(video abstract: <https://youtu.be/gVeq0v-Vbck>)

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**A Ready To Use Web-Application Providing a Personalized Biopsy Schedule for Men With Low-Risk PCa Under Active Surveillance**

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**Introduction and objective**

Prostate cancer patients enrolled in active surveillance (AS) undergo repeat biopsies. Treatment is usually advised when biopsy Gleason grade increases above grade 1 (Gleason 3+3), called upgrading. Periodical nature of biopsies could lead to time delay in detection of upgrading.Therefore, fixed and frequent biopsy schedules are commonly used for detecting upgrading timely. Consequently, slow/non-progressing patients undergo many unnecessary biopsies. Our aim is to assist patients/doctors in making better biopsy decisions than currently. Using data from the PRIAS AS study, we previously developed a joint model that predicts the risk of upgrading and creates personalized biopsy schedules1.

**Methods**

We validated our model in five of the largest AS cohorts within the Movember Foundation’s Global Action Plan Prostate Cancer Active Surveillance (GAP3) database (>20,000 men, 27 centers worldwide). The model includes all PSA and biopsy results, a patients baseline characteristics and schedules can be updated with each subsequent follow-up visit. We estimated the time delay in detection of upgrading for both personalized and fixed schedules, in a patient-specific manner. Issues in validation were resolved by recalibrating our model. Last, we employed our models (recalibrated and original) and personalized schedules in a web-application (<http://tiny.cc/biopsy>).

**Results**

Rate of upgrading at year 5 of AS in PRIAS and external GAP3 cohorts was maximum 50%. Thus, no biopsies are required in first five years for over half of the patients. PSA velocity is a stronger predictor of reclassification (Adjusted hazard ratio: 2.47, 95%CI: 1.93 - 2.99) than PSA value (Hazard Ratio: 0.99, 95%CI: 0.89 - 1.11). Moderate Area under ROC curve (0.55 to 0.75) was observed for PRIAS and external GAP3 cohorts. Large mean absolute prediction error (0.3 to 0.45) was seen in cohorts with risk of reclassification different from PRIAS, and moderate (0.1 to 0.3) otherwise. Model required recalibration in all external GAP3 cohorts.

**Conclusions**

External validation of our model showed that after center specific recalibration….

We developed risk of upgrading based personalized biopsy schedules as an alternative to fixed biopsy schedules in AS. Our risk prediction model validated externally in largest 5 cohorts of GAP3 database. Risk prediction accuracy in external cohorts was better only if cohorts had rate of reclassification similar to PRIAS.

Personalized schedules employing recalibrated models implemented for PRIAS and validated cohorts in a web-application. Web-application enables shared decision making of appropriate biopsy schedule by comparing fixed and personalized schedules on the total biopsies and expected time delay in detection of reclassification.

1 Reference naar PRIAS paper