MEDICAL COLLEGE OF WISCONSIN
Office of TECHNOLOGY DEVELOPMENT

Patents to Patients®

Predictive Mapping of Prostate Cancer Grade by MRI

MCW Case 1799

Stage of Development:

Human clinical research data

Intellectual Property:

Patent application
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Background and Description of the Invention

One in six men develop prostate cancer. Advances in magnetic resonance imaging (MRI) have shown promise for detecting prostate tumors, yet lack sensitivity and specificity for accurately predicting the underlying tumor grade. The Gleason Score is a well-established pathology grading scale that predicts patient prognosis after biopsy or surgery. We have pioneered a new technique that combines radiology and pathology with machine learning, which allows us to virtually diagnose Gleason Score using diagnostic information from previous surgical patients. This method generates 'Virtual Gleason Score' images and pathology feature maps, such as epithelium density, that predict the status of prostate cancer prior to biopsy or surgery.

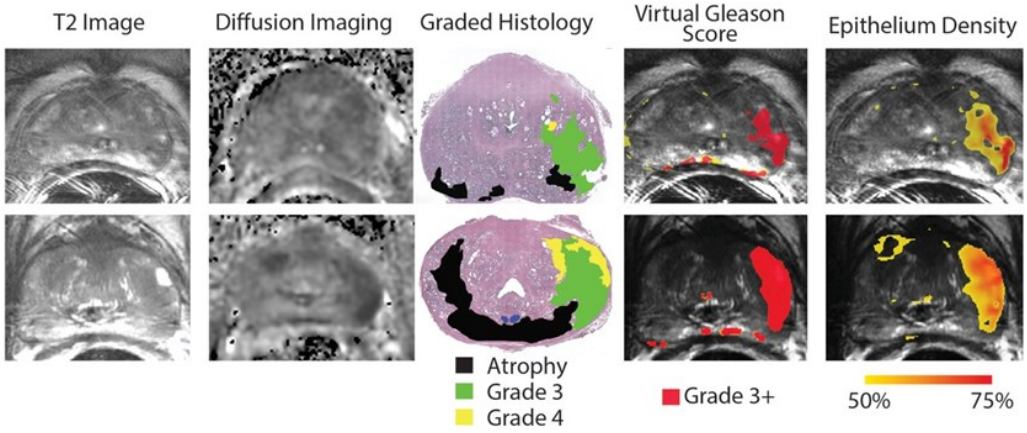

Figure: Comparison of traditional T2 and diffusion imaging **(Left)** and the final graded histology **(Center)**. Virtual Gleason Score images and predictive maps of epithelium density **(Right)** highlight regions diagnosed as high-grade cancer.

Key Advantages

Diagnostic tests currently rely on expensive and invasive biopsies and unreliable prostate specific antigen (PSA) tests. Our technique of predictive mapping of prostate cancer grade will allow clinicians to determine tumor stage quantitatively and noninvasively. Our algorithm relies on a single MRI scan that takes only ten minutes to acquire. We expect this technology to improve diagnostic accuracy of biopsies by providing viable targets, as well as improve radiation therapy guidance. We expect this to ultimately improve patient prognosis and reduce the number of unnecessary biopsy and surgical procedures.