

# AbstractID: 2848 Title: Some physical factors which affect the patient doses and the radiological images quality

**Purpose:** The purpose of this paper is the analysis of the console set parameters, the shape and the composition of the X-ray spectrum that is generated by the Roentgen device and the estimation of the organ doses and the effective dose involved in several radiological examinations using Monte-Carlo simulations

**Method and Materials:** The quality of X-ray beam, is usually expressed in terms of HVL. The HVL method consists in several measurements of the radiation dose, free in air, using a set of aluminum filters and a RADCHECK 06-256-dosimeter. First, a spline interpolation on the mmAl-dose plot has been made. Then, the HVL1 (the added filtration that correspond to the dose reduction by 1/2) and QVL (quarter value layer, which is the added filtration that correspond to the dose reduction by 1/4) factors are estimated by solving the corresponding cubic spline equations using the classical Cardano formulas. The HVL2 factor is calculated as  $HVL2=QVL-HVL1$ .

**Results:** For comparison, the theoretical values at the same settings, regarded as those values corresponding to an adequate radiological device, HVL1 and HVL2 were computed, using the XCOMP5R software provided by University of Vienna. The effective dose was calculated, using the PCXMC, a Monte-Carlo based software, provided by STUK (Radiation and Nuclear Safety Authority in Finland).

HVL and homogeneity factor values for theoretic and experimental mode are presented below (mmAl)

	<b>HVL1</b>	<b>HVL2</b>	<b>HVL1/HVL2</b>
Theoretic	2.64 +/- 0.13	3.97 +/- 0.20	0.66 +/- 0.05
Experimental	2.09 +/- 0.10	2.46 +/- 0.12	0.85 +/- 0.06

**Conclusion:** The experimental HVL1 and HVL2 values are significant smaller then the theoretical values. that, all console set parameters are correct, we can conclude that patient doses should be greater then the corresponding doses generated by an appropriate X-ray device, due to the strong photons absorbtion at low energies.