INTRODUCTION & OBJECTIVES: Bone scintigraphy has been widely used for identifying bone metastases associated with various types of cancer. Bone is a common site of metastatic spread in patients with advanced renal cell carcinoma (RCC). Contrary to the pattern in some other tumor types such as prostate cancer (PC), bone metastases from RCC are predominantly osteolytic-type. However, some studies reported that osteolytic-type bone metastases were difficult to detect using bone scintigraphy. Recently, computer-assisted diagnosis (CAD) software for bone scintigraphy has been introduced as a clinical quality assurance tool. It is reported that CAD software for bone scintigraphy can improve diagnostic accuracy and that the Artificial Neural Networks (ANN) value calculated by the software can be a useful index for diagnosis. In this study, we assessed the diagnostic utility of the CAD software in RCC patients.

MATERIAL & METHODS: We evaluated the bone scintigraphic images of 600 PC patients and 172 RCC patients from our institution. The ANN value was calculated by the BONENAVI system, the CAD software for bone scintigraphy, utilizing data from a Japanese database. Every patient who underwent bone scintigraphy was classified into one of two groups - those with and those without bone metastases - based on information from multiple modalities including X-ray, computed tomography, magnetic resonance imaging, positron emission computed tomography, and serial bone scan follow-up studies. We then performed receiver-operating characteristic (ROC) analysis and calculated area under the curve (AUC).

RESULTS: A total of 98 patients (72 out of 600 PC patients and 26 out of 172 RCC patients) had bone metastases. The ROC analysis based on the ANN value in both PC and RCC patients showed an ideal shape and was within the optimal cutoff range. In the PC group, the AUC was 0.84, sensitivity was 72%, and specificity was 87% (ANN cutoff value was 0.55). In the RCC group, AUC was 0.84, sensitivity was 73%, and specificity was 82% (ANN cutoff value was 0.47).
CONCLUSIONS: On the basis of the present results, the ANN values calculated using the BONENAVI system could be used as a clinical quality assurance tool in RCC patients with osteolytic-type bone metastases.