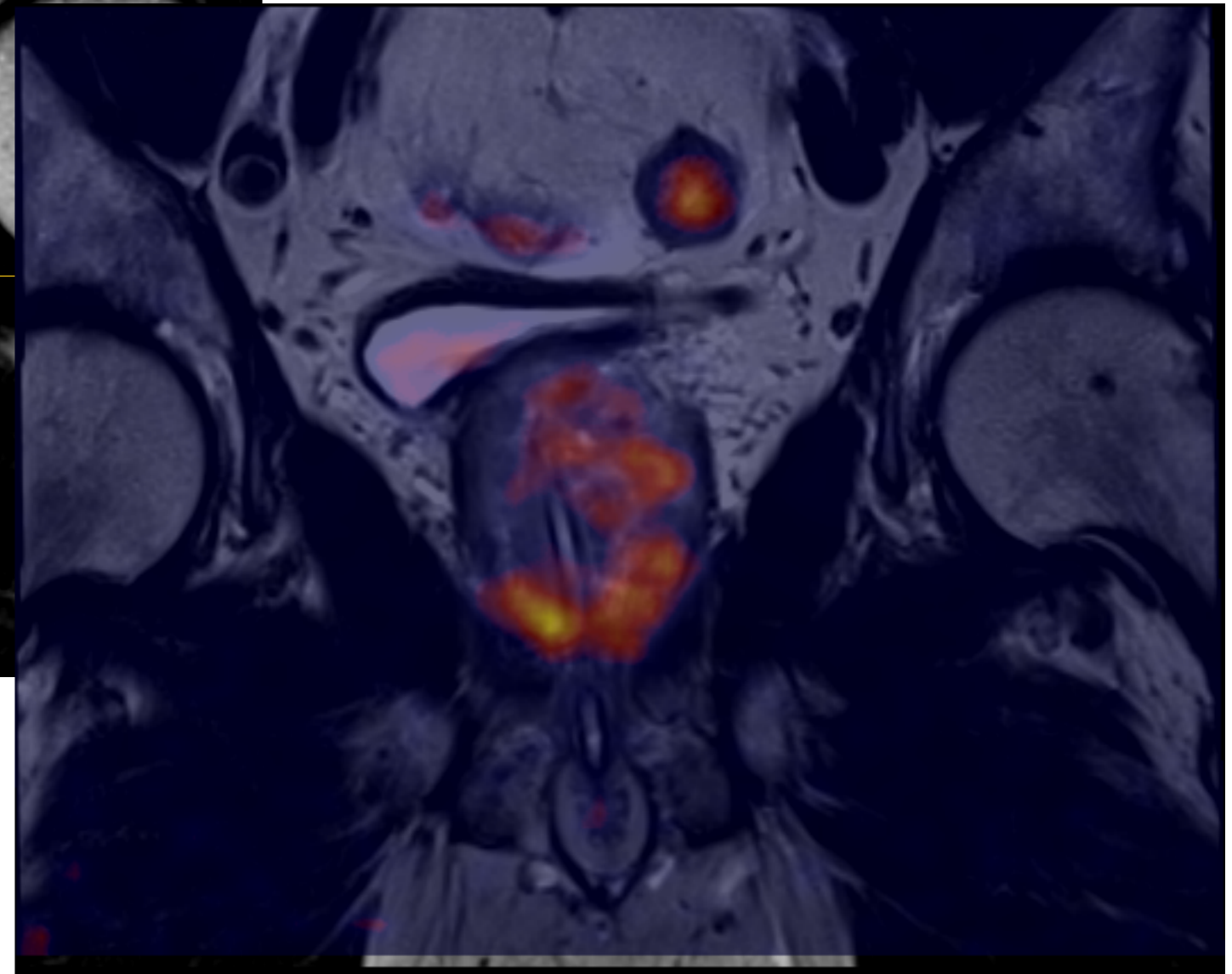
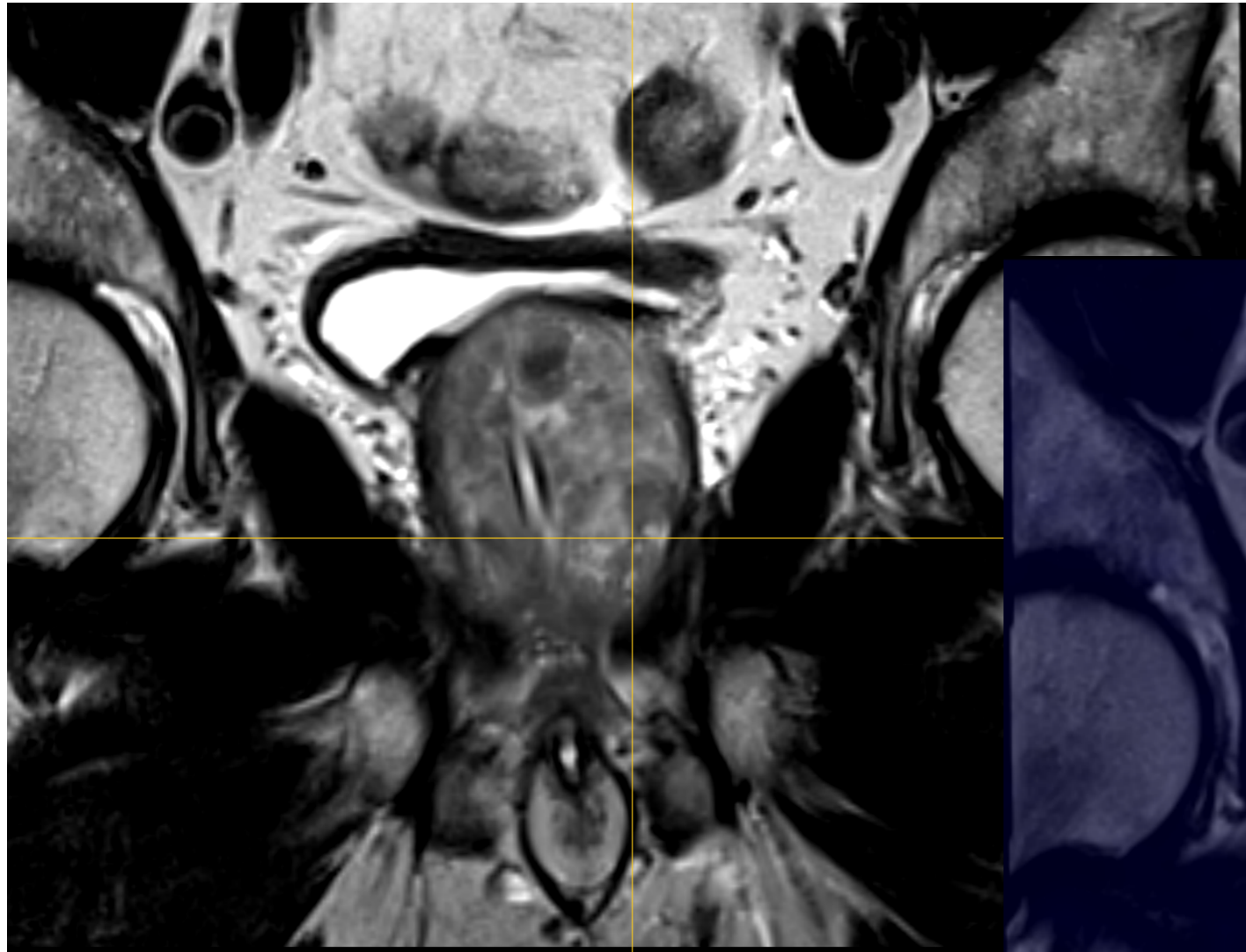


Digital Histopathology: Applications in Prostate Cancer

Matthew D. DiFranco, PhD

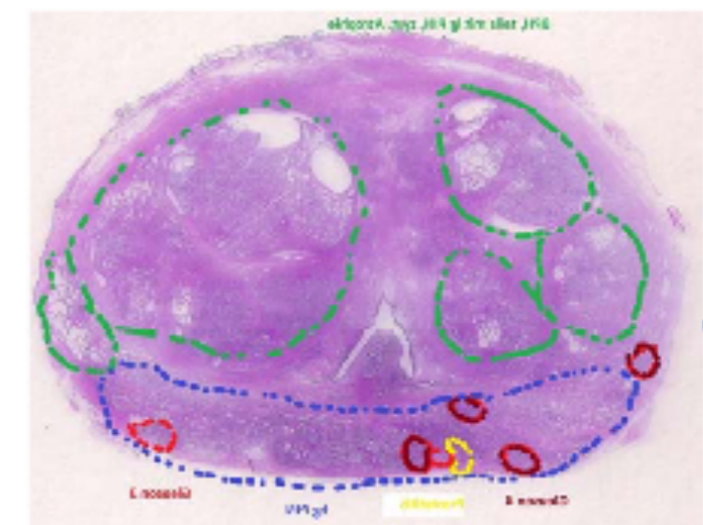
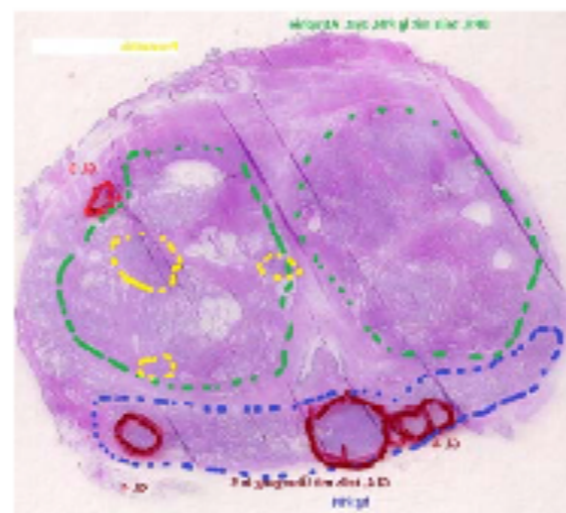
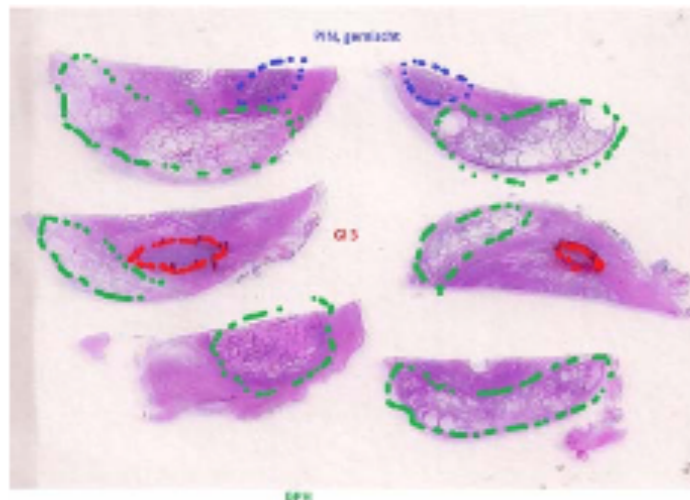
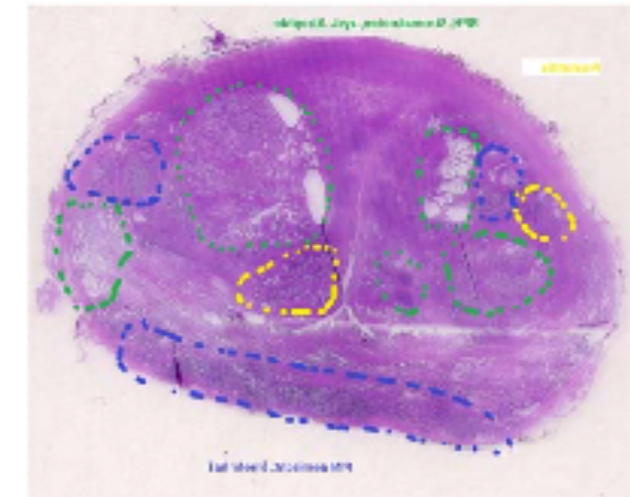
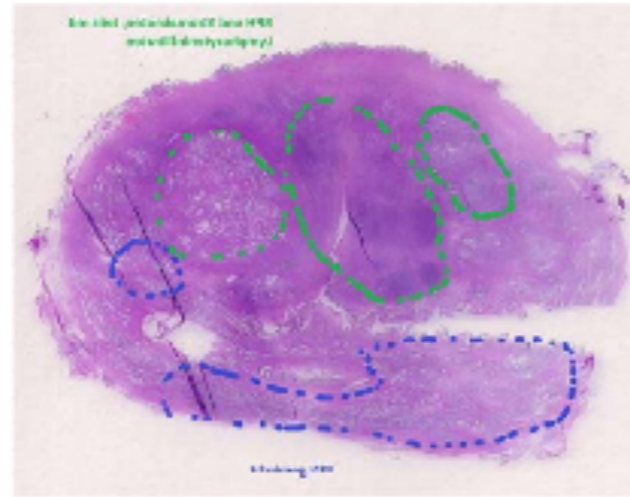
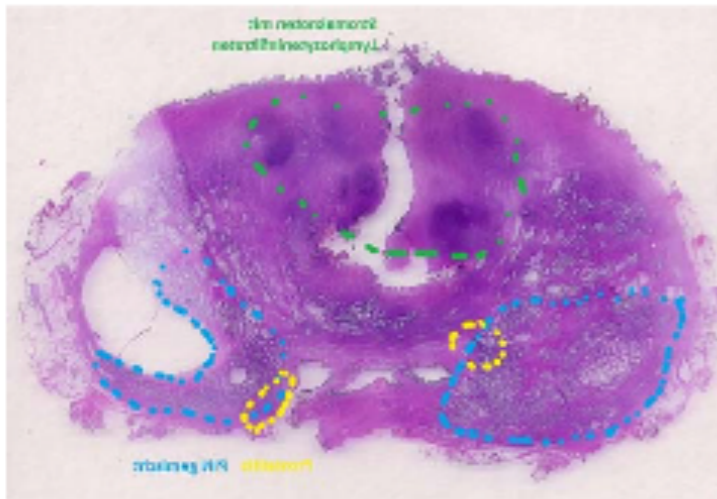
QIMP: Quantitative Imaging and Medical Physics
Center for Medical Physics and Biomedical Engineering
Medical University of Vienna

[F-18] Choline PET /MR



Digital Histology

Basis



Apex

Gleason Grading System

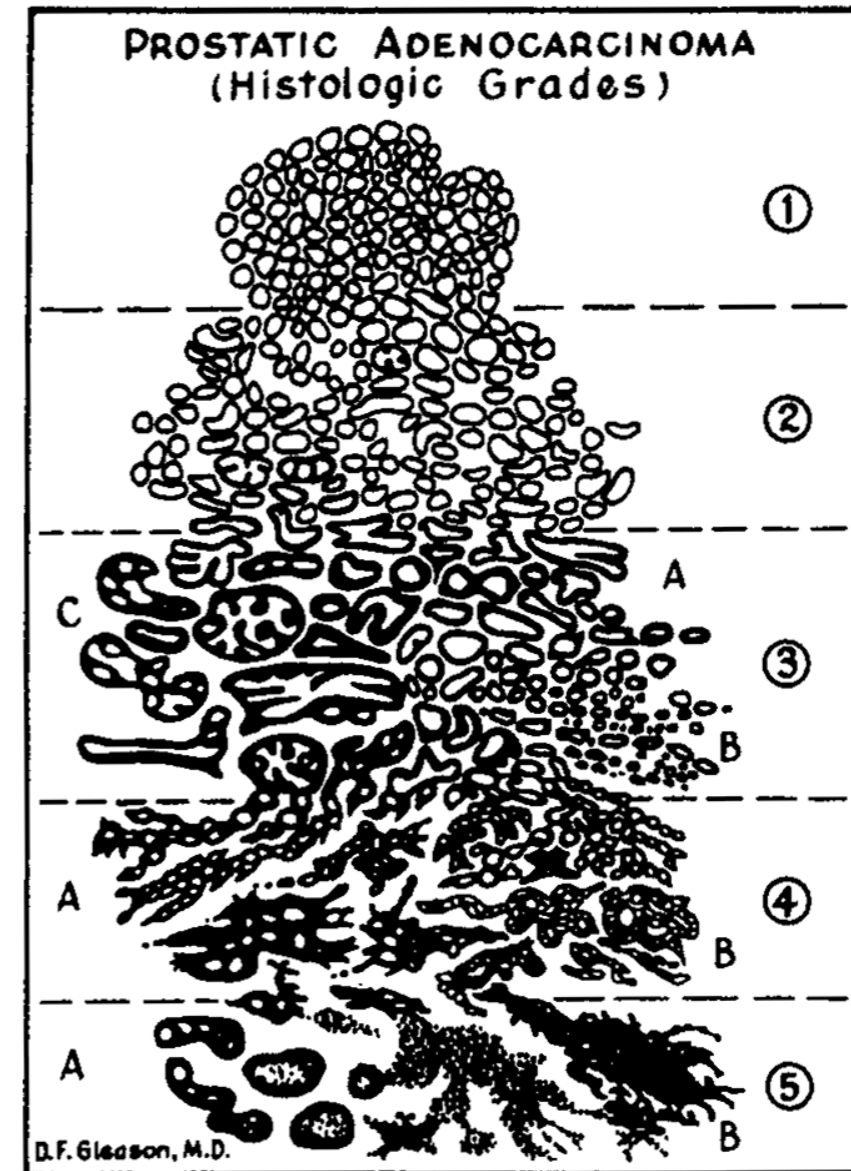
Gleason Grade

Morphological assessment: 1 to 5

Gleason Score

Sum of two most prominent grades:
2 to 10

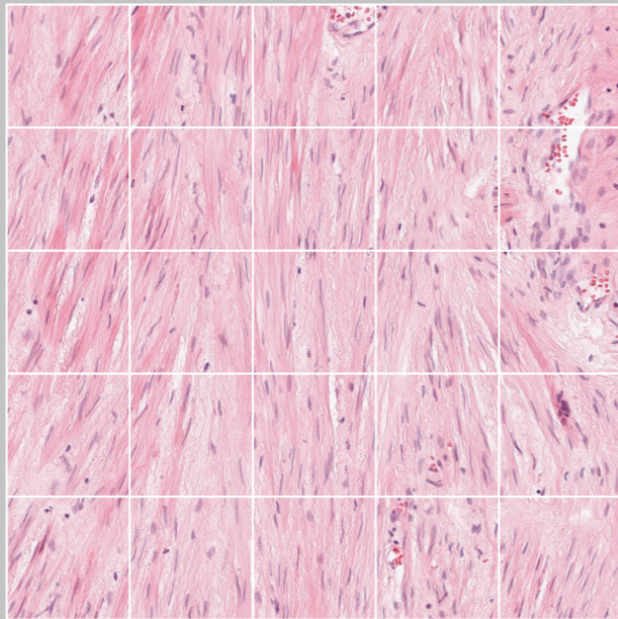
Original Gleason Grades



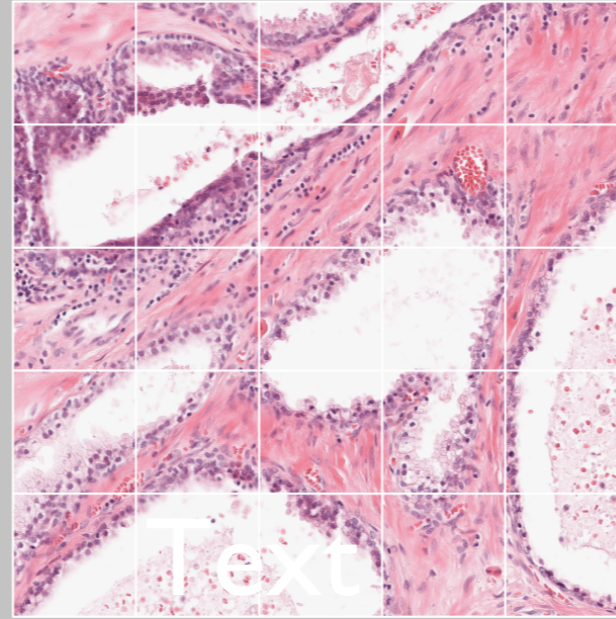
Gleason, D.F. In Tannenbaum M (ed.)
Urologic Pathology: The Prostate. Lea and
Febiger, Philadelphia, 1977; 171-198.

Example prostate tissue patterns

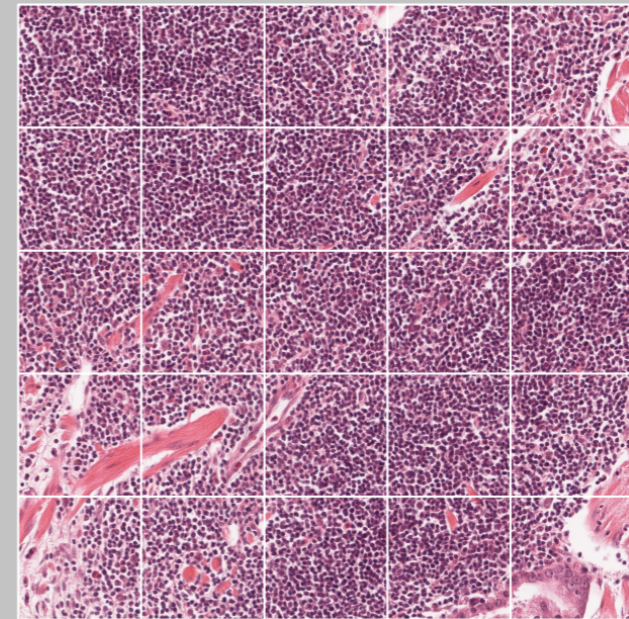
Non-cancer



Stroma

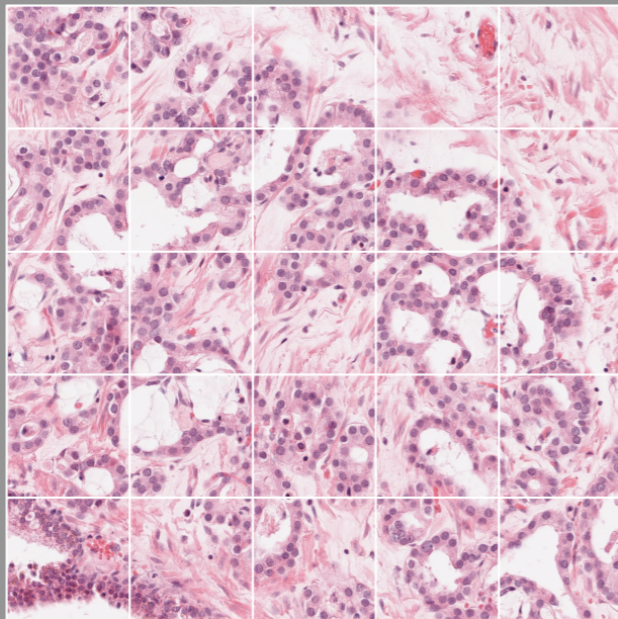


BPH

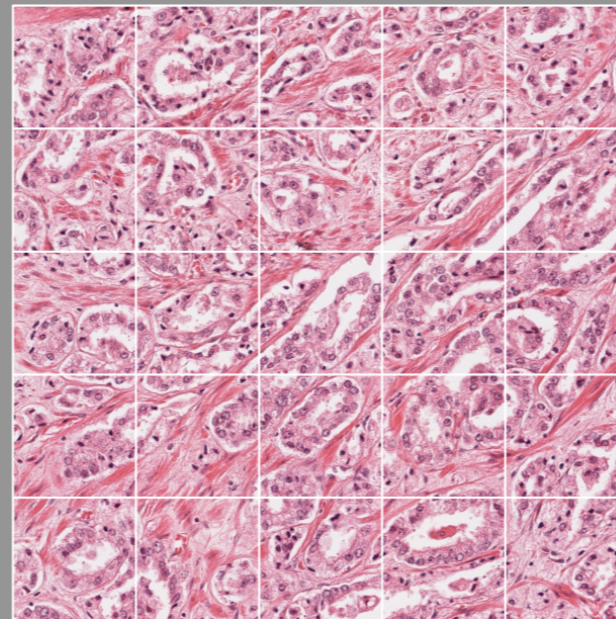


Inflammation

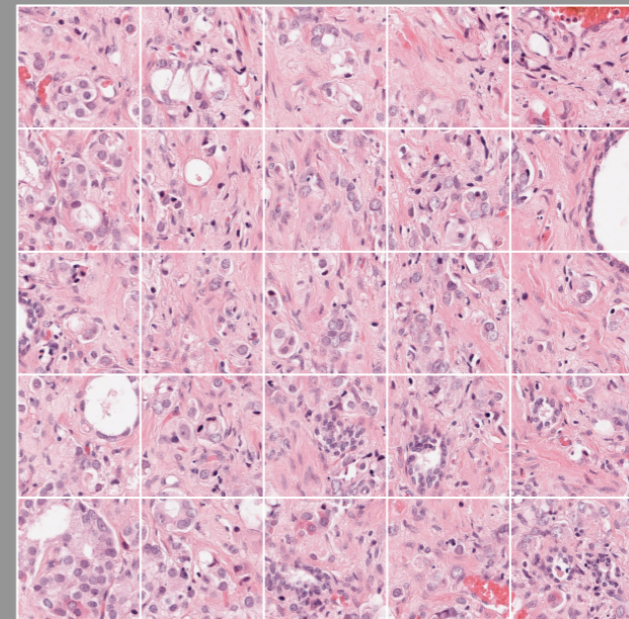
Cancer



Gleason Grade 3



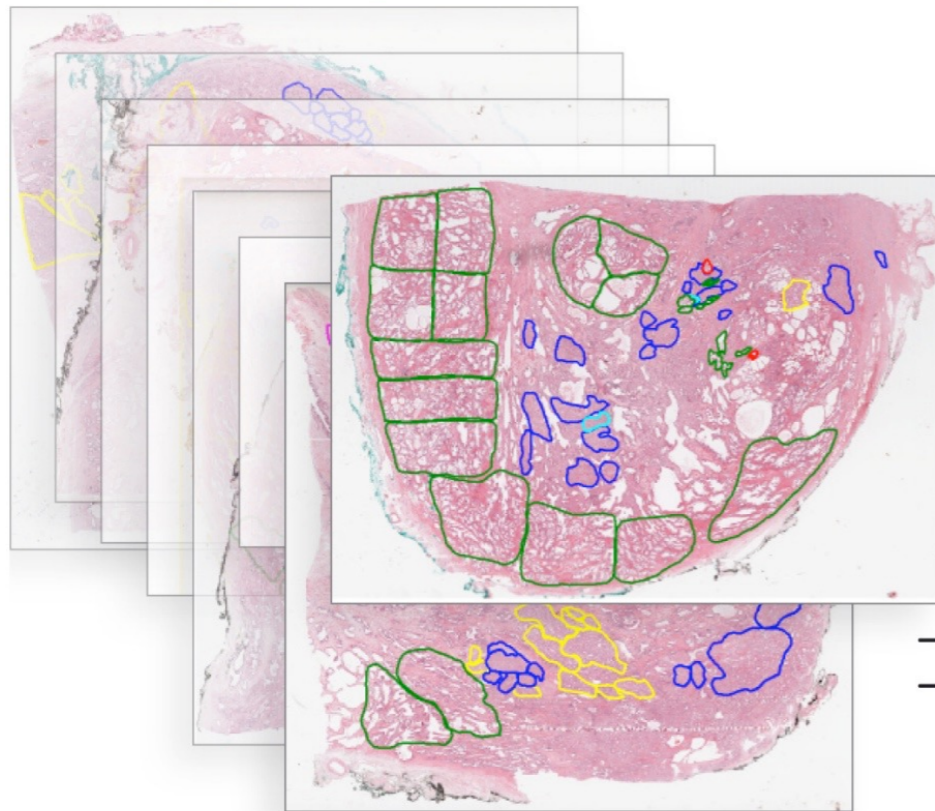
Gleason Grade 4



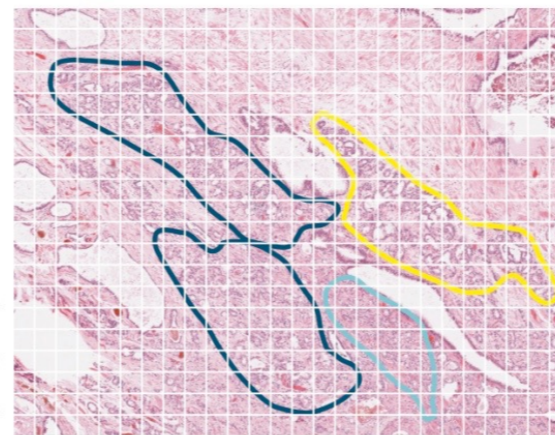
Gleason Grade 5

Data Workflow

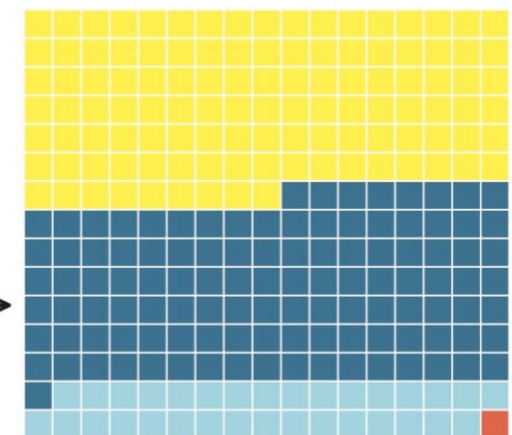
Training Images



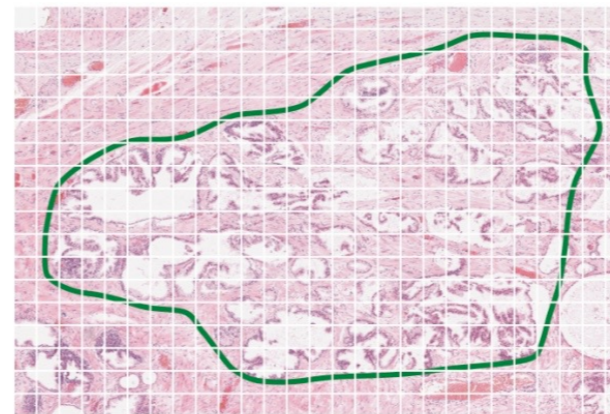
Regions of Interest



Cancer Tiles



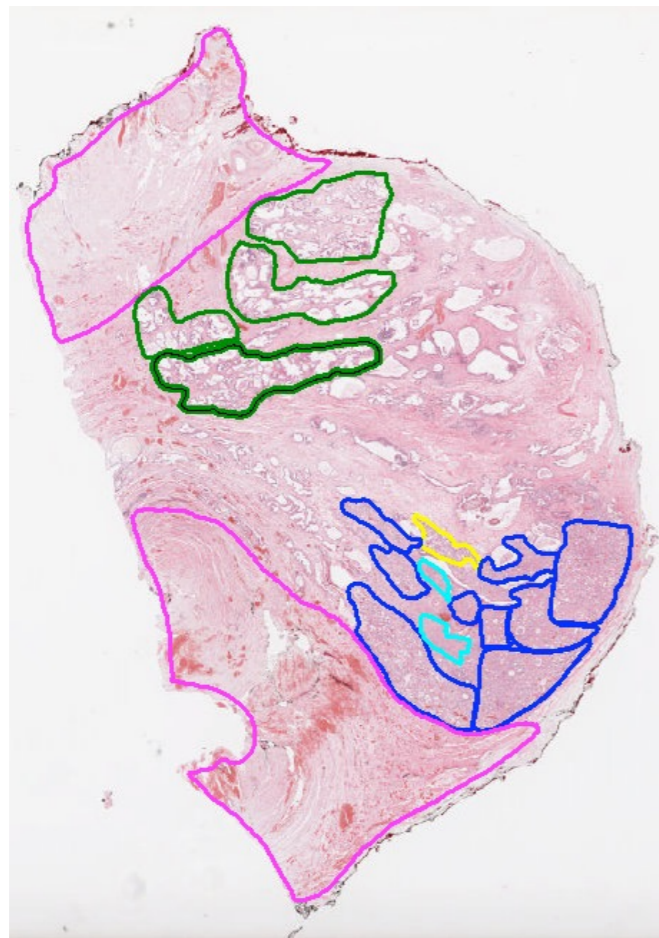
Non-Cancer Tiles



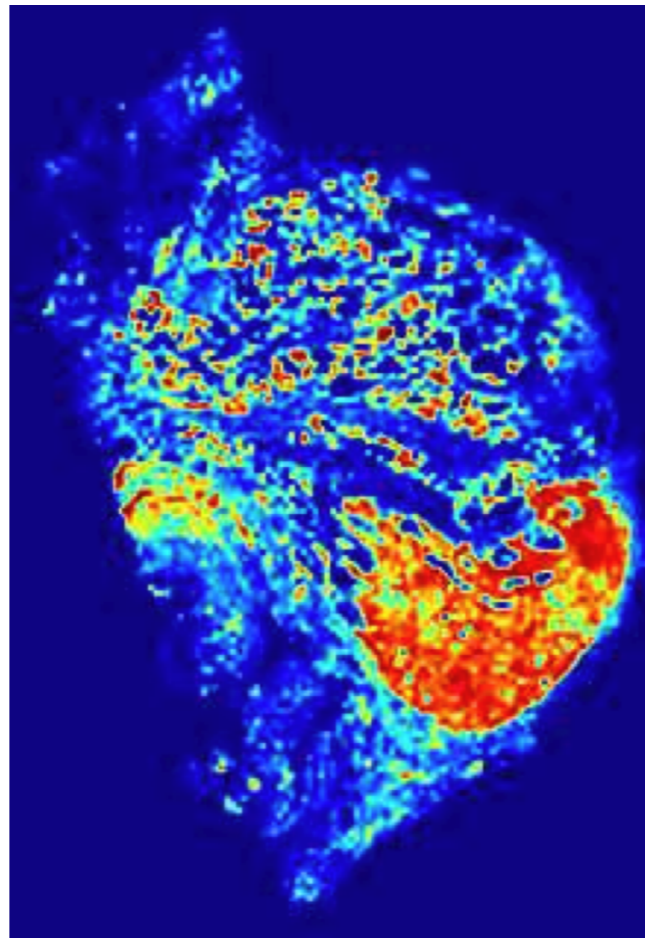
[1] M. D. DiFranco, G. O'Hurley, E. W. Kay, R. W. G. Watson, and P. Cunningham, "Ensemble based system for whole-slide prostate cancer probability mapping using color texture features," *Computerized Medical Imaging and Graphics*, vol. 35, no. 7, pp. 629–645, Oct. 2011.

Heat Map Visualization

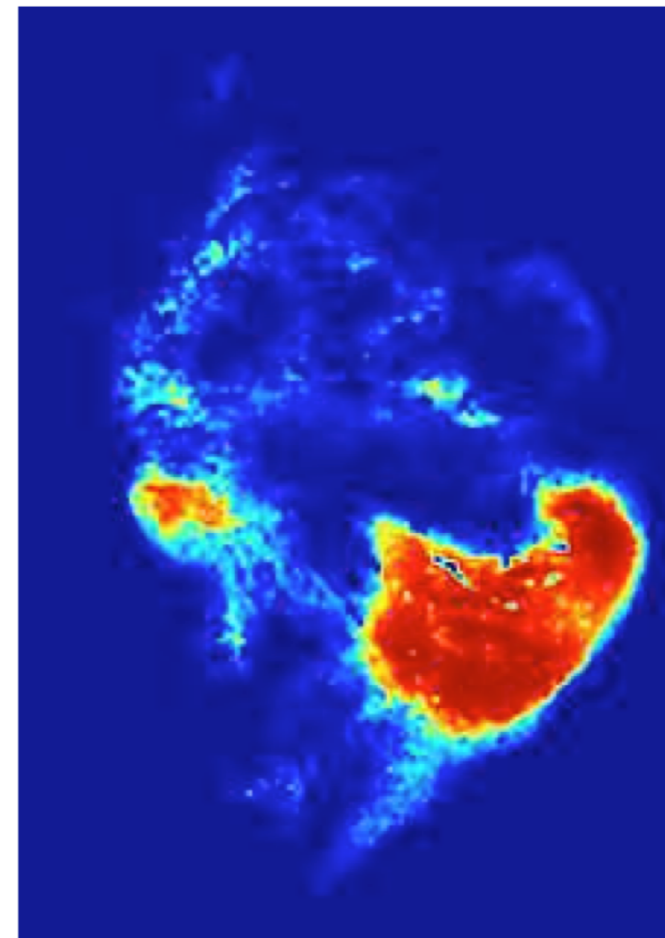
Annotated Original



No Feature
Smoothing

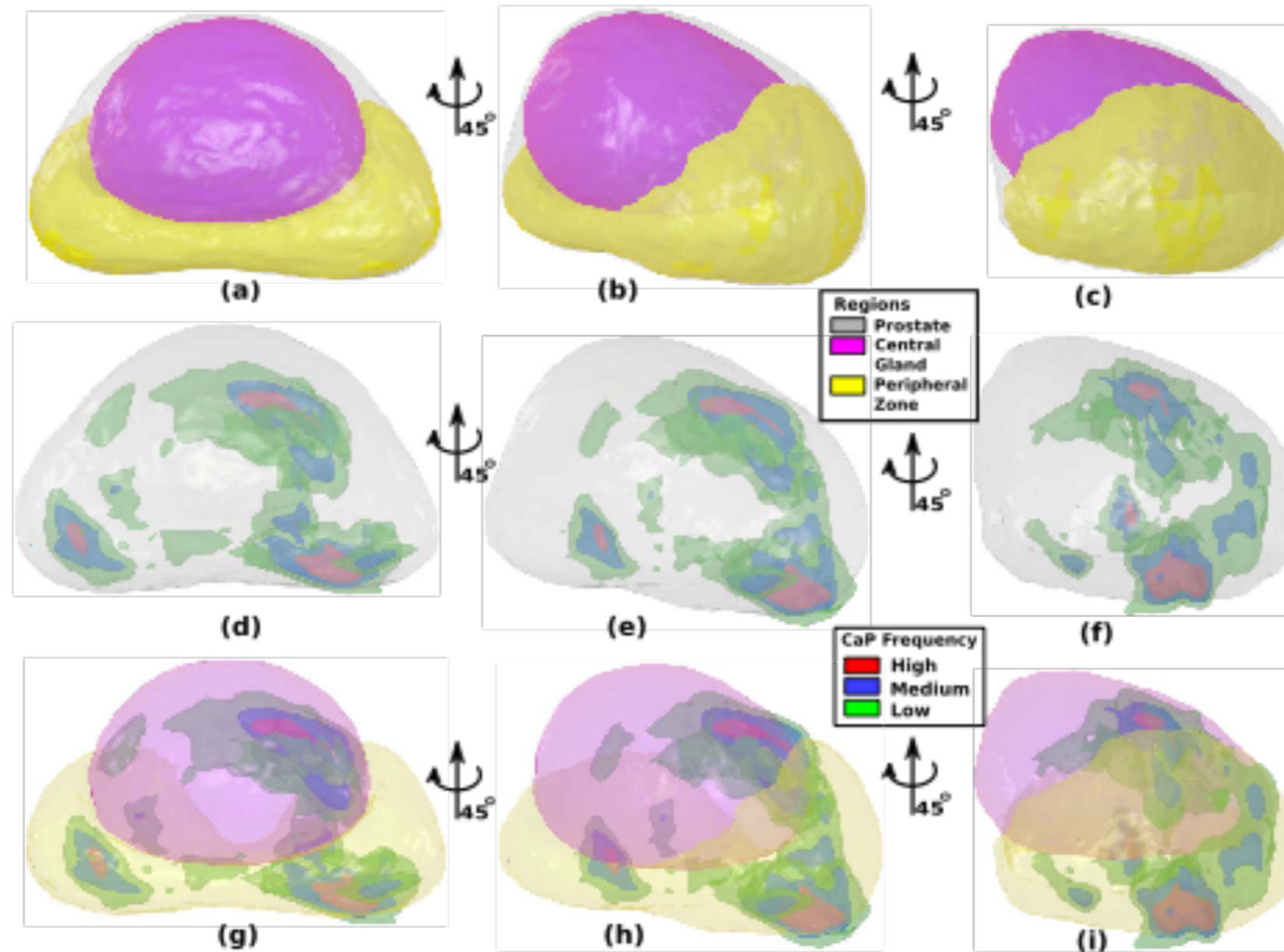


With Feature
Smoothing



- [1] M. D. DiFranco, G. O'Hurley, E. W. Kay, R. W. G. Watson, and P. Cunningham, "Ensemble based system for whole-slide prostate cancer probability mapping using color texture features," *Computerized Medical Imaging and Graphics*, vol. 35, no. 7, pp. 629–645, Oct. 2011.

Anatomic-Disease Atlas



[1] M. Rusu et al., "Statistical 3D prostate imaging atlas construction via anatomically constrained registration," presented at the SPIE Medical Imaging, 2013, vol. 8669, p. 866913.