

# Using Radiomics to Study Statin Use and Omega-3 Use in Prostate Cancer Patients

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## INTRODUCTION

Prostate cancer is the second most common cancer among males . It was estimated in the United States that 1 in 7 men will be diagnosed with prostate cancer at some point in their lifetimes<sup>1</sup>. There have been known links between prostate cancer and the use of statins (a common heart medication) and omega-3 fatty acids (fish oil supplements)<sup>2</sup>. The observed associations are complex and controversial, drawing active research for further elucidation. We therefore explore the novel application of using radiomics, a new field of medicine that involves extracting large amounts of quantitative data from medical images such as CT scans or MRIs.

## AIM

To analyze the association of radiomics pattern and statin and omega-3 use in prostate cancer patients.

## METHOD

**A panel of 944 radiomics features were analyzed on 95 male patients with prostate cancer.**

### Clinical Information

- Patient diagnosis details and use of statins or omega-3 supplements were collected

### Imaging and Contouring

- High resolution T2-weighted MRI scan was used for radiomics analysis
- The prostate gland and the peripheral region of the prostate were contoured (Example contours shown for two patients in Figure 1)

### Radiomic Feature extraction

- All images were normalized to be compatible for analysis
- A total of 944 radiomic features were extracted for each contour using 3D-Slicer

### Data Analysis

- Heatmaps were generated to display correlations of omega-3 use and statin use with the radiomic features
- Machine learning models were developed using a sequential floating forward method (SFF) for feature selection with 1000 round resampling and a gradient boost machine (GBM) for optimization
- The machine learning model was trained and then tested for its ability to predict the use of statins or omega-3s using 3-fold cross-validation with 500 round resampling
- Final results of the models' predictability were measured as average ROC-AUC and average precision-recall AUC for the prostate gland and peripheral region for both statin use and omega-3 use

## CONCLUSIONS

**As the first study to analyze the radiomic feature pattern in relation to statin and omega-3 drug uses in prostate cancer patients, our study illustrated the potential usefulness of the radiomics tool for further exploring these drugs' effects and mechanisms in prostate cancer.**

## RESULTS

- Heatmaps were generated to show the association between the use of statins or Omega-3s and the radiomic feature pattern, based on the prostate ROI (Figure 2) and the peripheral ROI (Figure 3). This offers a holistic and visual representation of the correlations within our dataset.
- For Omega-3 use prediction, a 6-feature radiomics model based on the prostate ROI achieved an average AUC of 0.772 (SD: 0.073) and a 6-feature radiomics model based on the peripheral ROI achieved an average AUC of 0.554 (SD: 0.091). (Figure 4 A & C)
- For statin use prediction, a 4-feature radiomics model based on the prostate ROI achieved an average AUC of 0.731 (SD: 0.085) and a 4-feature radiomics model based on the peripheral ROI achieved an average AUC of 0.704 (SD: 0.090). (Figure 4 B & D)

