Role of Nuclear Medicine in breast cancer

Tc-99m Multigated Radionuclide Angiography :

It has been well documented throughout cancer research that the use of multidrug chemotherapy causes heart failure and requires regular monitoring of the left ventricular ejection fraction. Among the fast-growing anti-cancer drugs used to treat breast cancer, anthracyclines and monoclonal antibody trastuzumab, agents have a well-known cardiotoxicity. Anthracycline chemotherapy causes an increase in dose-dependent cardiotoxicity with direct and irreversible cell damage to the myocytes, which can lead to heart failure and cardiac death. Trastuzumab can cause high levels of cardiotoxicity especially when combined with anthracyclines. In addition, radiation therapy and chemotherapy irritate pericardials and thus increase the risk of pericardial effusion problems, making early diagnosis critical for the reduction of primary or underlying related deaths seen in ~ 86% of patients with symptomatic cancer. Cardiovascular disease such as coronary artery disease, valvular disease, constructive pericarditis and myocardial dysfunction involving severe heart failure can significantly reduce a patient's quality of life. Therefore, it is important to effectively determine the patient's level of risk for a cardiac event. The most common way to detect cardiac toxicity and pericardial infarction is to obtain fractional extracts made before and after chemotherapy in patients with breast cancer. Serial testing allows physicians to monitor a patient's heart response to treatment that reduces the risk of chemotherapy-induced comorbidities.

Multigated radionuclide angiography (RNA) or equilibrium radionuclide angiocardiography (ERNA) is considered a gold standard for measuring cardiac function with high frequency and low spectrum variability in chemotherapy patients. RNA is a non-invasive method that uses the Tc-99m pertechnetate erythrocyte label to test regional and global wall movements, ventricular systolic and diastolic function (both right and left ventricular ejection components), and ventricular volumes. Labeling of red blood cells with Tc-99m pertechnetate was performed using in vivo, in vitro, or in vivo modification as described in the literature. In any clinical setting, the selection of a blood pool agent will depend on the acceptable level of image quality, patient discharge requirements, and the professional level of the technical staff. Patient acceptance may also influence product selection. For example, some patients may reject in vitro so-called red blood cells based on religious beliefs about transfusions.