Introduction and Objectives:

Glycosylation is a biologically important post-translational modification involved in many physiological processes, such as cell adhesion, differentiation, and protein folding. Structural changes in the carbohydrate moieties of various glycoproteins have been reported in different malignancies, including prostate cancer, in which aberrant glycosylation patterns of prostate specific antigen (PSA) have been identified. Recently, aberrant serum PSA glycosylation isomer (PSA-GIM) and Wisteria floribunda agglutinin reactivity on prostate cancer has been reported as a promising diagnostic biomarker, which could detect more accurately than serum PSA patients with a Gleason score ≥ 3 cancer.

The objectives of the study is to evaluate the usefulness of PSA-GI in predicting pathological findings for biopsy-proven index prostate cancers.

Methods:

We included 67 patients whose serum PSA levels were ≥ 20 ng/ml, and who had undergone multi-parametric magnetic resonance imaging (mpMRI) in Tokai University Hospital. PSA-GI, which is PSA-glycosylation isomer, was measured using an automated two-step Wisteria floribunda Agglutinin lectin-anti-PSA antibody sandwich immunoassay using a highly sensitive surface plasmon field-enhanced fluorescence spectroscopy system. (Figure 2) MRI-transrectal ultrasound elastic fusion image-guided biopsy were performed for cancer suspicious lesions with PI-RADS category ≥ 3 (PI-RADS version 2) (Blistet®, D&K Technologies GmbH, Barum, Germany). The cancer lesion with highest Gleason score and/or largest core length was considered to be the index cancer.

Results:

Patients’ characteristics were shown in Table 1. Median PSA-GI levels significantly differed between patients with vs. without detected biopsy proven clinically significant cancer (0.177 ng/mL (U/mL) vs. 0.029 ng/mL (U/mL), P=0.001). This disparity was especially pronounced among patients with PI-RADS assessment category 3 disease (0.122 ng/mL (U/mL) vs. 0.022ng/mL (U/mL), P<0.0001). (Figure 4). Areas under ROC curves based on PSA-GI levels (AUC: 0.887, 95% CI: 0.829–0.946; Figure 5) and on highest PI-RADS assessment category (AUC: 0.695, 95% CI: 0.565–0.824, P<0.001) were significantly greater than non-discrimination (Figure 5). Among patients with biopsy-proven clinically significant cancers (n=41), PSA-GI levels and Gleason scores for index cancer were significantly correlated (r=0.69, P<0.001) (Figure 6).

Table 1. Patients characteristics (n=67)

Conclusions:

PSA-GIM might predict pathological findings of biopsy-proven index prostate cancers. However, larger studies are needed to verify its predictive value.

Table 2. Detection rates of significant prostate cancer and prostate cancer by highest categories of PI-RADS ver. 2.

Table 3. Differences in the PSA-GI levels between the patients who were detected significant prostate cancer and prostate cancer

Table 4. Differences in the PSA-GI levels between the patients with PI-RADS category ≥ 3 who were detected significant prostate cancer and prostate cancer

Figure 1. Structure of normal PSA and PSA-glycosylation isomer

Figure 2. Anti-PSA antibody sandwich immunoassay using highly sensitive surface plasmon field-enhanced fluorescence spectroscopy (SPFS) system

Figure 3. Differences in the PSA-GI levels between the patients who were detected significant prostate cancer and prostate cancer

Figure 4. Differences in the PSA-GI levels between the patients with PI-RADS category ≥ 3 who were detected significant prostate cancer and prostate cancer

Figure 5. ROC curves using PSA-GI levels and highest PI-RADS category for prediction of clinically significant cancer detection

Figure 6. Relationship between PSA-GI levels and Gleason score of the biopsy-proven significant cancer

References:


Conflicts of Interest

The authors declare no conflicts of interest.