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Development of step-wedge phantom for Dental X-ray machine Quality Control test

تطوير نموزج مدرج لإختبار جودة جهاز أشعة الأسنان

A thesis submitted for partial fulfillment of M.Sc. degree in Medical Physics

By

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Dedication

To the spirit of my father and mother

To my sister Dr. Eslam

To My Brothers (Ahmed, Mammon, Mosab)

And to my dear lovely friends

To all who stood with me in this long journey of study

I Dedicate This Research

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List of abbreviation

UNSCEAR	The United Nation Scientific Committee on the Effects of Atomic Radiation
NCRP	National Council on Radiation Protection and Measurement
ICRP	International Commission on Radiation Protection
K Vp	Tube Potential
mAs	Tube Current – Time Product
QA	Quality assurance
QC	Quality control
ALARA	As Low as Reasonably Achievable
UV	ultra violet
K E	kinetic energy
HVL	Half value layer

ABSTRACT

The aim of this study was to development step wedge dental phantom which calibrated with the standard phantom for accuracy fitting; that used in quality control in dental x-ray radiography and film automatic processing machine. The phantom after has been checked and assimilated, were used in Quality Control for dental intra-oral machine. The result of this study showed that application of design phantom in QC showed similar Result as Standard Phantom. T-test was applied to test the significant difference between the two phantoms at ***P*** =0.05 in case of transmission using air, Cu and Pb where t-value were equal to 0.33, 0.07 and 1.6 Respective with ***p*** equal to 0.7 ,0.9and 0.2 respectively .

Optical density also showed insignificant different between the two phantoms at ***p*** =0.05 with t value = 0.02 and ***p*** =045. The optical density result also showed an exponential response of absorbed radiation versus thickness of step wedge for design phantom it was $y=0.8588+e^{0.0064}$

R^2=0.7861 and for the standard phantom was $y=0.7801+e^{0.0456,}$ R^2=0.8978.

تخلص

هدفت هذه الدراسة لاعاده تصميم نموزج الالمونيوم المدرج ومعايرته مع نموزج قياسي للتاكد نسبة تطابقه وإستخدامه في ضبط الجوده لتصوير الاسنان وجهاز تحميض الافلام الاوتوماتيك