THE UNIVERSITY OF TEXAS
MD Anderson Cancer Center
Making Cancer History®

# Task Group 158

**Measurement and Calculation of Doses Outside the Treatment Volume from External-beam Radiation Therapy Treatment**

## Scope of Report

**This report aims to address the following charges as they pertain to non-target radiation:**

- **Highlight major concerns**
- **Provide a rough estimate of doses associated with different treatment approaches in clinical practice**
- **Discuss the uses of dosimeters and phantoms for measuring photon, electron, and neutron exposures**
- **Discuss the use of calculation techniques (including Monte Carlo) for dosimetric evaluations**
- **Highlight techniques that may be considered for reducing non-target doses**
- **Discuss dose reporting**
- **Make recommendations for clinical and research practice**

## Task Group Members

- **Stephen F. Kry**, co-chair MD Anderson Cancer Center, Houston, TX
- **Bryan Bednarz**, co-chair, University of Wisconsin, Madison, WI
- Rebecca M. Howell, MD Anderson Cancer Center, Houston, TX
- Larry Dauer, Memorial Sloan-Kettering Cancer Center, New York NY
- David Followill, MD Anderson Cancer Center, Houston, TX
- Eric Klein, Washington University, Saint Louis, MO
- Harald Paganetti, Massachusetts General Hospital and Harvard Medical School; Boston, MA
- Brian Wang, University of Louisville, Louisville, KY
- Cheng-Shie Wuu, Columbia University, New York, NY
- X. George Xu, Rensselaer Polytechnic Institute, Troy NY

## Status of Report

- **Reviewed by TPC**
- **Responses pending**
- **Submitted to Medical Physics**

- **Published ~end of the year/early 2016**

## Goal of this session

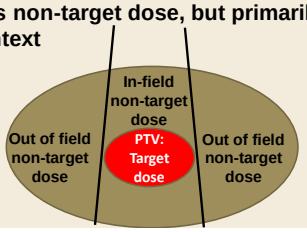
- **Listen to this talk now so you don't have to read the TG report later!**

## Session Outline

- Overview of Non-Target Doses
  Stephen Kry (10 min)
- Dosimeters and Phantoms for Measuring Non-Target Doses
  Rebecca Howell (12 min)
- Calculation Techniques for Determining Non-Target Doses
  Bryan Bednarz (12 min)
- Summary of Recommendations
  Stephen Kry (10 min)

## Introduction to TG-158

- Non-target dose?
  - Dose outside the PTV (no benefit to patient)
- Out-of-field dose?
  - Dose outside any primary field border
- TG-158 addresses non-target dose, but primarily in a low-dose context



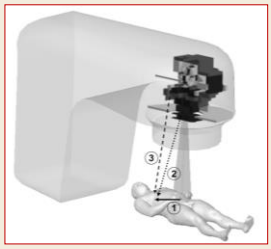

## Why do we care?

Low doses of radiation can be bad

- Second cancers
- Cardiac toxicity
- Fetal damage
- Implantable electronic devices
- Cataracts
- Skin dose (unique considerations not addressed in this report – see TG-176)

## Where does the dose come from?

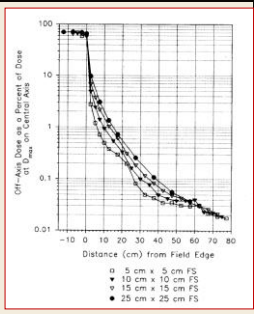
- Patient scatter
- Collimator Scatter
- Head leakage
- Neutrons




- Different properties than in-field radiation

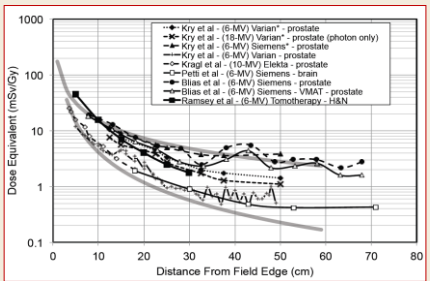
## So how much dose is there?

- Simple square fields
  - Use TG-36
  - 1995
- What about newer techniques?




## Chapter 3 of report

- IMRT; similar for Tomo, VMAT, FFF, SBRT, electron, proton, brachytherapy, imaging.




## Caution

- These doses provide a range that is likely to be encountered
- There can be a lot of variability between individual treatments
- These are just rough guidelines
- You need to determine the dose for your own case
- Measurements and calculations

**Let’s get into some details!**