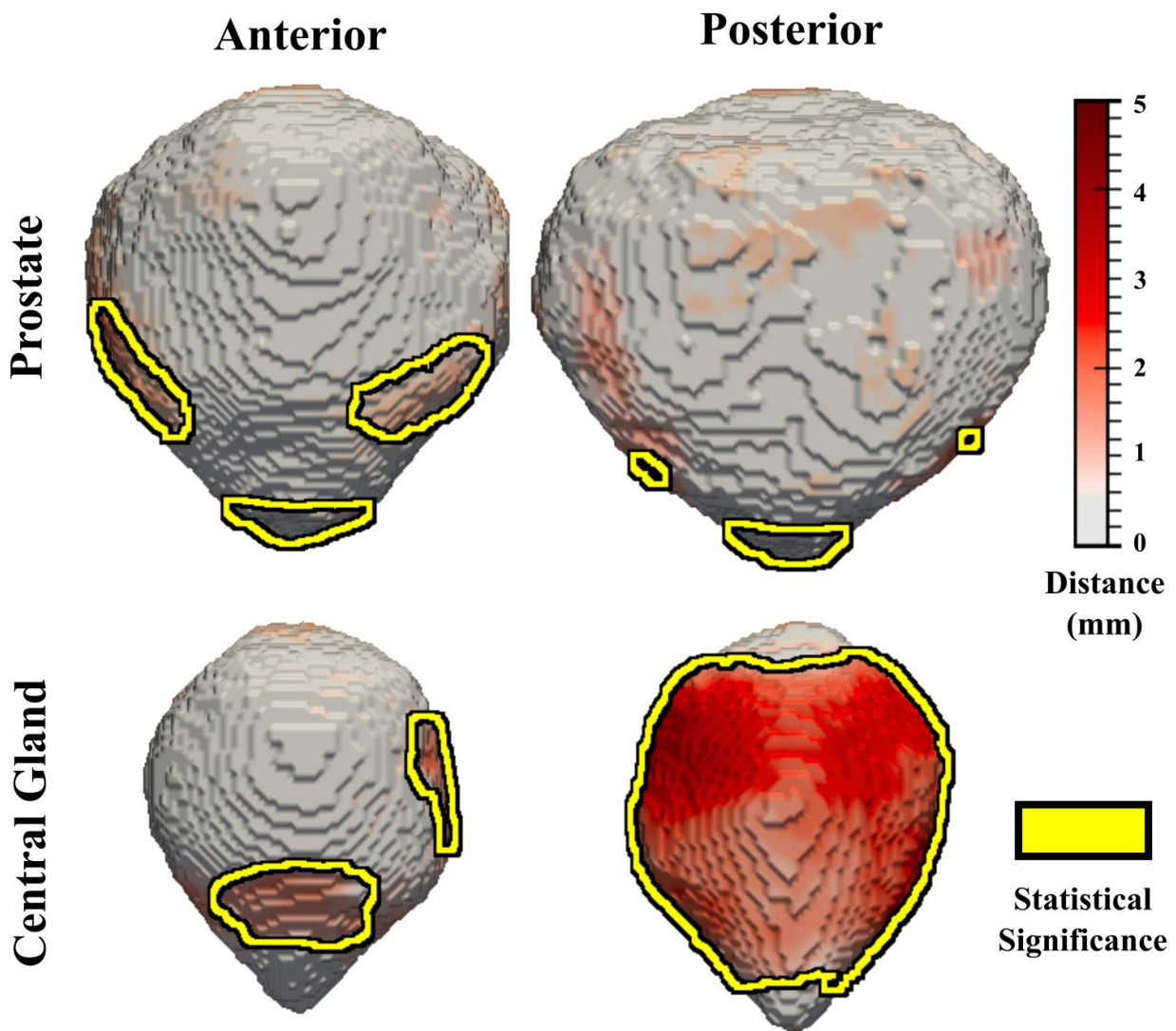


# Shape of prostate and compartments within may serve as cancer indicators

February 1 2017



Prostate cancer seems to induce significant changes in the shape of the prostate

apex, while benign prostatic hypertrophy appears to drive the differences observed on the posterior side of the central gland for patients without cancer. Credit: Mirabela Rusu

Preliminary computerized imaging reveals the shape of the prostate and a compartment within the gland—called the transitional zone—consistently differ in men with prostate cancer than those without the disease, according to new research led by Case Western Reserve University.

The finding may provide a new avenue to diagnose the disease—perhaps even the cancer's aggressiveness.

The differences held up in comparisons of [magnetic resonance imaging](#) (MRI) scans of 70 patients. The scans came from three different medical institutions in Ohio and two in Sydney, Australia, on different makes and models of MRI's.

The research is published in *Scientific Reports* today.

"Looking at [shape](#) is a fundamental shift from looking at the intensity of pixels in an image to predict if a patient has [prostate cancer](#)," said Anant Madabhushi, F. Alex Nason professor II of biomedical engineering and leader of the research. "Pixel intensities vary, but shape is resilient."

Variability in MRI scans can result in disagreement as to whether prostate cancer is present, in turn potentially resulting in unnecessary biopsies and treatments. The American College of Radiology and others are working to develop standards to eliminate inconsistencies in imaging.

"Here, we potentially have an image-based biomarker for prostate

cancer, which is not greatly sensitive to the MRI parameters used by each institution, the maker of the MRI or the scanner itself, " Madabhushi said.

## **A new view**

To find the differences in shapes, the researchers took images of 35 cancerous prostates, aligned them into a single frame and created a statistical shape atlas. They then took images of 35 healthy prostates, aligned them in one frame and created a second statistical shape atlas.

The researchers then aligned the two frames and controlled for size—tumors and a noncancerous condition, called benign prostatic hyperplasia (which some images in this study showed), increase the gland's volume.

Comparing cancerous and cancer-free prostates showed clear, statistically significant differences in both the shape of the transitional zone—which is in the central part of the gland—and the gland itself.

The researchers analyzed and compared the images from each of the five medical institutions and found that, no matter where the images were from, differences in shapes between cancerous and cancer-free prostates were consistent.

Madabhushi said that if shape proves to be a reliable marker of cancer, it could be combined with radiomics, which employs computer algorithms to extract differentiating features in cancerous and non-cancerous tissues.

## **Complementing strategy**

In a paper published in the December issue of the Journal of Magnetic Resonance Imaging, Madabhushi and colleagues found they could accurately identify cancer by the microarchitecture and heterogeneity of the tumor in the prostate's peripheral zone, which is the area surrounding the transitional zone.

The researchers found that aspects of cancerous features in the peripheral zone differed from cancerous features found in the rest of the gland, leading them to identify tumors there.

As with shape, the peripheral zone features held up across the institutions in Tuku, Finland; Sydney, Australia and New York City that contributed MRI scans in this study.

As a follow-up, researchers are now working to identify radiomic features from the peripheral and transitional zones along with measurements derived from the prostate shape to use as predictors of whether a patient has cancer or not.

Further, they are trying to determine whether shape can also predict if the cancer is aggressive or slow-moving—a key in determining how the disease is treated.

**More information:** Mirabela Rusu et al, Computational imaging reveals shape differences between normal and malignant prostates on MRI, *Scientific Reports* (2017). [DOI: 10.1038/srep41261](https://doi.org/10.1038/srep41261)

Provided by Case Western Reserve University

Citation: Shape of prostate and compartments within may serve as cancer indicators (2017, February 1) retrieved 3 April 2024 from <https://medicalxpress.com/news/2017-02-prostate->

[compartments-cancer-indicators.html](http://compartments-cancer-indicators.html)

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.