بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

بعض الوثائق
الاصلية تالفة

بالرسالة صفحات

لم ترد بالاصل

Electron contamination scatter factor from different megavoltage therapy machines

Thesis

Submitted in partial fulfillment for the requirements of the degree of M. Sc. in Medical Biophysics

By

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Approval sheet

Title of M. Sc. Thesis

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To my parents

&

my husband Mohamed

Chapter 3: Results and Discussion

Abstract

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Electron contamination can be defined as the undesirable electrons which accompany high energy photon beam during radiotherapy. It arises from the interaction between incident photon beam and the metallic constituents of gantry head (such as flattening filter & collimator jaws) and the air volume separating between the treatment head and the point of measurement. Electron contamination is known to increase with photon beam energy & field size, and decrease with Source Axis Distance (SAD). It is also affected by machine collimator system design.

Contamination with secondary electrons would probably degrade the skin sparing advantage of high-energy x-rays resulting in a possible increase in the surface dose to patient and skin injury. Since electron contamination depends on many parameters that vary potentially between radiotherapy machines and measurement conditions, it should be calculated independently for each machine.

In this work collimator scatters factors in air ($Sc_{(air)}$) and in mini-phantom ($Sc_{(mph)}$) are measured using Perspex build-up cap & miniphantom, respectively. By dividing $Sc_{(air)}$ by $Sc_{(mph)}$ electron contamination scatter factor (S_{cel}) is calculated for three linear accelerators, Varian 600C (6 MV without MLC), Varian DBX (6 MV with MLC) and Elekta precise (6&15 MV with MLC). Measurements are done at 80, 100 & 120 cm SAD for square fields and at 100 cm SAD for asymmetric, conformal & IMRT fields.

Results show that the maximum recorded S_{cel} value for square fields is 4.84% with respect to reference field for Elekta 15 MV at 80 cm SAD. At 100 cm SAD, the value of S_{cel} is 1.91% for the same machine. For Varian 600C, Varian DBX & Elekta 6 MV, the

measured S_{cel} values are all less than 1% for square fields, conformal and asymmetric fields at SAD 100 cm. Using IMRT reduces S_{cel} below reference field down to a minimum -4.24 % for Elekta 6 MV at 100 cm SAD. There is no significant difference in the value of S_{cel} when using MLC only or Jaws only in Varian DBX. Physical wedge decreases S_{cel} by 0.21 % in Varian DBX.

Chapter 1
Introuduction