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بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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التوثيق الالكتروني والميكروفيلم

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بالرسالة صفحات لم ترد بالاصل

Study of The Physical Properties of Different Wedge Modalities

Presented by

Abdelatif Awad Abdelatif

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Contents

List of Abbreviations

Abbreviation:

AAA: Anisotropic Analytic Algorithm.

CADD: Central Axis Depth Dose.

CAX: Central Along Axis.

CCCS: Collapsed-Cone Convolution Superposition.

CCD: Charge Coupled Device.

CL: Confidence limit.

COF: Center Of Field.

DW: Dynamic Wedge.

DTA: Distance to Agreement.

DVH: Dose Volume Histogram.

EDWOF: Enhanced Dynamic Wedge Output Factor.

EDW: Enhanced Dynamic Wedge

EDWF: Enhanced Dynamic Wedge Factor.

EPID: Electronic Portal Imaging Device.

GSTT: Golden Segmented Treatment Table.

GTV: Growth Target Volume.

HDLG: High Dose Low Gradient.

HDSDG: High dose, small dose gradient.

HDLDG: High dose, large dose gradient.

ICRU: International Commission on Radiation Units and Measurements.

ICRP: International Commission on Radiological Protection.

IEC: International Electrotechnical Commission.

IMRT: Intensity Modulated Radiation Therapy.

LDA: Linear Diode Array.

LDSDG: Low dose, small dose gradient.

MUs: Monitor Units.

MLC: Multileaf Collimator.

MW: Motorized Wedge.

MWF: Motorized wedge factor.

MC: Monte Carlo.

NWF: Normalized Wedge Factor.

NGSTT: Normalized Golden Segmented Treatment Table.

NAT: Normalized Agreement Test.

O.F: Output Factor.

OAR: Off-Axis Ratio.

OAF: Off- Axis Factor.

OAR: Organ At Risk.

OD: Optical Density.

PW: Physical Wedge.

PDD: Percentage Depth Dose.

PBC: Pencil Beam Convolution.

PWF: Physical Wedge Factor.

PC: Personal Computer.

PP: Parallel Plate.

PTW: Physician Technique Workstation. (Physikalisch-Technische Werkstätten)

PTV: Planning Target Volume.

PTA: Planning Target Area.

QA: Quality Assurance.

ROI: Region of Interest.

RTP: Radiotherapy Treatment Planning.

RGB: Red – Green - Blue.

SSD: Source to Surface – Distance.

SAD: Source to Axis – Distance.

SsIMRT: Step-and-Shoot Intensity-Modulated Radiation Therapy.

STT: Segmented Treatment Table.

SWD: Source to Wedge Distance.

SD: Standard Deviation.

TIFF: Tagged Image File Format.

TSD: Target to Surface Distance.

TPS: Treatment Planning System.

TLD: Thermoluminescence Detector.

UW: Universal Wedge.

VW: Virtual Wedge.

VWF: Virtual Wedge Factor.

WF: Wedge Factor.

WTF: Wedge Transmission Factor.

Abstract

The study objective was to investigate three wedge modalities physical and dosimetric properties using **6Mv** photon beam. This study included **3D** Eclipse commercial **TPS** (version **6.5.0**) and dose predicted according to clinical current calculation model {pencil beam convolution algorithm **(PBC)**} accuracy evaluation. All measurements were performed at three different radiation therapy machines, Varian **600c** equipped with nominal **15°, 30°, 45° and 60°** physical wedges **(PWs)**, **Elekta** linac with internal motorized wedge **(MW)** of angle range from **0° to 60°** and Varian **DBX** with **10°, 15°, 20°, 25°, 30°, 45° and 60°** enhanced dynamic wedges **(EDWs)**. OFF-axis dose profiles were measured by **Profiler** and **Kodak x-omat V** films for up to **20x20 cm^2** field sizes. Some measurements were performed with **0.125 cm^3 CC13** chamber in **3D** water phantom for **60° MW** and **PWs**. Absolute dose measurements were carried out using **0.6cc** farmer chamber with **PTW** unidose electrometer. Central axis depth doses at depths down to 20cm and for up to **20x20 cm^2** field sizes were measured and verified by **Kodak X-omat V** films. Wedge factors were measured in **PMMA** phantom with **0.6cc** cylindrical chamber. Field factor was measured relative to **10x10 cm^2** area and at 10cm depth.

For **EDW** profiles, the obtained results by profiler were found to be in agreement with those calculated by **3D** Eclipse **TPS** with a **< ±1.5%** deviation. This was in good agreement with those obtained by films within **±2%** except for hot spot and peripheral dose under the toe region where a **< ±1.5%** systematic underestimate dose was appeared. Similarly for **MW**, the deviation was **0.4%** within **80%** field width and **2.3%** outside. For **PW**, the deviation was **< ±1.5%** and the peripheral dose was slightly underestimated (a **< 2%** deviation). Three wedge modalities calculated **PDDs**, for different wedge angles, different field sizes and at depths down to **20cm** agreed with those measured within **±2%**. **EDW**