Patient doses from chest radiography in a big radiology department

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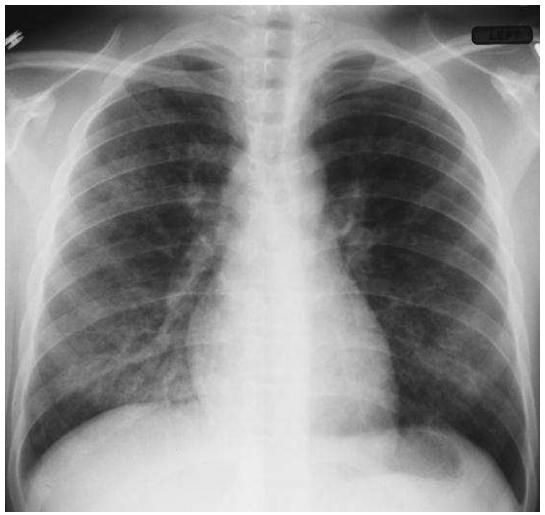
Introduction

Chest radiography was the most common radiographic examination in military medical academy during this spring. Chest radiographies were more than 50% of all radiography exams. It is due to seasonal diseases and some National health insurance fund’s requirements.



Purpose

The aim of the study is to compare patient doses from chest radiography performed with three different methods:

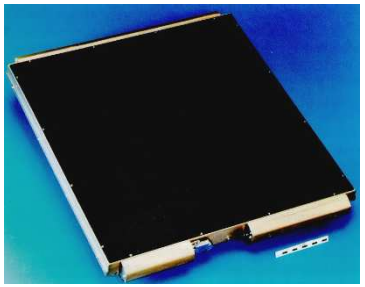
- film-screen combination (FSC),

Photo Coutesy of AGFA-Gevaert Group

- computed radiography (CR)

- direct digital radiography (DR) systems,

and to recommend corrective actions.



Materials and Methods

Three x-ray systems in a busy radiology department have been studied:

- Systems EDITOR-MR 601 (recycled from TUR), working with FSC
- Systems EDITOR-MR 601 (recycled from TUR), working with CR
- DR system SIEMENS AXIOM Aristos FX with flat detector

.

All image detectors have sensitivity class 400.

Materials and Methods

Measurements of air Kerma Area Product (KAP) have been performed for adult patients, recording for every patient:

✓anthropomorphic and exposure data,
✓real field size
✓focus to skin distance

Measurements of KAP have been performed with dosemeter Diamentor M4-KDK (PTW Freiburg, Germany)

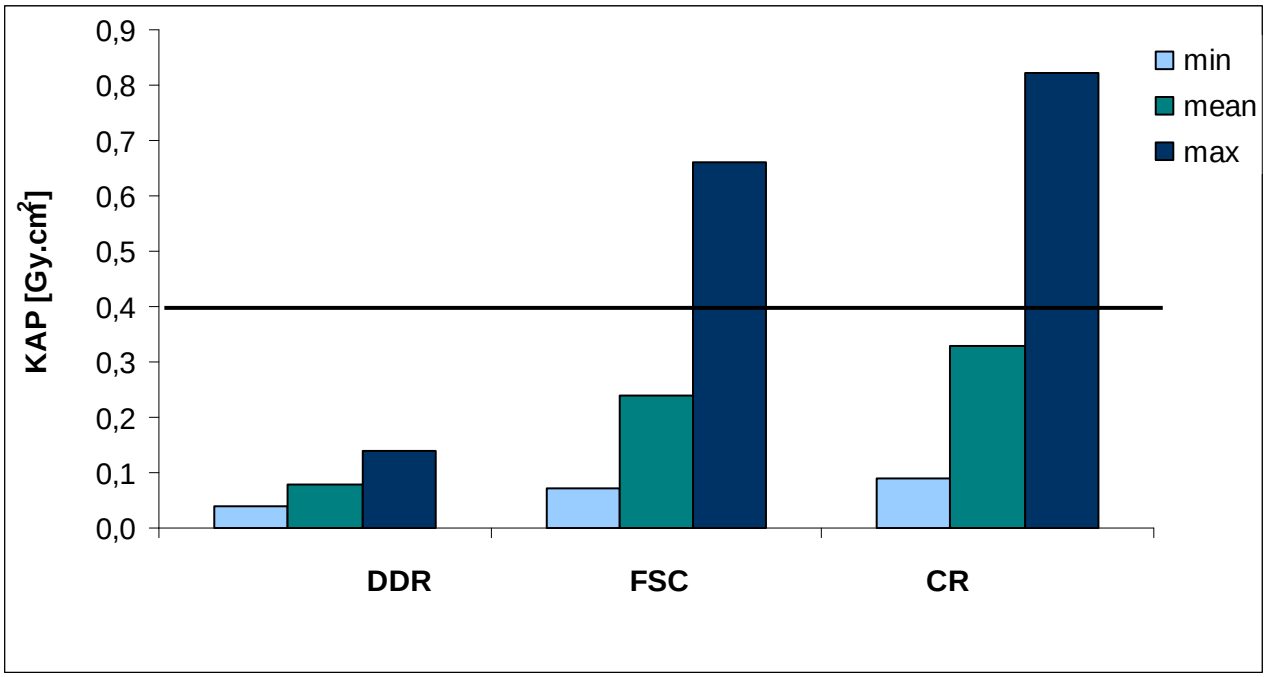
For each system quality control and individual calibration of KAP meters have been performed.

Results

Range of measurements

Receptor type	FSC	CR	DDR
Number of patients	56	50	77
male	24	24	39
female	32	26	38
min. weight [kg]	46	44	50
mean weight [kg]	75	74	74
max weight [kg]	130	115	105

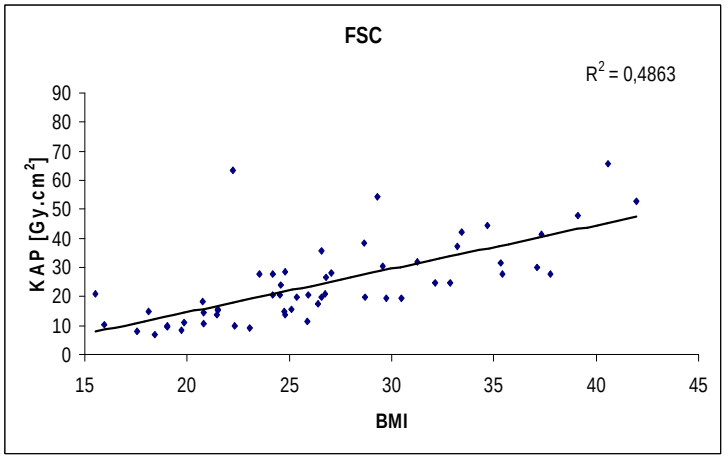
Results

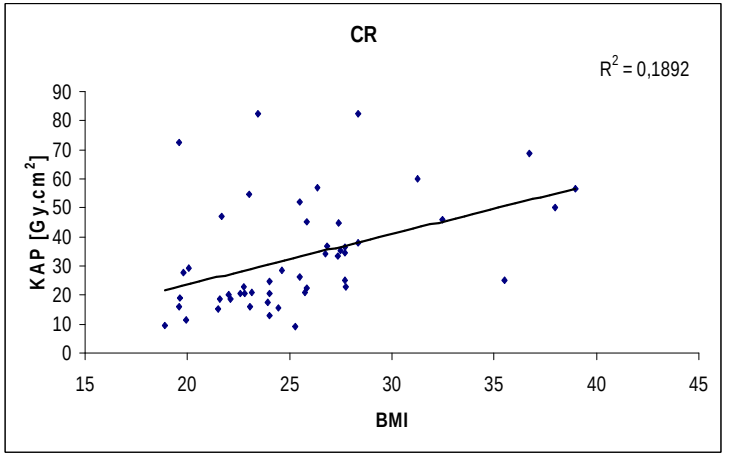


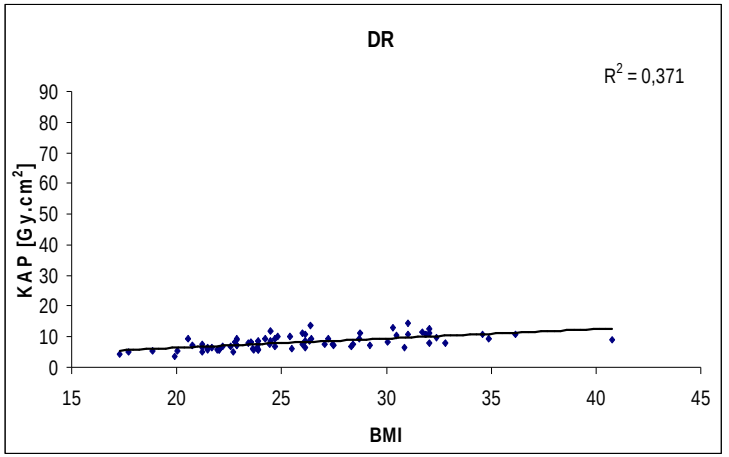
Minimal, mean and maximal values of KAP, compared to Bulgarian national reference level for chest radiography of 0.4 Gy.cm^2

Results

Week correlation found between KAP and Body Mass Index (BMI).







Conclusions

- The mean KAP values of all radiographic systems are lower than the new Bulgarian national reference level for chest radiography of 0.4 Gy.cm^2.
- The DR system shows the best performance and the mean value is under the UK reference level of 0.12 Gy.cm^2.
- The main reason for the higher doses of the FSC and CR systems is the lower kilovoltage used: FSC and CR operate in the range of 90 – 95 kV, compared to 125 kV for the DR system.
- Additional disadvantage for the CR system is the very low total filtration of the X-ray tube of 2.6 mm Al.

Conclusions

- Following actions were recommended to reduce doses:
  - Increasing additional filtration of the X-ray system working with CR
  - Increasing tube voltage used for routine chest radiography at systems with FSC and CR
  - Applying proper collimation and use of appropriate size of FSC and CR cassettes.