

Clinical Implication of Tests for Prostate-specific Antigen in Brain-dead Organ Donors

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ABSTRACT

Background. Although cancer screening tests are not mentioned under brain-dead organ donor care guidelines in Korea, we assessed the level of prostate-specific antigen (PSA), an important prostate cancer marker, and performed prostate biopsies when needed in brain-dead organ donors. We believe that insisting on a screening test for cancer diagnosis in donors' organs is important.

Materials and Methods. Data were collected between January 2010 and July 2015 from Ajou University Hospital. We retrospectively analyzed the PSA levels and prostate biopsy results in 111 male brain-dead organ donors (mean age, 48.4 years).

Results. The mean PSA level was 7.395 ng/mL (range, 0.062 to 61.780; reference, 0 to 4 ng/mL). Ultrasonography or computed tomographic examination did not reveal prostate cancer, and a rectal examination was not performed. After checking the PSA levels, prostate biopsies were performed in 16 patients based on the recommendations of a urologist, and 4 patients (3.6% of 111) were diagnosed with prostate cancer. All cancers involved adenocarcinomas (acinar type) histopathologically. In 2 patients, the Gleason score was 6 (3 + 3), whereas the other 2 showed a score of 7 (3 + 4). Among the patients diagnosed with prostate cancer, 1 donated his liver and corneas, and the remaining 3 could not donate.

Conclusion. Well-defined cancer screening tests are needed in Korea. Additionally, when the probability of organ transplantation-induced cancer metastasis is low or a recipient is at a high risk owing to not receiving organs, the law should allow organ donation even if prostate cancer is diagnosed in the donor.

THREE types of cancer can be distinguished in patients who receive organ transplants: 1) cancer that is unrelated to the organ transplantation; 2) cancer before the transplantation and recurrence in the transplanted organs; and 3) malignancy transmitted to the transplant recipient [1]. Among these, only the third type can be prevented through intervention by the medical staff involved in the transplantation process. Because of the inherent risks associated with the third type, cancer screening is recommended in donors before transplantation to prevent possible transmission of cancer to the recipient's organs [1–3].

In Korea, patients with a history or current diagnosis of cancer are not allowed to donate organs. Tests for tumor

markers are usually not performed [4]. The Korea Centers for Disease Control & Prevention (KCDCP) only stipulates that the abdominal cavity be examined for evaluation of potential tumors when donor organs are procured. However, with regard to prostate cancer, mere inspection of the abdominal cavity through clinical and/or radiological examination is incapable of detecting the presence of a tumor owing to the location of the prostate gland. Unless lymph

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nodes are sufficiently large to be detected, a tumor in the prostate will not be most likely noticed [5,6].

Because of the absence of regulations for prostate cancer screening in South Korea, no studies have been conducted to evaluate the usefulness of such screening examinations in brain-dead organ donors in the country to date. This study discusses the results obtained from monitoring the levels of prostate-specific antigen (PSA), which is routinely evaluated as a tumor marker for prostate cancer screening. The tests were performed as part of the management of brain-dead organ donors at Ajou University Hospital.

This study aims to verify the need and show the benefits of prostate cancer screening in male brain-dead organ donors. Based on study results, it is recommended that prostate cancer screening in brain-dead potential organ donors be legally introduced.

MATERIALS AND METHODS

Ajou University Hospital routinely analyzes blood samples obtained from brain-dead potential organ donors to check for tumor markers, such as carcinoembryonic antigen, alpha fetoprotein, cancer antigen 125, cancer antigen 19-9, and PSA. Suspiciously high concentrations of any of these markers necessitate ultrasonographic and computed tomography (CT) examination of the abdomen with or without contrast medium. In some cases showing high PSA levels, an abdominal CT examination may be followed by ultrasonography and biopsy of the prostate.

Between January 2010 and July 2015, the PSA levels were checked in 111 male brain-dead patients at Ajou University Hospital, and we retrospectively studied their medical records. The mean age of the patients was 48.4 years (range, 12 to 78 years). We consulted urologists for the possibility of prostate cancer in cases showing a serum PSA level > 5 ng/mL regardless of patient's age and duration of Foley catheterization. Before organ procurement, prostate biopsies with frozen sections were performed in 16 patients showing high serum PSA levels based on the urologist's recommendations.

Statistical analyses were performed using the SPSS software package (version 21.1; IBM Co., Armonk, New York, United States). A *P* value < .05 was considered statistically significant.

RESULTS

The mean PSA level in the blood samples obtained from all 111 patients was 7.395 ng/mL (range, 0.062 to 61.780 ng/mL) (Fig 1). PSA levels between 0 and 4 ng/mL were considered normal. The general observation that older patients show a higher PSA level in their blood was supported by a statistical analysis (*P* = .024). The length of stay in the intensive care unit, which equals the duration of the application of a Foley catheter, did not correlate with the PSA level (*P* = .716). Abdominal ultrasonography, CT, or rectal examination did not indicate the presence of prostate cancer in any of the 111 cases.

Prostate biopsies were performed in 16 patients who showed elevated serum PSA levels. The mean age of these

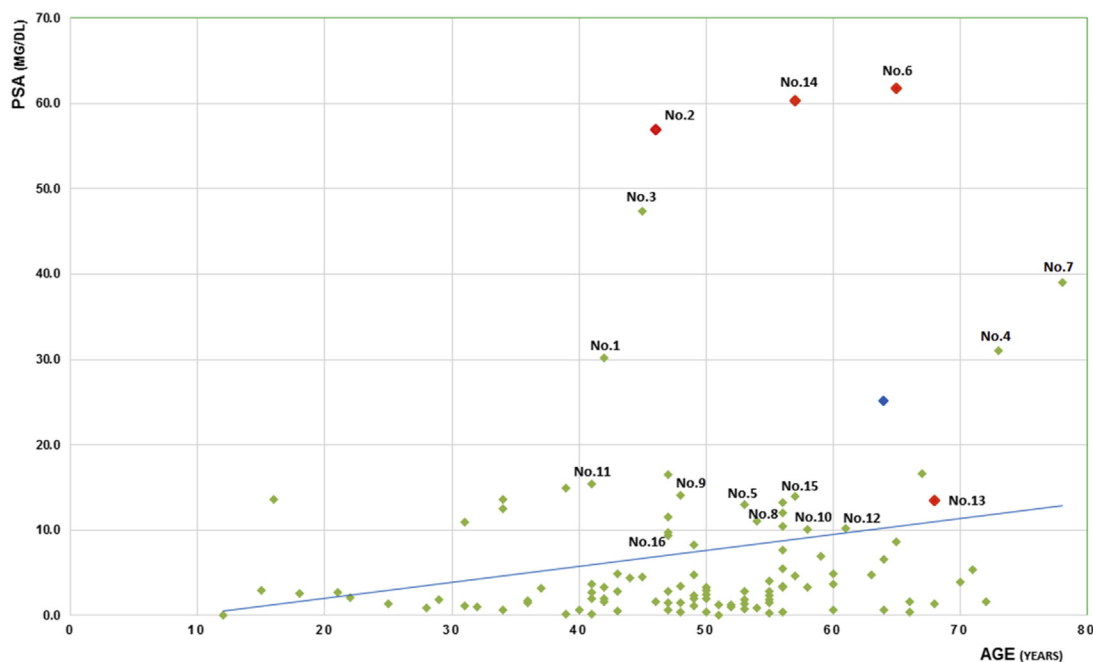


Fig 1. Distribution of the prostate-specific antigen (PSA) levels based on the brain-dead donor's age. Biopsy cases are presented as case numbers in Table 1. Four cases with frozen section biopsy confirming prostate cancer are presented with red rhombuses (◆). The case with a blue rhombus (◆) (a 64-year-old man with a PSA level of 25.1 mg/dL) showed a high index of suspicion for prostate cancer; however, we did not perform a prostate biopsy because he was excluded from the group of brain-dead organ donors owing to an electroencephalogram failing to prove his brain-dead status.

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