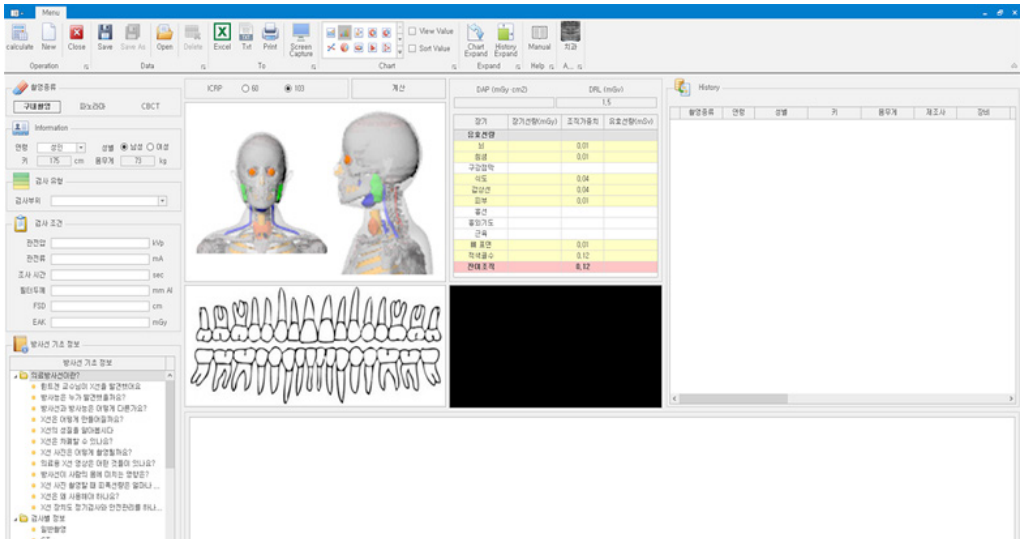


Figure 8. Screen capture of ALARA-DR program