It has been a goal of medical sciences that diagnosis of cancer would be performed by simply measuring serum levels of "tumor markers". The purpose of the present report was to overview of the current status in the clinical use of cancer markers.

Most widely-used and well-studied tumor markers are CEA and AFP. Both tumor markers are very useful for follow the response of patients after surgery and to predict the recurrence of cancers. Recently improvement of new imaging modalities are remarkable, such as X-ray CT, ultrasound, single photon emission CT and so on. In order to evaluate AFP as a screening of small hepatocellular carcinoma (HCC) in high risk group, we have selected 356 patients with liver cirrhosis or chronic hepatitis, comparing AFP with ultrasound, conventional liver scintigraphy and single photon emission CT. Nineteen small HCC were found from these patients during 19 months. Elevation of serum AFP more than 50 ng/ml was found only in 7 out of 19 cases (37%), indicating that AFP was not effective in the screening of small HCC even in high risk group and inferior to new imaging modalities.

Tumor markers, recently paid attention to, are Tissue Polypeptide Antigens (TPA) and Carbohydrate Antigen (CA) 19-9. The former was purified from 56 mixed malignant tumors and the latter was the product of monoclonal antibodies. Serum levels of TPA and CA 19-9 were elevated in cancers of gastro-intestinal systems but different from CEA and AFP immunologically. Serum TPA was positive in 53% (21/40) for gastric cancer, 58% (16/30) for colorectal cancer, 80% (4/5) for biliary cancer and 83% (35/42) for pancreatic cancer, respectively. However, in patients with some benign diseases such as gastric ulcer, acute hepatitis and liver cirrhosis, serum TPA concentrations were also elevated, resulting in a relatively high false positive ratio. CA 19-9 is the first human cancer markers of clinical use, which was developed by the application of hybridoma technology. Serum CA 19-9 levels were remarkably elevated in most (more than 90%) patients with pancreas, gallbladder or biliary tract cancers, and was especially useful for the diagnosis and management of pancreas cancers.

These tumor markers have also been used to detect the sites of tumors in vivo. Antibodies to tumor markers is radiolabeled, injected into the patients and localization determined by scintigraphy. This technique was also used in the diagnostic value of tumor markers. We have examined monoclonal antibodies to AFP and osteosarcomas in tumor bearing nude-mice, and results were considered to have great promise for detecting tumors. The advantage of monoclonal antibodies over conventional antiserum is evident due to its homogeneity, with the elimination of unwanted specificities. In the near futures, new tumor markers will be developed by applying hybridoma technology and a variety of monoclonal antibodies against various cancers would be used as tumor markers in vitro and also in tumor localization in vivo.