Prostate Cancer - Diagnosis and Treatment

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MD. MCh. FRCS(Urol)

28th September 2024

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THIS IS MODERN MEDICINE

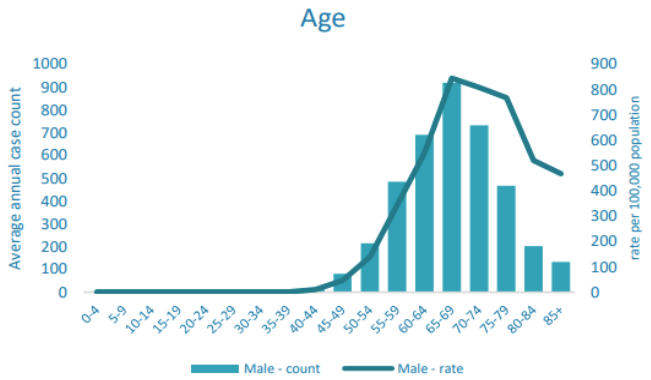
Introduction

Prostate Cancer is the most prevalent cancer in men in Ireland

1 in 8 men diagnosed in their lifetime

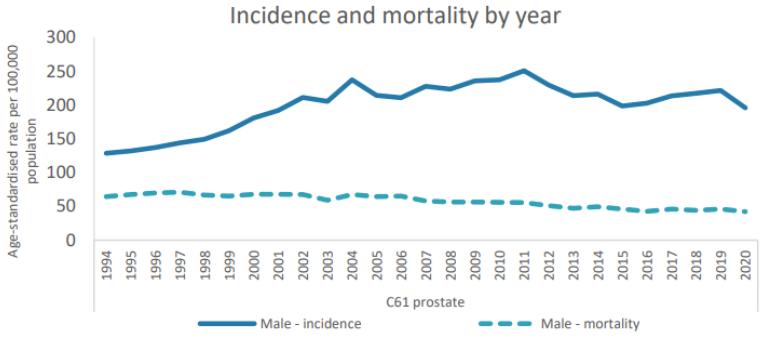
30% of all newly diagnosed cancer in men

4000 cases diagnosed yearly in Ireland- Increasing



Diagnosis: Optimise Screening and Minimise over-detection

Treatment: Oncological and Functional Outcome



Prostate Cancer Diagnosis

- PSA blood test
- **Prostate Biomarkers**
- **Radiological Investigation**
- **Prostate Biopsy**

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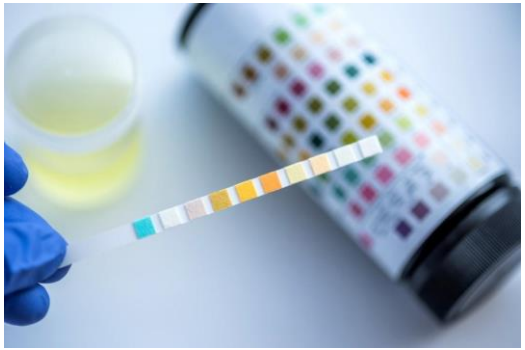
PSA Blood Test

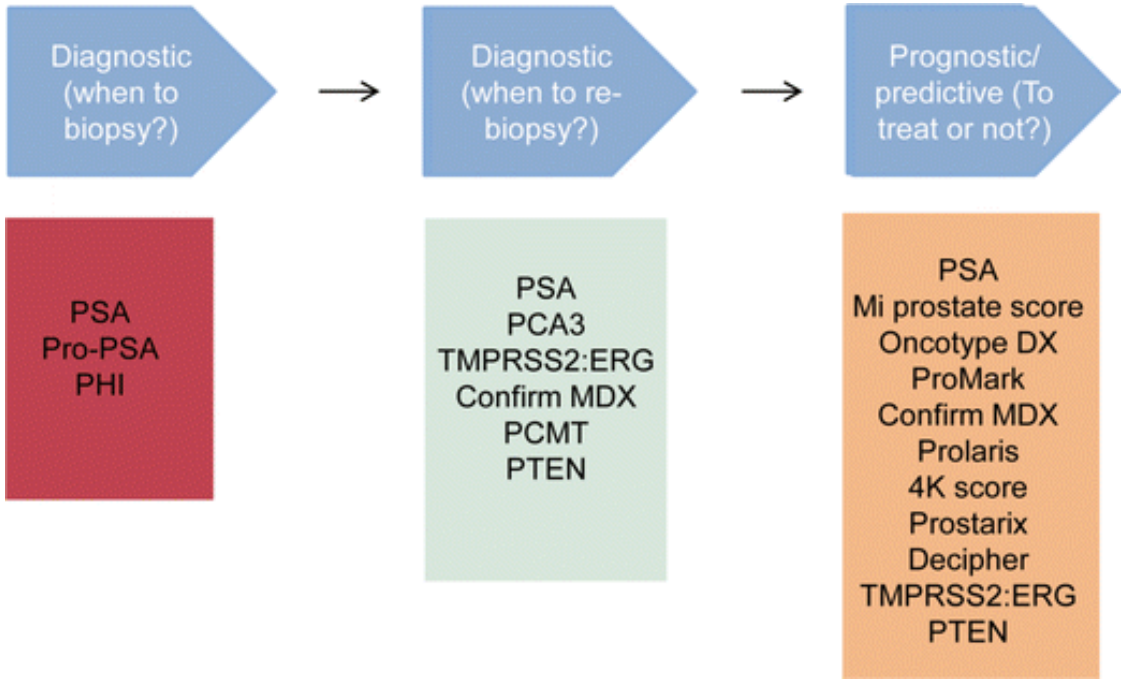
Prostate Specific and NOT Prostate cancer specific

Raised age related PSA **and/or** suspicious DRE	
Under 50 years of age	≥2µg/L
50-59	≥3µg/L
60-69	≥4µg/L
70+	≥5µg/L



Prostate Biomarkers

- Blood Based
- Urine Based
- Tissue Based
- Semen Based



- Generate a Percentage or Risk Score

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Prostate Biomarkers

Guidelines

5.2.5. Blood and urine biomarkers

Urine and serum biomarkers as well as tissue-based biomarkers have been proposed for improving detection and risk stratification of PCa patients, potentially avoiding unnecessary biopsies. However, further studies are necessary to validate their efficacy [200].

• an additional serum, urine biomarker test	Weak

- Use as an adjunct
- Risk stratify patient and aid in decision making to have prostate biopsy

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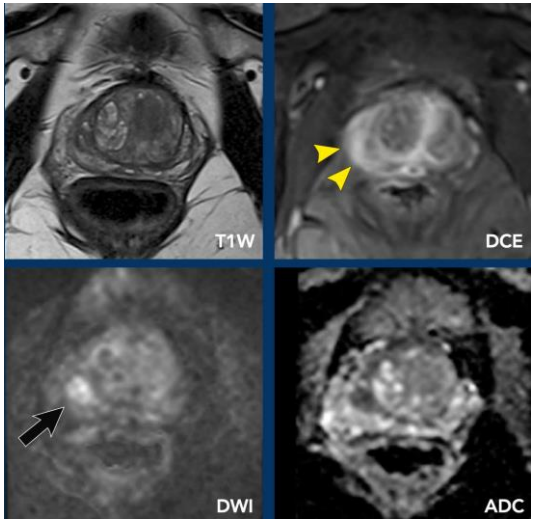
Radiological Investigation- Multiparametric MRI

Multiparametric MRI

- Improve diagnosis of clinically significant prostate cancer and avoid biopsy in around 30% of men
- 10 % False negative (PROMIS)

In patients with suspected PCa, PI-RADS v2.1 is configured to improve detection, accurately localise, characterise and risk stratify lesions in treatment-naïve prostate glands.



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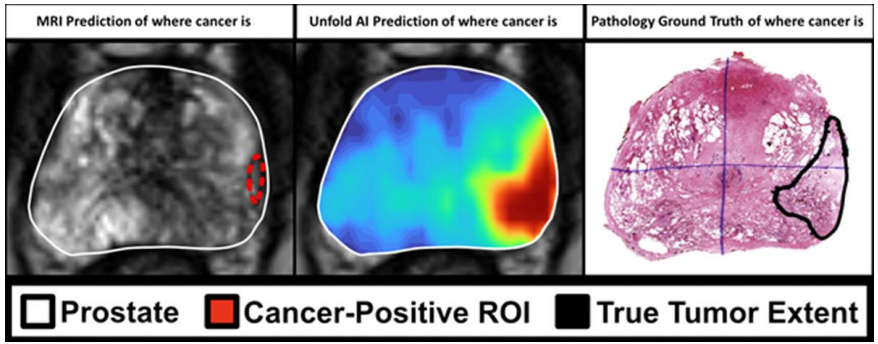
Radiological Investigation - Artificial Intelligence



Interpretation

An AI system was superior to radiologists using PI-RADS (2.1), on average, at detecting clinically significant prostate cancer and comparable to the standard of care. Such a system shows the potential to be a supportive tool within a primary diagnostic setting, with several associated benefits for patients and radiologists. Prospective validation is needed to test clinical applicability of this system.

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Oncology

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ARTICLES · Volume 25, Issue 7, P879-887, July 2024 · Download Full Issue

Artificial intelligence and radiologists in prostate cancer detection on MRI (PI-CAI): an international, paired, non-inferiority, confirmatory study

Anindo Saha, MSc [a,b,*] · Joeran S Bosma, MSc [a,*] · Jasper J Twilt, MSc [b,*] · Prof Bram van Ginneken, PhD [a] · Prof Anders Bjartell, MD [d,e] · Prof Anwar R Padhani, MD [f] · Prof David Bonekamp, MD [g] · Prof Geert Villeirs, MD [h] · Prof Georg Salomon, MD [i] · Prof Gianluca Giannarini, MD [j] · Prof Jayashree Kalpathy-Cramer, PhD [k] · Prof Jelle Barentsz, MD [l] · Prof Klaus H Maier-Hein, PhD [m,n] · Mirabela Rusu, PhD [o] · Prof Olivier Rouvière, MD [p,q] · Roderick van den Bergh, MD [r] · Prof Valeria Panebianco, MD [s] · Veeru Kasivisvanathan, MD [t] · Prof Nancy A Obuchowski, PhD [u] · Derya Yakar, MD [v,w] · Mattijs Elschot, PhD [x,y] · Jeroen Veltman, MD [z,aa] · Prof Jurgen J Fütterer, MD [b] · Maarten de Rooij, MD [c,†] · Prof Henkjan Huisman, PhD [a,x,†] on behalf of the PI-CAI consortium [‡] Show less

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Prostate Biopsy

- Transrectal Prostate Biopsy
- Transrectal and Targeted Prostate Biopsy
- Transperineal Prostate Biopsy under GA
- Transperineal and Targeted Prostate Biopsy under LA

Prostate Biopsy

Targeted Transperineal biopsy

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PROSTATE CANCER – EDITOR'S CHOICE · Volume 86, Issue 1, P61-68, July 2024

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Transperineal Versus Transrectal Magnetic Resonance Imaging–targeted and Systematic Prostate Biopsy to Prevent Infectious Complications: The PREVENT Randomized Trial

Jim C. Hu [a] · Melissa Assel [b] · Mohamad E. Allaf [c] · Behfar Ehdaie [d] · Andrew J. Vickers [b] · Andrew J. Cohen [c] · Benjamin T. Ristau [e] · David A. Green [f] · Misop Han [c] · Michael E. Rezaee [c] · Christian P. Pavlovich [c] · Jeffrey S. Montgomery [g] · Keith J. Kowalczyk [h] · Ashley E. Ross [i] · Shilajit D. Kundu [i] · Hiten D. Patel [i] · Gerald J. Wang [f] · John N. Graham [j] · Jonathan E. Shoag [k] · Ahmed Ghazi [c] · Nirmish Singla [c] · Michael A. Gorin [l] · Anthony J. Schaeffer [i] · Edward M. Schaeffer [i] Show less

UROLOGY

Royal Australasian College of Surgeons

Outpatient transperineal prostate biopsy under local anaesthesia is safe, well tolerated and feasible

Anne Hong [*†] Sarah Hemmingway,[‡] David Wetherell,[§] Brendan Dias[§¶] and Homayoun Zargar[†§¶]

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‡Faculty of Business, Law and Arts, Southern Cross University, Lismore, New South Wales, Australia
§Department of Urology, Western Health, Melbourne, Victoria, Australia and
¶Department of Surgery, University of Melbourne, Melbourne, Victoria, Australia

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Treatment- For Localized Prostrate Cancer

Robotic Assisted Radical Prostatectomy

Radical Radiotherapy

Brachytherapy

Focal Therapy

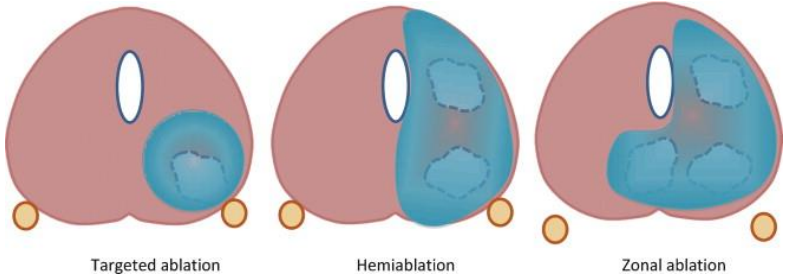
"You cannot solve a problem with the same mind that created it"

Albert Einstein

Focal Therapy for Prostate Cancer

Minimally Invasive Surgical Treatment for prostate cancer

Treat only areas of the prostate gland with proven cancer and preserve remaining of prostate tissue



High Intensity Focused Ultrasound

Cryotherapy

Brachytherapy

Interstitial Photothermal Laser

Irreversible Electroporation

Radiofrequency Ablation

Thermal Water Vapour Therapy

Injectable drugs

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Focal Therapy

Prostate Cancer is Multifocal

We cannot treat only the malignant part and preserve the rest of the organ

Poor oncological outcome

Not accepted by international guidelines

Treatment side effects are no different

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PROSTATE CANCER IS MULTIFOCAL: Focal Therapy has no role

Focal Therapy

Tech Urol. 1999 Sep;5(3):139-42.

Predictability and significance of multifocal prostate cancer in the radical prostatectomy specimen.

Djavan B[1], Susani M, Bursa B, Basharkhah A, Simak R, Marberger M.

Author information

1 Department of Urology, University of Vienna, Austria.

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Nature. 2015 April 16; 520(7547): 353–357. doi:10.1038/nature14347.

The Evolutionary History of Lethal Metastatic Prostate Cancer

Gunes Gundem[1], Peter Van Loo[1,2,3], Barbara Kremeyer[1], Ludmil B. Alexandrov[1], Jose M.C. Tubio[1], Elli Papaemmanuil[1], Daniel S. Brewer[4], Heini M.L. Kallio[5], Gunilla Högnäs[5], Matti Annala[5], Kati Kivinummi[5], Victoria Goody[1], Calli Latimer[1], Sarah O'Meara[1], Kevin J. Dawson[1], William Isaacs[6], Michael R Emmert-Buck[7], Matti Nykter[5], Christopher Foster[#8,16], Zsofia Kote-Jarai[9], Douglas Easton[#10,16], Hayley C. Whitaker[11], ICGC Prostate Group[12], David E. Neal[11,13,16], Colin S. Cooper[9,4,16], Rosalind A. Eeles[9,14,16], Tapio Visakorpi[5], Peter J. Campbell[1], Ultan McDermott[#1,16,*], David C. Wedge[#1,*], and G. Steven Bova[#5,16,*]

ORIGINAL ARTICLE

Do Adenocarcinomas of the Prostate With Gleason Score (GS) ≤ 6 Have the Potential to Metastasize to Lymph Nodes?

Hillary M. Ross, Oleksandr N. Kryvenko,† Janet E. Cowan,‡ Jeffry P. Simko,‡§ Thomas M. Wheeler,‖ and Jonathan I. Epstein, MD*¶#*

Multifocal: 70% patients with Prostate Cancer

PELICAN study: Patients with multiple metastases were almost always monoclonal originating from the index lesion (>90% cases)

Gleason 6 Disease:

- 0% Metastases
- 0% Mortality

Secondary low-grade lesions are:

- Rarely lethal or less likely to metastasize
- Index lesion- 80% IR/HR disease
- Secondary lesion- 80% LR disease

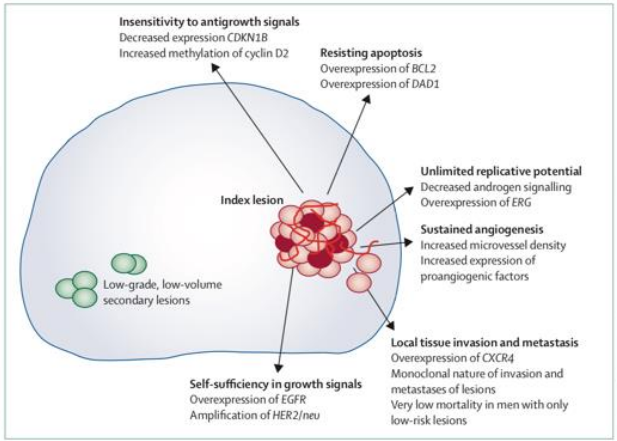
Focal Therapy

We cannot treat only the malignant part and preserve the rest of the organ: Focal Therapy will not work

The question is not new in the cancer field

Breast cancer	Lumpectomy
Thyroid cancer	Hemithyroidectomy
Kidney	Partial nephrectomy
Liver	Partial resection

In fact, almost all other cancers are multifocal



This is not really a new concept in the field of cancer surgery

ORIGINAL ARTICLE

Twenty-Year Follow-up of a Randomized Study Comparing Breast-Conserving Surgery with Radical Mastectomy for Early Breast Cancer

Umberto Veronesi, M.D., Natale Cascinelli, M.D., Luigi Mariani, M.D., Marco Greco, M.D., Roberto Saccozzi, M.D., Alberto Luini, M.D., Marisel Aguilar, M.D., and Ettore Marubini, Ph.D.

Partial vs. radical nephrectomy and the risk of all-cause mortality, cardiovascular, and nephrological outcomes

Rodney H. Breau, MD[1]; Anil Kapoor, MD[2*]; Danielle M. Nash, PhD[3]; Neal Rowe, MD[1]; Octav Cristea, MD[1]; Garson Chan, MD[4]; Stephanie N. Dixon, PhD[3]; Eric McArthur, MSc[3]; Camilla Tajzler[2]; Ravi Kumar, MD[1]; Christopher Vinden, MD[4]; Jonathan Izawa, MD[4]; Amit X. Garg, MD[3,5]; Patrick P. Luke, MD[4]*

[1]The Ottawa Hospital Research Institute, Division of Urology, University of Ottawa, Ottawa, ON, Canada; [2]McMaster University, Hamilton, ON, Canada; [3]ICES; [4]Divisions of Urology and General Surgery, Department of Surgery Western University, London, ON, Canada; [5]Division of Nephrology, Department of Medicine, Western University, London, ON, Canada

*Co-first authors

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Focal Therapy

Focal Therapy has poor oncological outcome

Prostate Cancer

Cancer Control Outcomes Following Focal Therapy Using High-intensity Focused Ultrasound in 1379 Men with Nonmetastatic Prostate Cancer: A Multi-institute 15-year Experience

Deepika Reddy [a,b,], Max Peters [c], Taimur T. Shah [a,b], Marieke van Son [c], Mariana Bertoncelli Tanaka [b], Philipp M. Huber [d], Derek Lomas [e], Arnas Rakauskas [f], Saiful Miah [g], David Eldred-Evans [a], Stephanie Guillaumier [h,i], Feargus Hosking-Jervis [a], Ryan Engle [a], Tim Dudderidge [j], Richard G. Hindley [k,l], Amr Emara [k,x], Raj Nigam [m,n], Neil McCartan [h,i], Massimo Valerio [f], Naveed Afzal [o], Henry Lewi [p], Clement Orczyk [h,i], Chris Ogden [q], Iqbal Shergill [r], Raj Persad [s], Jaspal Virdi [t], Caroline M. Moore [h,i,u,v],*

European Association of Urology

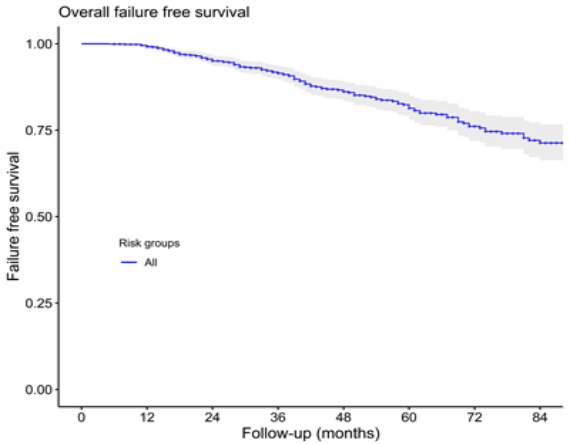
Platinum Priority – Collaborative Review – Prostate Cancer

Editorial by Olivier Rouvière, Jean-Yves Chapelon, Sébastien Crouzet and Albert Gelet on pp. 35–36 of this issue

New and Established Technology in Focal Ablation of the Prostate: A Systematic Review

Massimo Valerio [a,b,c,†,], Yannick Cerantola [c,†], Scott E. Eggener [d], Herbert Lepor [e], Thomas J. Polascik [f], Arnauld Villers [g], Mark Emberton [a,b]*

[a] Division of Surgery and Interventional Science, University College London, London, UK; [b] Department of Urology, University College London Hospitals NHS Foundation Trust, London, UK; [c] Department of Urology, Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland; [d] Section of Urology, University of Chicago, Chicago, IL, USA; [e] Department of Urology, New York University School of Medicine, New York, NY, USA; [f] Division of Urology, Duke University Medical Center, Durham, NC, USA; [g] Department of Urology, Lille University Medical Center, Lille University, France



Cancer Survival: 99-100%

Infield Recurrence rate: 20%

Salvage Treatment: 5-10%

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Focal Therapy

International Guidelines do not support Focal Therapy

- UK- NICE GUIDELINES 2023

NICE National Institute for Health and Care Excellence

NICE guidance

Focal therapy using high-intensity focused ultrasound for localised prostate cancer

1 Recommendations

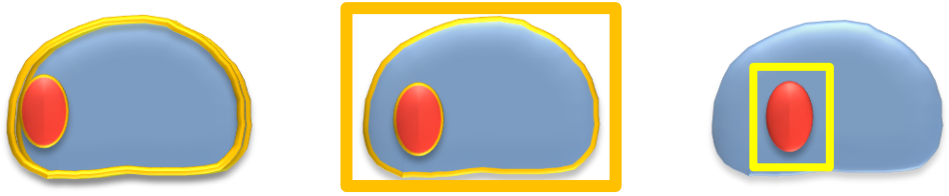
1.1 Evidence on the safety of focal therapy using high-intensity focused ultrasound for localised prostate cancer is adequate, but evidence on its efficacy is limited. Therefore, this procedure should only be used with special arrangements for clinical governance, consent, and audit or research. Find out what special arrangements mean on the NICE interventional procedures guidance page.

1.2 Clinicians wanting to do high-intensity focused ultrasound for localised prostate cancer should:

- Inform the clinical governance leads in their healthcare organisation.
- Give people (and their families and carers, as appropriate) clear written information to support shared decision making, including NICE's information for the public. Use the recommendations in NICE's guideline on diagnosing and managing prostate cancer for information on treatment options and decision support.
- Ensure that people (and their families and carers, as appropriate) understand the procedure's safety and efficacy, and any uncertainties about these.

Focal Therapy- Outcome Comparison

Side effects are similar!!



	Radical Surgery	Radical Radiotherapy	Focal Therapy (2 sessions)
Urinary issues	5%	10-20%	1%
Incontinence	10-25%	5%	1-2%
Impotence	40-60%	50-60%	5-15%
Ejaculation	0%	0%	60%
Rectal toxicity	0.1%	5-15%	0.1%
Salvage at 5-10 years	10-15%	10-15%	5-10%
Survival at 5-10 years	99%	99%	99%

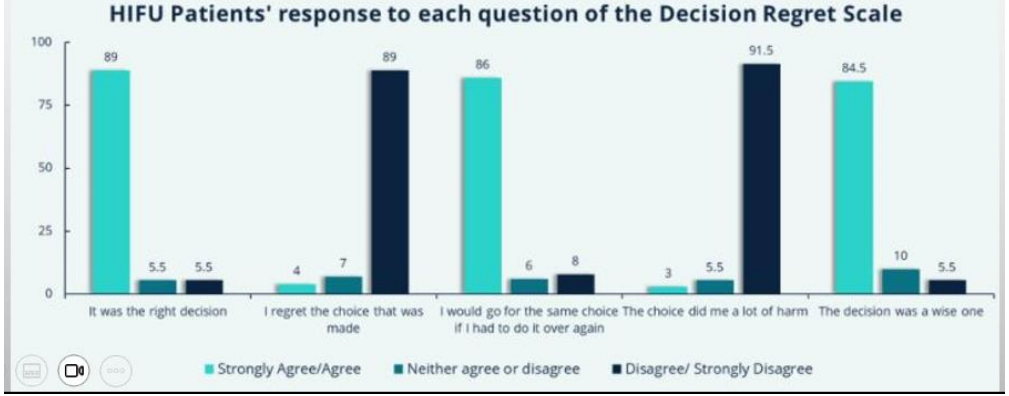
Focal Therapy- Patient Perspective

Patient-reported Satisfaction and Regret Following Focal Therapy for Prostate Cancer: A Prospective Multicenter Evaluation

Ghoreifi, A., Kaneko, M., Peretsman, S, et al. | European Urology Open Science| February 2023

N = 143 patient respondents|3 validated questionnaires

during a post-operative period of 26-68 months



Men with 12 years life expectancy:

Severe urine Leak: + 2 years life

Erectile dysfunction: + 6 months life

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Advantages of Focal Therapy over Radical Treatment

- Lowest Risk of Erectile Dysfunction
- Lowest Risk of Urinary Incontinence
- Lowest Risk of Urinary Issues (Lower Urinary Tract Symptoms)
- Lowest Risk of Rectal Toxicity
- Highest chance to preserve Ejaculation

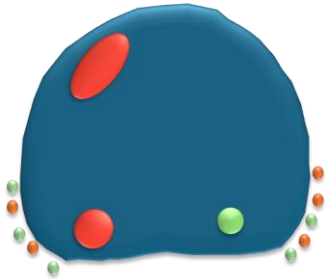
Candidates for Focal Therapy

Clinical

- PSA </=20ng/ml
- Radiological T3aN0M0
- Lesion no more than one quadrant on MRI

Histology

- Gleason 7 (4+3 or 3+4)



Contralateral lobe – Secondary Lesion

Up to 5mm of Gleason 3+3

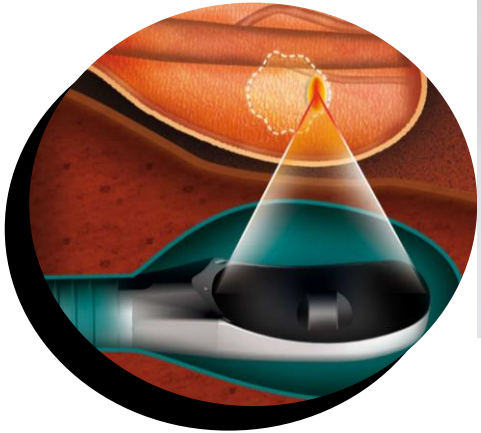
40% of patients:
Suitable candidate for Focal Therapy

90% of patient:
Choose Focal Therapy over Radical Treatment

HIFU: High Intensity Focused Ultrasound

sonablate
HIFU

Delivery of high intensity ultrasound energy- Lead to a Rapid rise in intracellular temperature and thus leading to instant cell death, while preserving surrounding tissues



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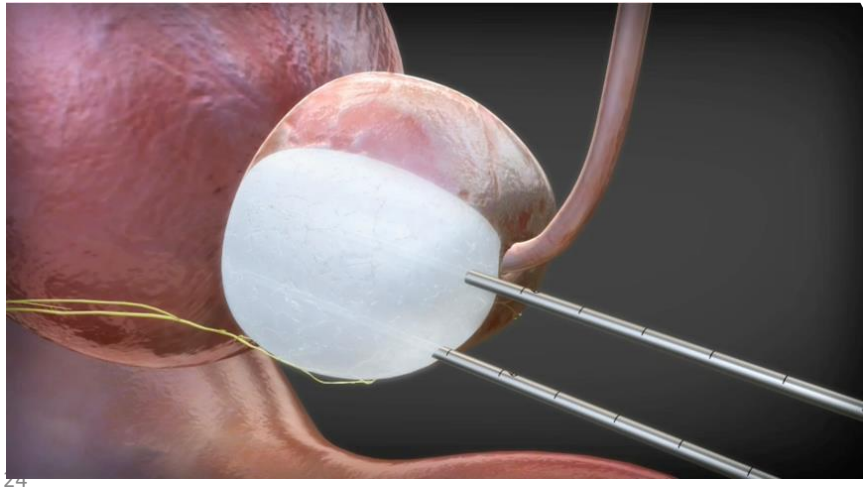
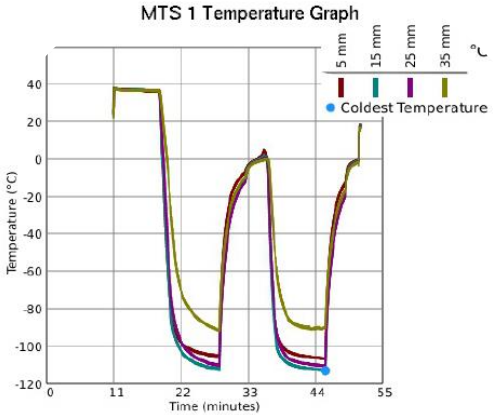
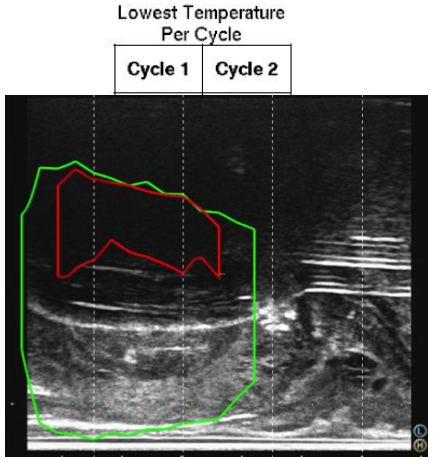
Cryotherapy

Delivery of freezing and thawing gases directly into area of diagnosed prostate cancer leading to direct cellular injury and cell death







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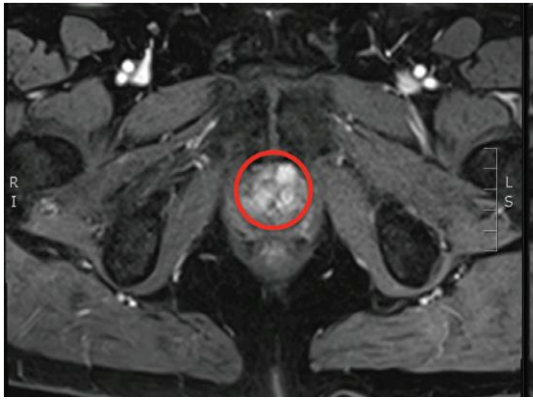
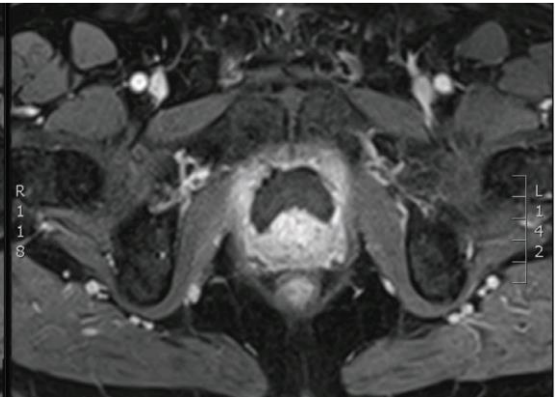
Focal Therapy- Post Treatment Effect and Follow up





Follow-up Protocol

- Day case or Overnight stay
- TWOC day 7-10
- Review with PSA 3 months
- OPD at 12 months with MRI
- 6 monthly PSA for year 1-5 post op
- Yearly PSA and Urology review for initial 10 years after treatment
- Any PSA rise triggers repeat MRI +/- Biopsy

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- Implementation of a new hub for prostate diagnostics
- The Beacon Prostate Diagnostic Centre
- Launch in January 2025

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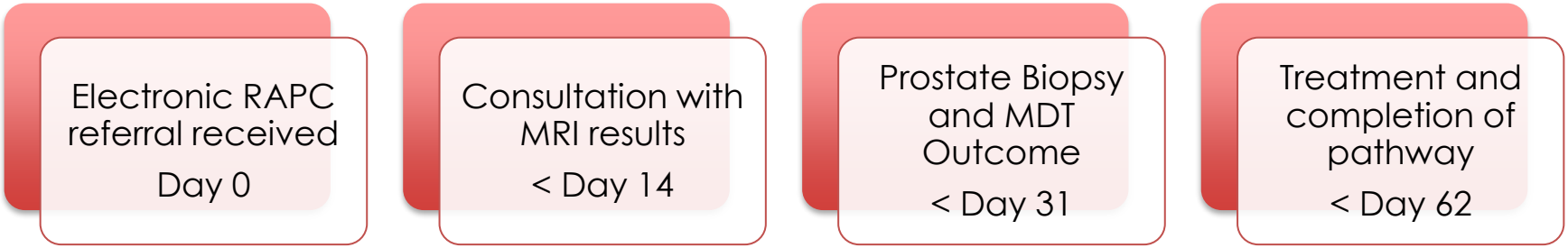
Beacon Prostate Diagnostic Centre

1) Beacon Rapid Access Prostate Clinics
2) Beacon Focal Therapy Unit



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In Summary

Prostate Cancer- Diagnosis

Improved diagnostic tools

Dynamic and evolving field

Early assessment leads to treatment with curative intent

Prostate Cancer Treatment

Focal Therapy :

Has good Oncological outcome

Has better functional outcome

Adapted by International guidelines

Key Messages: Beacon Prostate Diagnostic Centre

Beacon Rapid Access Prostate Clinic

- Patient-Centered Care
- Easy Access
- Prompt Investigations & Consultations
- Timely Diagnosis & Treatment

Focal Therapy Unit

- First in the Republic of Ireland
- Expert Counselling
- Bespoke Management

Thank you

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