Establishing, developing and maintaining training in HDR

JP Wylie

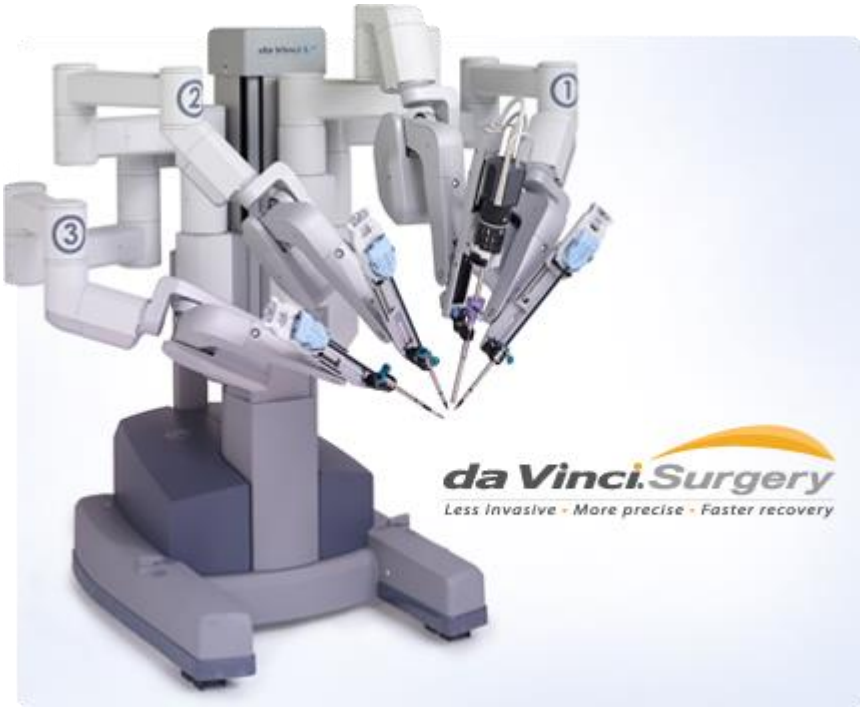
Consultant Clinical Oncologist

Christie NHS Trust

Multi-tiered training in HDR – ideally !

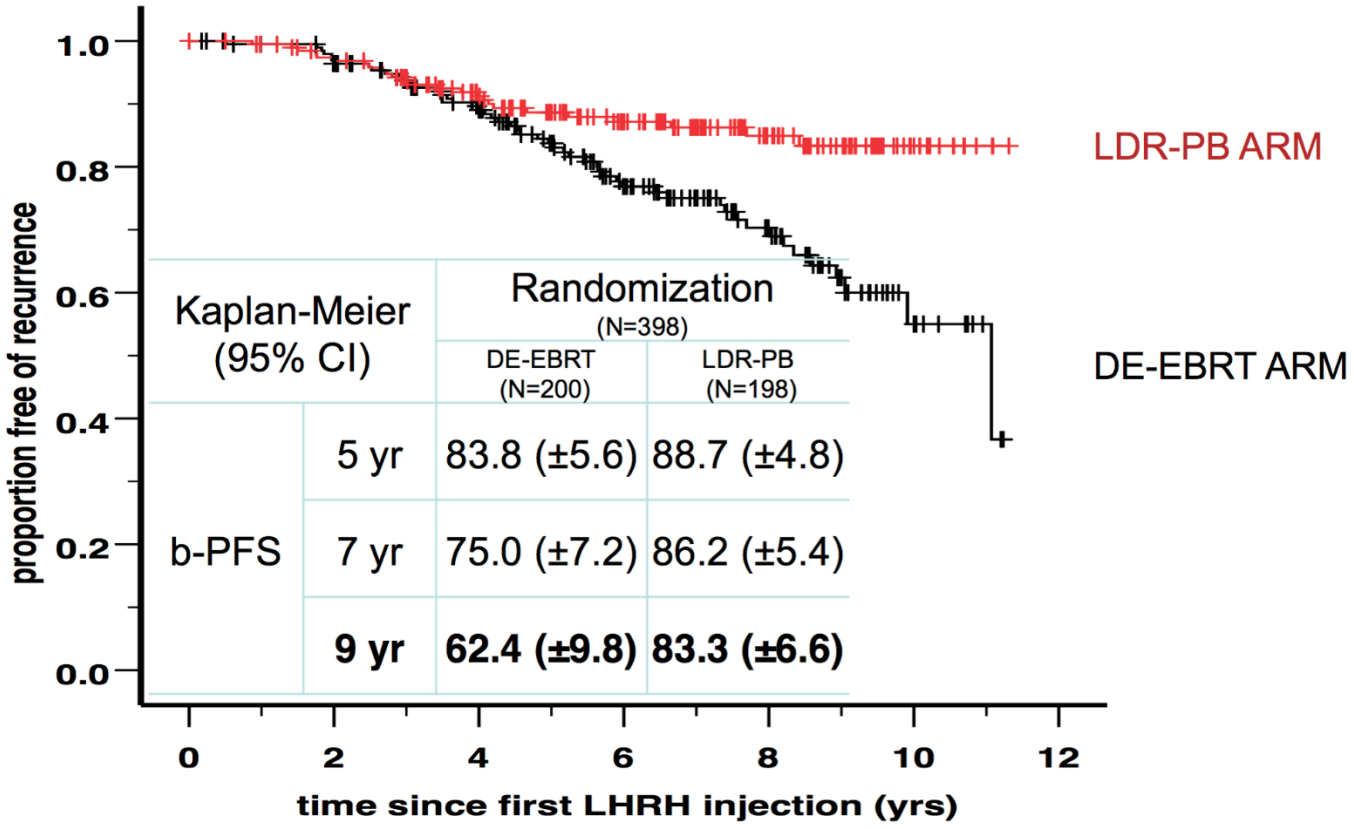
- Promote better awareness amongst potential referrers about suitable patients for HDR prostate brachytherapy
- Recognise and address individual training needs of multi-skilled HDR brachytherapy teams
- Maintaining competencies
- QA processes

“Training” referrers



Results: Biochemical PFS

Intent-to-treat analysis of the primary endpoint



Kaplan-Meier (95% CI)		Randomization (N=398) DE-EBRT (N=200)	LDR-PB (N=198)
b-PFS	5 yr	83.8 (±5.6)	88.7 (±4.8)
	7 yr	75.0 (±7.2)	86.2 (±5.4)
	9 yr	**62.4 (±9.8)**	**83.3 (±6.6)**

Training referrers- NICE guidance 2014

1.3.22

- Consider high-dose rate brachytherapy in combination with external beam radiotherapy for men with intermediate- and high-risk localised prostate cancer. **[new 2014]**

1.3.23

- Do not offer brachytherapy alone to men with high-risk localised prostate cancer. **[2008]**

Other guidance

EAU 2016

- no specific recommendation to HDR- references GEC/ESTRO guideline

AUA 2017

- no specific recommendation about HDR
  - Clinicians may offer external beam radiotherapy or brachytherapy alone or in combination for favorable intermediate-risk localized prostate cancer.
  - Clinicians should offer 24-36 months of ADT as an adjunct to either external beam radiotherapy alone or external beam radiotherapy combined with brachytherapy to patients electing radiotherapy for high-risk localized prostate cancer.

ASCO guidelines - March 2017

- Intermediate risk CaP
  - EBRT with or without androgen-deprivation therapy(ADT), brachytherapy boost (LDR or high–dose rate [HDR]) should be offered to eligible patients.
- High risk CaP
  - For patients with high-risk prostate cancer receiving EBRT and ADT, brachytherapy boost (LDR or HDR) should be offered to eligible patients.

Training a multi-disciplinary HDR team

- Clinical Oncologist (s)
- Medical Physicist (s)
- Brachytherapy radiographer (s) and dosimetrist (s)
- Consultant Anaesthetist (s)
- Theatre nurses
- Data manager
- Scheduler

Multi-disciplinary HDR team training needs

- Clinical Oncologist
  - Needle placement straightforward and pre-planned
  - Dose fractionation schedules/normal tissue tolerances easily available (GEC ESTRO, ABS)
  - But prostate and normal tissue contouring (esp urethra) with TRUS can be more challenging than LDR
    - Significant artefact created by metal needles
    - Further image degradation by haemorrhage and/or hitching of gland causing loss of contact with u/s
    - Arch (must less a problem than LDR)
  - Dose constraints to prostate and normal tissues rarely not met

Multi-disciplinary HDR team training needs

- Ultrasound acquisition
    - Initial set up
    - Optimising image acquisition initially and throughout procedure (haemorrhage, needle artefact, hitching)
    - Difficulty defining base as procedure progresses due to oedema, haemorrhage and artefact
    - Assessing arch

Multi-disciplinary HDR team training needs

- Planners/physicists
  - Familiar with planning software
  - Understanding of optimal needle placement
  - Needle tracking and reconstruction
  - Plan optimisation and evaluation
  - Servicing, calibration and QA of all equipment
  - Demonstrate comprehensive QA of the whole process including imaging, planning, delivery and verification

- Theatre nursing team
  - Initial procedures 3.5 hours in a high lithotomy position
  - Attention to pressure areas
  - DVT prophylaxis

Training of the multi-disciplinary HDR team

- At present most UK HDR teams have developed out of teams with extensive LDR experience and already have core brachytherapy skills
- Relies heavily on in-house training/mentorship of new colleagues
- In the future stand alone HDR teams could develop who will need training
  - Site visits
  - Dedicated courses
  - Mentorship

In-house training

Date	Time:	Subject	Tutor
Monday 8/2/16	pm	Overview whole process - watch implant + treatment	DAW/LL
Tuesday 9th	9:30am	Oncentra Prostate overview 1) Equipment set up, Image acquisition, Contouring Needle positioning Pre-planning	LL
Wednesday 10th	pm	Repeat/Practice 1	DAW
Thursday	9am	2) Needle tracking & reconstruction	LL
Friday	PM	Practice needle reconstruction	
Monday 15th	pm	Overview whole process - watch implant + treatment	
Tuesday	1:00pm	Practice pre planning	DAW
Friday	1:00pm	Practice needle reconstruction	DAW
Monday 29th	pm	Overview whole process - watch implant + treatment	
Tuesday		3) Optimisation and plan evaluation	LL
Thursday	1:00pm	Practice optimisation	LL
Friday	9am	Practice 1+2+3	DAW
Monday 6th	pm	Overview whole process- watch implant + treatment	
Thursday	am	Go through whole procedure - Jelly	DAW
Monday	am	Assist /do implant	
Monday	am	Assist /do implant	
Monday	am	Assist /do implant	

2017
ESTRO SCHOOL
LIVE COURSE

Brachytherapy for Prostate Cancer

29 June - 1 July 2017
Brussels, Belgium

TARGET GROUP

The course is aimed at all those who may be part of a prostate brachytherapy team and for those wishing to set up a prostate brachytherapy unit i.e.: urologists, radiation oncologists, radiation therapists (RTTs) radiologists, physicists and specialist nurses.

COURSE AIM

- Provide an overview of the epidemiology and treatment options for localised prostate cancer
- Discuss patient selection/indications and contra-indications for brachytherapy
- Provide an overview of the techniques, equipment and staffing for a prostate brachytherapy unit, including the physics background and regulatory requirements
- Give an overview of the results, side effects and their management
- Discuss new developments relevant to brachytherapy in imaging, focal therapy and salvage.

LEARNING OUTCOMES

By the end of this course participants should be able to know the:

- Requirements for a successful brachytherapy programme
- Relevant patient groups for prostate brachytherapy and the literature reporting their outcome
- Current areas of development in focal and salvage prostate brachytherapy.

COURSE CONTENT

This course covers an overview on epidemiology and treatment options for localised prostate cancer and gives an adequate introduction to brachytherapy. Patient selection for both HDR and LDR seed implants will be discussed with treatment indications and contra-indications. A review of the equipment and staffing for a brachytherapy unit is included in the programme for those yet to embark on this area of activity. Practical examples of gland evaluation types of treatment planning, different implant techniques and post implant planning are presented in the context of videos and interactive discussions between participants and the teaching staff. New approaches are discussed including salvage and focal therapy. Comparisons are presented between permanent (seed) and temporary (HDR) brachytherapy implants and between brachytherapy and other treatments available for prostate cancer.

PREREQUISITES

Before commencing this course, participants should:

- Revise the general principles of prostate cancer pathology, diagnosis and staging
- Read the published GEC-ESTRO guidelines in LDR and HDR prostate brachytherapy
- Complete the FALCON exercise which is distributed prior to the course.

TEACHING METHODS

- 11 hours of lectures
- 1 hour of contouring
- 2 hours of practical workshops
- 3 hours of interactive discussions.

ROADMAP

RADIOTHERAPY TREATMENT PLANNING AND DELIVERY

RADIATION ONCOLOGIST, MEDICAL PHYSICIST, RADIATION THERAPIST, OTHER SPECIALIST

COURSE DIRECTOR
Peter Hoskin (UK)

TEACHERS
Bashar Al Qaisieh (UK)
Stefan Machtens (DE)
Carl Salembier (BE)
Frank-André Siebert (DE)

PROJECT MANAGER
Viviane Van Egten

WORKING SCHEDULE
The course starts on Thursday 29 June 2017 at 09:00 and ends on Saturday 1 July at 13:00.

LANGUAGE
The course is conducted in English.
No simultaneous translation will be provided.

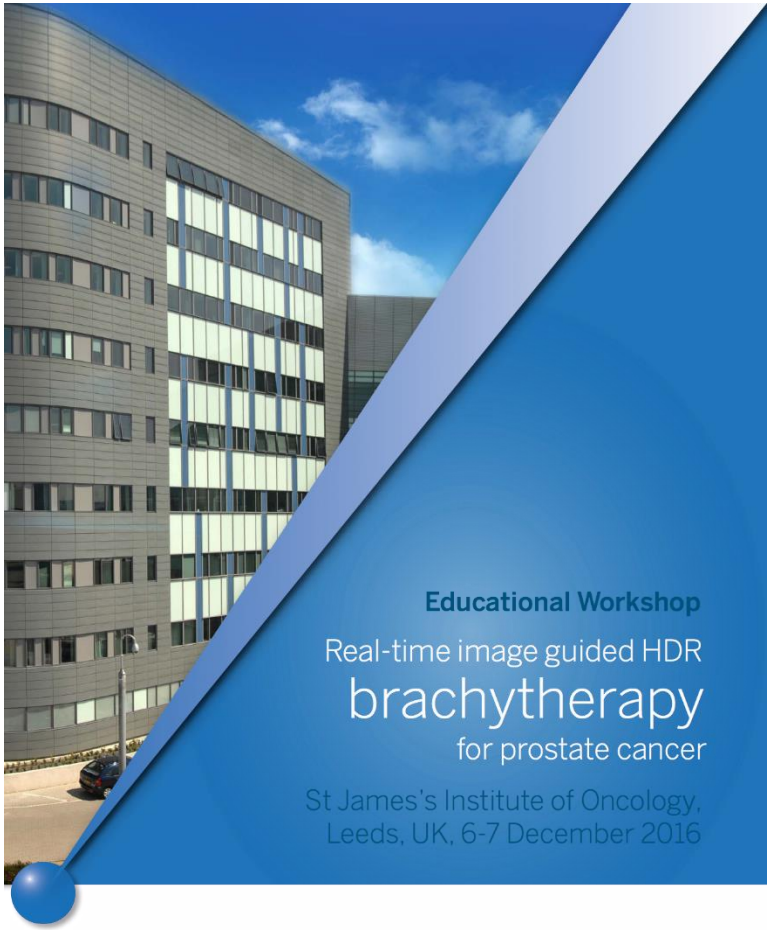
COURSE ORGANISATION
For any further information please contact ESTRO:
Viviane Van Egten
E-mail: vvanegten@estro.org
Tel : +32 2 775 93 44 Fax : +32 2 779 54 94

COURSE VENUE
ESTRO Office
Rue Martin V, 40
1200 Brussels - Belgium

TECHNICAL EXHIBITION
Companies interested in exhibition opportunities during this teaching course should contact ESTRO:
Viviane Van Egten
E-mail: vvanegten@estro.org
Tel : +32 2 775 93 44 Fax : +32 2 779 54 94

ACCOMMODATION
To book you room, please download the accommodation form from the ESTRO website:
www.estro.org/school

RADIATION ONCOLOGIST · MEDICAL PHYSICIST · RADIOBIOLOGIST · RADIATION THERAPIST · OTHER SPECIALIST



Educational Workshop

Real-time image guided HDR
brachytherapy
for prostate cancer

St James's Institute of Oncology,
Leeds, UK, 6-7 December 2016

St James's
Institute of Oncology

BrachyAcademy
Supported by Elekta

ELSEVIER

BRACHYTHERAPY

Brachytherapy 11 (2012) 20–32

American Brachytherapy Society consensus guidelines for high-dose-rate prostate brachytherapy

Yoshiya Yamada[1,*], Leland Rogers[2], D. Jeffrey Demanes[3], Gerard Morton[4], Bradley R. Prestidge[5], Jean Pouliot[6], Gil'ad N. Cohen[7], Marco Zaider[7], Mihai Ghilezan[8], I-Chow Hsu[6]

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[4]*Department of Radiation Oncology, University of Toronto, Sunnybrook Health Sciences Centre, Toronto, Ontario*
[5]*South Texas Radiation Therapy Associates, Memorial Hermann – Southwest Hospital, Houston, TX*
[6]*Department of Radiation Oncology, Helen Diller Family Comprehensive Cancer Center, San Francisco, CA*
[7]*Department of Medical Physics, Memorial Sloan Kettering Cancer Center, New York, NY*
[8]*Department of Radiation Oncology, William Beaumont Hospital, Royal Oak, MI*

ABSTRACT

PURPOSE: A well-established body of literature supports the use of high-dose-rate (HDR) brachytherapy as definitive treatment for localized prostate cancer. Most of the articles describe HDR as a boost with adjuvant external beam radiation, but there is a growing experience with HDR monotherapy.

METHODS AND MATERIALS: The American Brachytherapy Society has convened a group of expert practitioners and physicists to develop guidelines for the use of HDR in the management of prostate cancer. This involved an extensive literature review and input from an expert panel.

RESULTS: Despite a wide variation in doses and fractionation reported, HDR brachytherapy provides biochemical control rates of 85–100%, 81–100%, and 43–93% for low-, intermediate-, and high-risk prostate cancers, respectively. Severe toxicity is rare, with most authors reporting less than 5% Grade 3 or higher toxicity. Careful attention to patient evaluation for appropriate patient selection, meticulous technique, treatment planning, and delivery are essential for successful treatment.

CONCLUSION: The clinical outcomes for HDR are excellent, with high rates of biochemical control, even for high-risk disease, with low morbidity. HDR monotherapy, both for primary treatment and salvage, are promising treatment modalities.

Keywords: High-dose-rate brachytherapy; Prostate cancer; American Brachytherapy Society; Guidelines

Introduction

There is mounting evidence that the outcome of patients with localized prostate cancer is related directly to local tumor control, even for patients with high-risk features (1). For example, the risk of distant metastasis is closely tied to local control (2). Dose-escalation strategies, particularly with intermediate- and high-risk prostate cancer, have improved local control, and higher doses of radiation, whether with brachytherapy, external beam radiation, or a combination, have consistently demonstrated improved outcomes (2–11).

High-dose-rate (HDR) brachytherapy is a vehicle for absolute and radiobiologic dose escalation that has resulted in high tumor control and low toxicity rates. As with all advanced technology, meticulous treatment planning and carefully executed methods are essential to the accurate delivery of high-dose radiation to complex volumes such as the prostate and seminal vesicles while avoiding excessive dose to the rectum, bladder, and urethra. The following

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GEC/ESTRO recommendations

GEC/ESTRO recommendations on high dose rate afterloading brachytherapy for localised prostate cancer: An update

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Prostate cancer
Guidelines

ABSTRACT

Background: HDR afterloading brachytherapy (HDRBT) for prostate cancer is now established as an effective technique to achieve dose escalation in the radical treatment of localized prostate cancer. The previous guidelines published in 2005 from GEC ESTRO and EAU have been updated to reflect the current and emerging roles for HDRBT in prostate cancer. *Patients and method:* The indications for HDRBT in dose escalation schedules with external beam are wide ranging with all patients having localized disease eligible for this technique. Exclusion criteria are few encompassing patients medically unfit for the procedure and those with significant urinary outflow symptoms. *Results:* Recommendations for patient selection, treatment facility, implant technique, dose prescription and dosimetry reporting are given. *Conclusions:* HDRBT in prostate cancer can be practiced effectively and safely within the context of these guidelines with the main indication being for dose escalation with external beam. HDRBT used alone is currently under evaluation and its role in focal treatment and recurrence will be areas of future development.
Radiotherapy and Oncology 107 (2013) 325–332

Brachytherapy using both permanent seed implants and temporary high dose rate (HDR) afterloading techniques play an important role in the treatment of localised and locally advanced prostate cancer. In recent years there has been a substantial increase in the use of HDR brachytherapy (HDRBT) most commonly as a dose escalating boost delivered in combination with external beam radiotherapy. There is also increasing experience in HDRBT used alone to deliver a radical dose of radiation. Recommendations on temporary transperineal prostate brachytherapy, were first published on behalf of the GEC/ESTRO-EAU Prostate Brachytherapy Group (PROBATE) in+ 2005 [1]; an update of those recommendations is now presented in this paper.

HDRBT has several advantages:

- The use of image guided catheter or needle placement enables accurate implantation which can be extended to include extracapsular disease and seminal vesicles
- It is possible to individualise the source positions over the full length of the prostate based on a defined planning target volume and organs at risk. Dose distribution optimisation by inverse planning enables highly conformal dose delivery.
- The fixation of the prostate by the implant and rapid radiation delivery minimises the problems of target and OAR movement.
- The use of high doses per fraction has a biological dose advantage for tumors with a low alpha beta ratio of which prostate is a common example [2].
- Temporary brachytherapy (BT) using a stepping source does not need any source preparation time and there is good radiation protection for personnel.
- The use of a single source for all patients using a multipurpose facility makes HDRBT highly cost effective.

Disadvantages of HDRBT include the use of a fractionated schedule which results in more work load per patient and logistic issues related to quality assurance across several radiation exposures. To allow relevant comparative information on clinical results, it is essential that patient data and treatment parameters are described in a similar way for permanent and for temporary implants as defined in these guidelines.

Developments in remote afterloading brachytherapy (temporary BT) technology and dedicated treatment planning systems as well as transrectal ultrasonography have resulted in highly sophisticated tools being available in the field of interstitial

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E-mail address: peterhoskin@nhs.net (P.J. Hoskin).
[1] On behalf of the GEC ESTROPROBATE and BRAPHYQS groups.

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Core qualities of the team

- Time efficient and competent
- Poor initial needle placement can often be optimised sufficiently to still produce an acceptable plan meeting all dose constraints
- Inaccurate needle reconstruction, inaccurate tip recognition, excessive dwell times lead to poor plans with potential hot spots
- Biggest limitation with real-time HDR is TIME
  - Time and motion studies throughout the procedure. Adapt a lean model
  - Inherent qualities of “quick” planners/implanters
    - Better communicators, intuitive, decisive
  - Off line training +++
  - Challenge anaesthetic “rituals”

Quality assurance

- Less operator dependent than LDR but still liable to systematic and random errors
- Less training/experience required to deliver HDR boost
- Do teams delivering HDR monotherapy needed additional training ?
- Test cases ?
- Agreed mentorship of early cases ?
- Minimum no. of cases per clinician to maintain competency

Clinical Oncology
The Royal College of Radiologists

Oncology

The role and development of afterloading brachytherapy services in the United Kingdom

Board of the Faculty of Clinical Oncology
The Royal College of Radiologists

Clinical Oncology
The Royal College of Radiologists

Oncology

Quality assurance practice guidelines for transperineal LDR permanent seed brachytherapy of prostate cancer

Board of the Faculty of Clinical Oncology
The Royal College of Radiologists

Conclusion

- HDR like LDR requires a multi-professional team
- Need to recognise the individual needs of the team and address training accordingly
- In-house training within large teams works well
- In the future stand alone HDR brachytherapy teams may develop and need to consider how such teams can be supported in their training
    - Training courses
    - Mentorship
- Is there a need for an HDR prostate brachytherapy QA document