Supplemental Figures Legends

Supplemental figure 1. (A) Cribriform carcinoma, (B) Noncribriform carcinoma.

Supplemental figure 2. Scheme of Sample Selection.

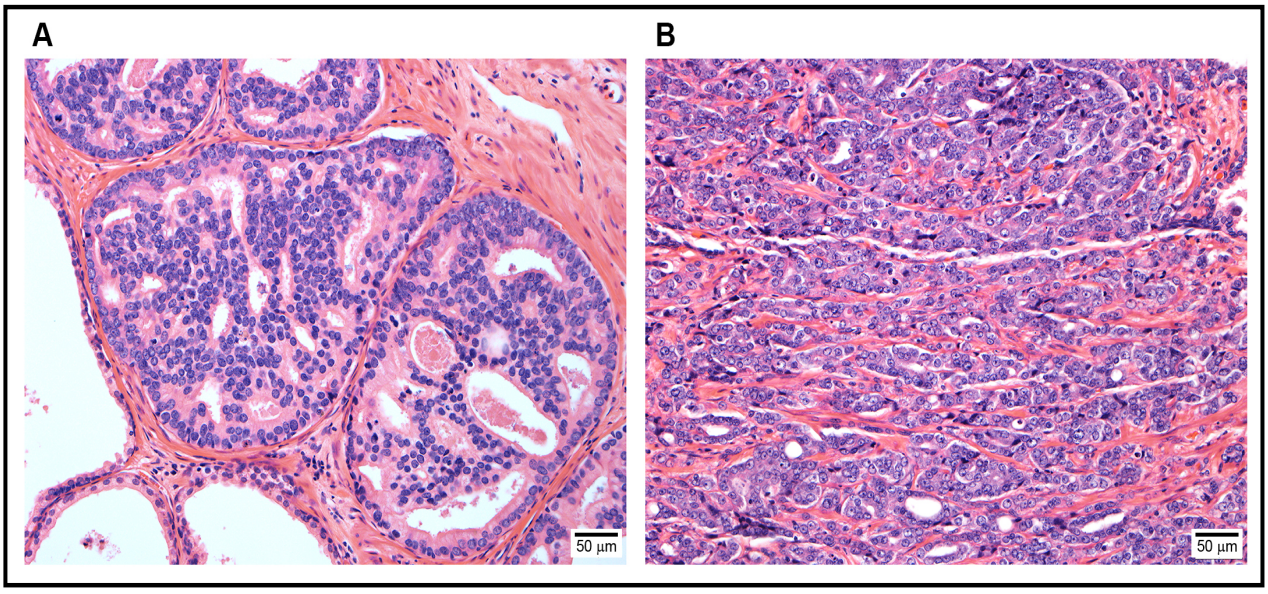
We analyzed the samples comprising Gleason 4 pattern (1ry and/or 2ry score) after excluding Gleason 6 & 10 (65 and 2 samples, respectively). Then, the cases were classified into ICC and NC4 (164 and 102 samples, respectively). Genomics data: Somatic copy number variation (SCNV), mutation, methylation and mRNA-expression were obtained from c-BioPortal and FireHose for Invasive cribriform carcinoma (ICC) and noncribriform carcinoma (NC4) samples and have been compared. Metastatic prostate cancer (150 samples) were then examined to explore the molecular similarities with ICC.

Supplemental figure 3. Examples of PTEN Immunostaining of Tissue Microarray (TMA) Cores, HPFS/ PHS Prostate Cancer Cohorts. (A) Invasive cribriform carcinoma (ICC) shows positive PTEN immunostaining. **(B)&(C)** ICC shows negative PTEN immunostaining with intact PTEN expression in intervening stroma (internal positive control).

Supplementary figure 4. Invasive Cribriform Carcinoma is Associated with High Gleason Score and Tumor Stage.

Supplementary figure 5. Difference in FGA between Cribriform Carcinoma (ICC) and Noncribriform Carcinoma (NC4) as well as between Gleason scores.

Supplementary figure 6. Cribriform Morphology in *PTEN*^{loss} and *SPOP*^{mut} Transgenic Mouse Prostate Model (10x): PTEN$^{+/+}$SPOP^{wt}, PTEN$^{+/+}$SPOP^{mut} and PTEN$^{L/+}$SPOP^{wt} show normal morphology. PTEN$^{L/+}$SPOP^{mut} shows early focal cribriform carcinoma in 3 mice out of 15. PTEN$^{L/L}$ mice show mainly invasive cribriform morphology and SPOP^{mut} adds more aggressive morphology in the form of sarcomatoid dedifferentiaon.



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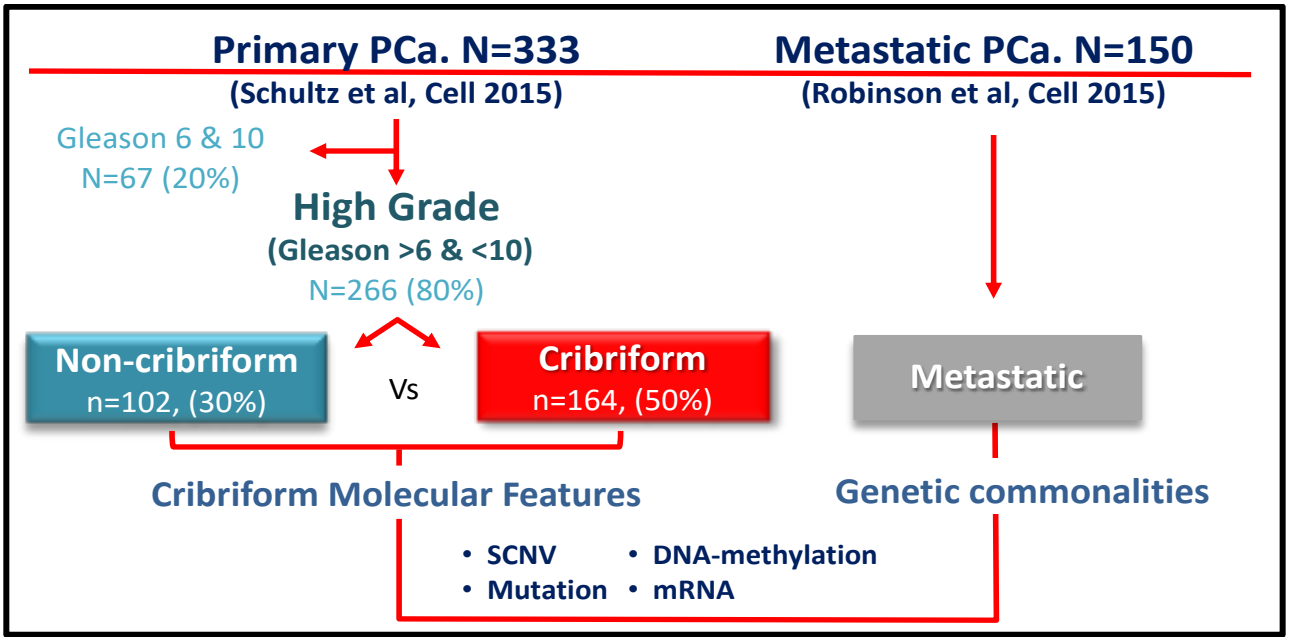

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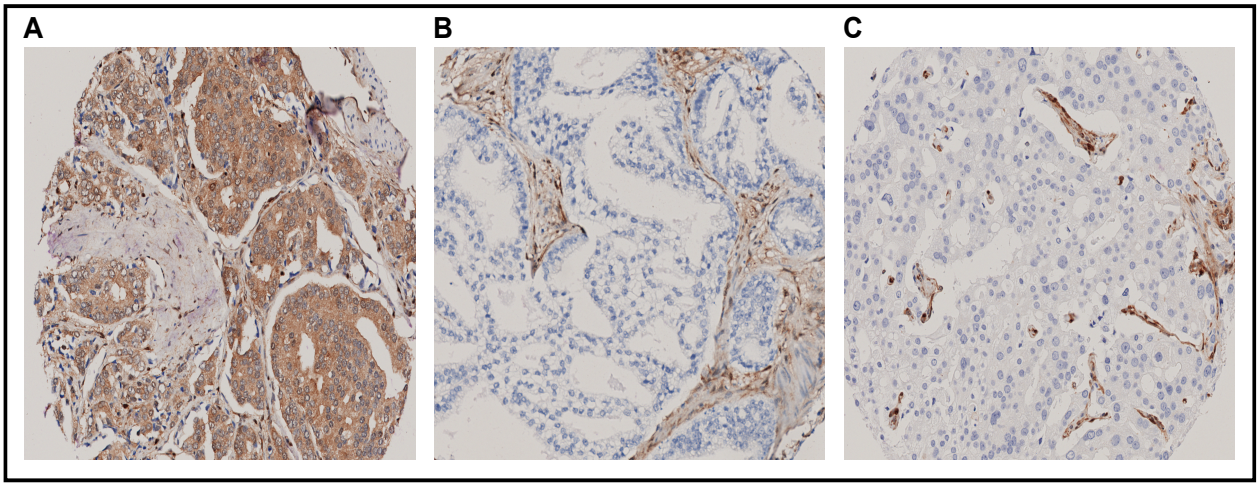

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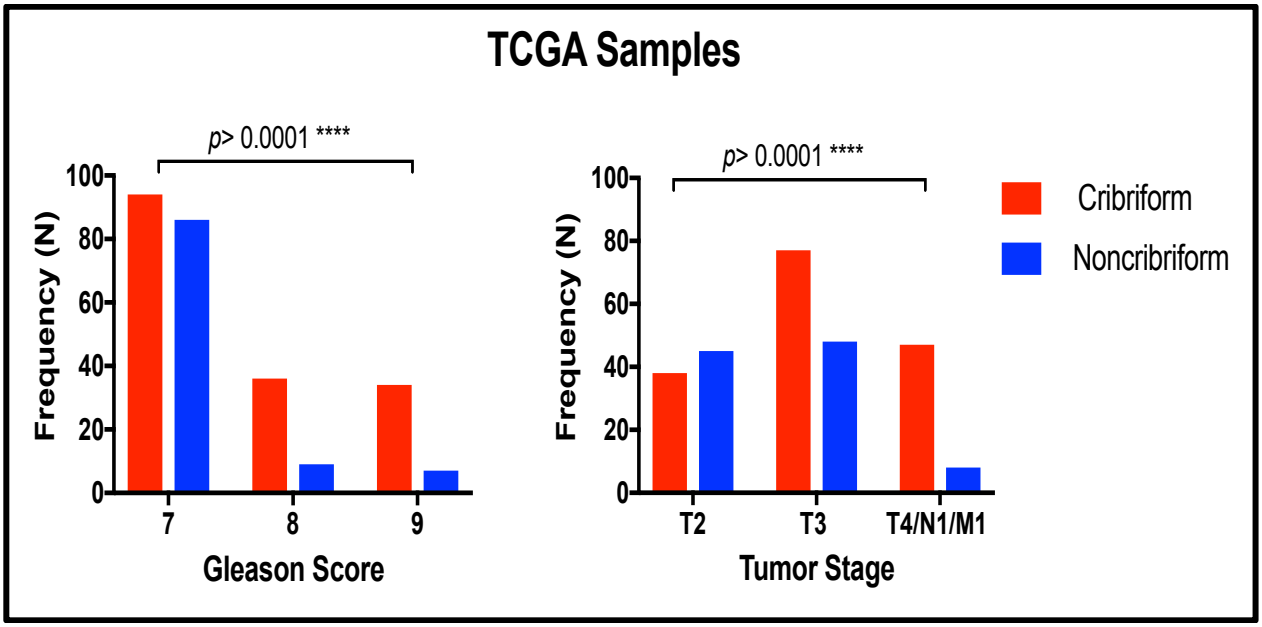

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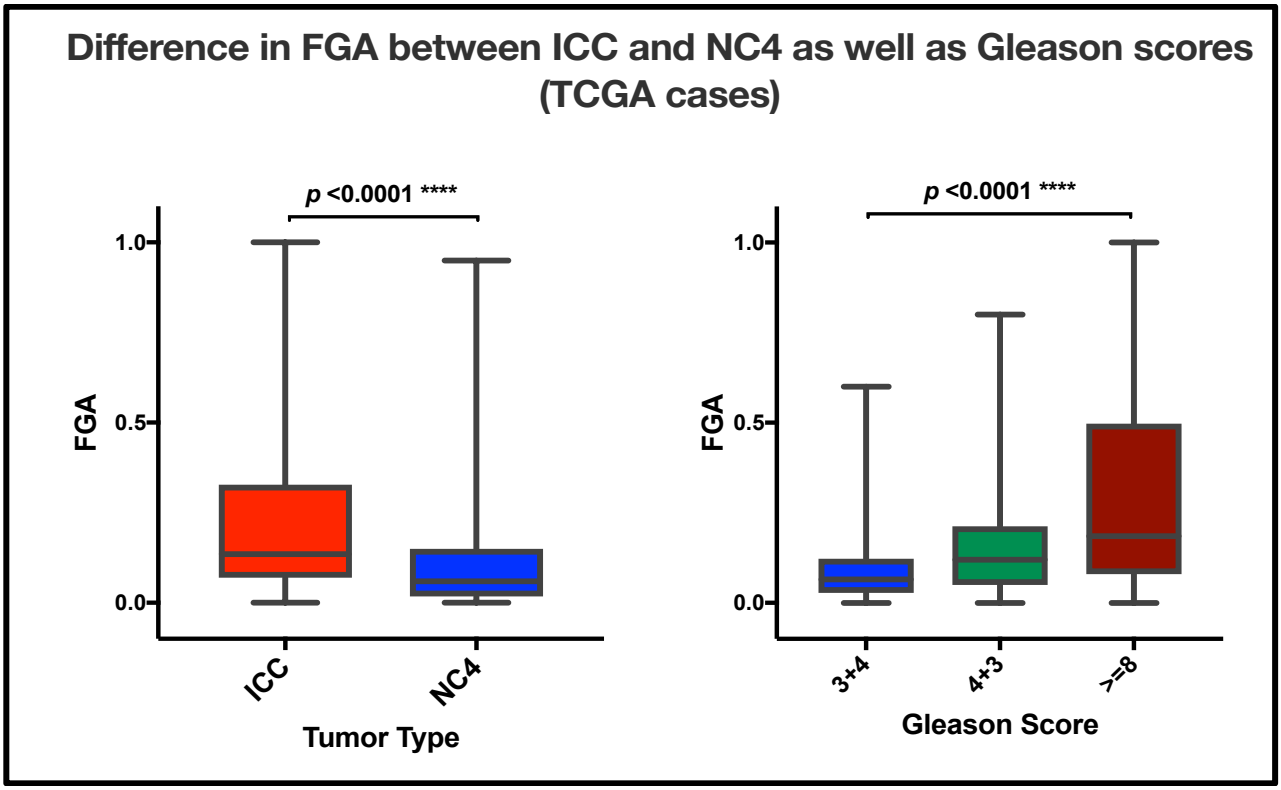

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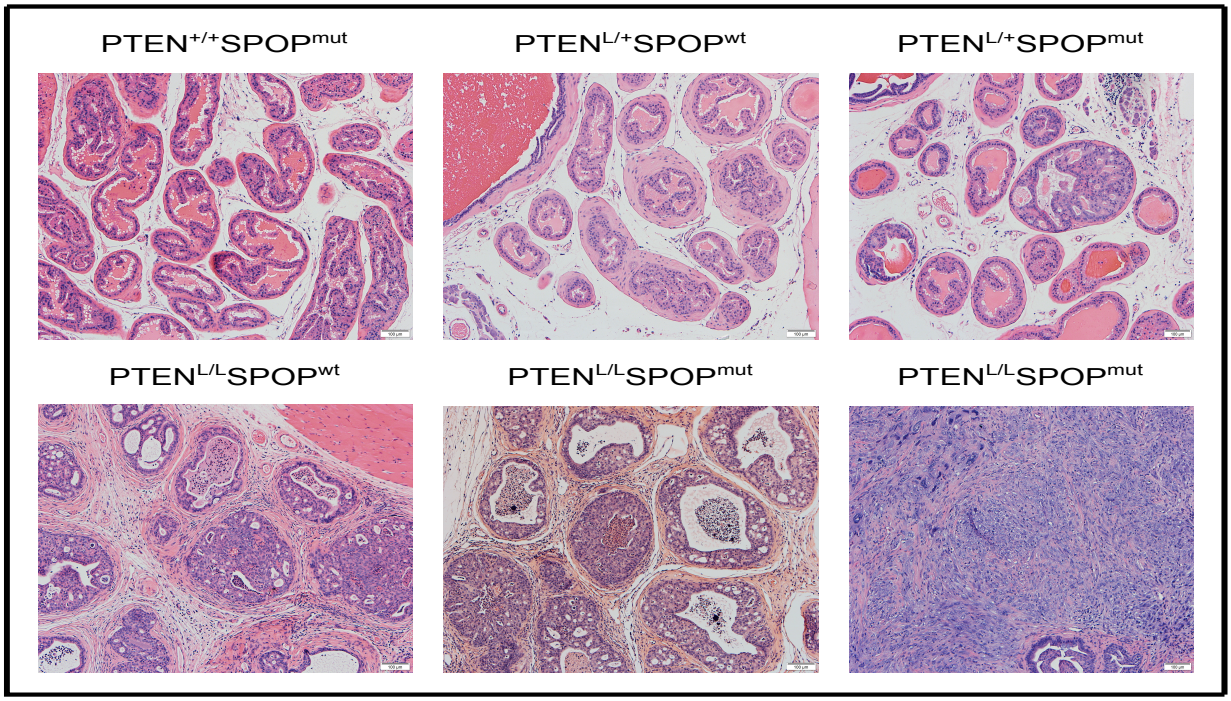

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