Three-dimensional Cancer Risk Score Mapping with MRI to Improve Early Detection and Individualised Treatment Planning for Men with Prostate Cancer

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PROSTATE CANCER
- Growth of abnormal cells in the prostate gland
- Multifocal disease
- Often asymptomatic

UK STATISTICS
- Lifetime risk
  - > 45,000 Cases/year
  - > 11,000 Deaths/year

MRI TECHNICAL CHALLENGES
- Images are two-dimensional and lack fine detail: could miss small cancers
- Long and complex acquisition with multiple, separate images: inefficient
- Relies on radiology expertise to detect and score cancer: subjective diagnosis

We designed a novel, efficient, optimised MRI method to address these challenges

- Single, robust, “push-button” MRI scan
- Simultaneously encodes morphological & functional tissue information in 3D
  - More accurate, faster data
- Extracts quantitative MRI biomarkers “T₂” and “ADC”
- Encode key cancer features
- Apply advanced image processing algorithm
  - Patient-specific and objective cancer risk score map

3D CANCER RISK SCORE MAP

Patient-specific and objective cancer risk score map

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MRI CANCER RISK SCORE MAP

Aggressive cancer
Healthy prostate

IMPART
- To improve patient reporting workflows
- To help NHS towards personalised precision diagnostic and treatment planning
- Applications:
  - Diagnosis
  - Biopsy-guidance
  - Treatment planning

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