# Triage MRI followed by MRI-targeted biopsy for men with suspected prostate cancer: a decision analysis

***Sarah Willis[1], Hashim Ahmed[2], Caroline Moore[2], Mark Emberton[2], Jan van der Meulen[1]***

[1] London School of Hygiene and Tropical Medicine [2] University College London, UK

## Introduction

Evidence of the benefit of treating prostate cancer with radical treatment, such as surgery, is limited[1]. Improving the selection of patients for radical treatment may be the key to improving patient outcomes.

One such approach could be to image all men with MRI and carry out an MRI-targeted biopsy in those with an MRI lesion. Consequently, patients without suspicion of significant cancer on MRI would avoid a prostate biopsy.

Despite annually diagnosing over 40,000 men with prostate cancer in the UK, little is known about the clinical effectiveness of the current diagnostic approach and how this might compare to the alternative of using imaging upfront.

**Aim: To compare MRI for all, followed by MRI-Targeted biopsy if positive, to TRUS biopsy for all to diagnose prostate cancer**

## Methods

We used a decision tree to draw together the best available evidence in order to compare a simplified version of the standard diagnostic pathway (TRUS for all) with a new pathway (MRI for all, then MRI-targeted biopsy if positive). We consider the prevalence of clinically significant prostate cancer (conservatively defined as a cancer volume of ≥0.2cc) to be 50% based on a multi-centre retrospective analysis of template prostate mapping biopsy data.

Diagnostic data for prostate cancer biopsies is limited; the gold standard, pathological data, is only available for men who went on to have surgery. Template mapping (TPM) biopsy is often used as a reference test in the absence of pathological data.

We assume MRI-targeted biopsy to be as good as but not better than TRUS at correctly identifying men with clinically insignificant disease or no cancer. All test accuracy data used is listed below.

**Table 1 – Test accuracy input data**

| Study | Patient population | Index Test | Reference test | Sensitivity | Specificity |
|---|---|---|---|---|---|
| Lecornet 2012[2] | 96 men who had undergone surgery for bladder cancer and were found to have prostate cancer | Simulated TRUS | pathology | 0.5 | 0.9 |
| Arumainayagam 2012[3] | 64 UK men; 51 of whom had a previous cancer diagnosis on TRUS. | MRI | 5mm-TPM | 0.9 | 0.4 |
| Kasivisvanathan 2012[4] | 182 men; 78 biopsy naive, 32 prior –ve and 72 had a prior +ve | MRI-TB | 20 sector-TPM | 0.75 | *0.9 (assumed)* |

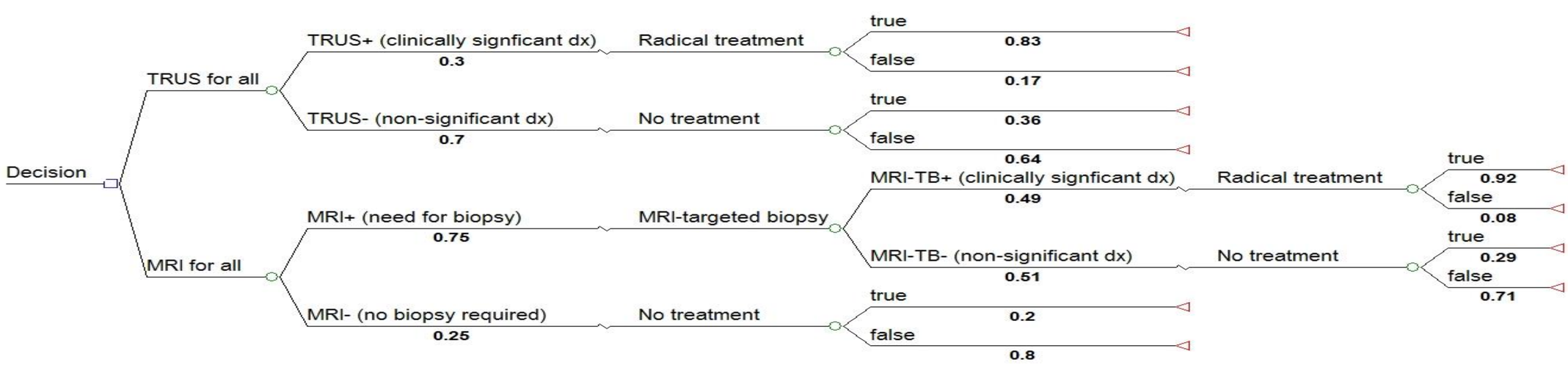
## Results

Given a prevalence of clinically significant prostate cancer of 50%, the use of a triage MRI followed by MRI-targeted biopsy in a hypothetical cohort of 1000 men could avoid biopsies in 250 men compared to the current pathway.

Given the assumptions in our base case, MRI followed by MRI-targeted biopsy will identify 338 men with significant prostate cancer correctly ***[= prevalence*sens_MRI*sens_MRITB]*** and 30 men erroneously as having prostate cancer ***[= (1-prevalence)*(1-spec_MRI)*(1-spec_MRITB)]*.**

Corresponding figures for TRUS biopsy are 250 men identified correctly and 50 men identified erroneously as having cancer.

**Figure 1 – Structure of the decision tree**




## Conclusion:

**By using MRI as a triage test, a quarter of all men who enter the current pathway could avoid a prostate biopsy.**

**MRI followed by MRI-TB dominates the current strategy of TRUS in all men; in a hypothetical cohort of 1000 men with suspected prostate cancer it will correctly identify 88 more men with significant cancer and 20 more men with no cancer.**

**Further studies are needed to quantify the relative costs and quality-adjusted life expectancy before it can be concluded that the new strategy is worth adopting.**

**References**

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