ADVANCED APPLICATIONS OF PET/CT IN VISUALIZING TUMOR SPREAD IN BREAST CANCE

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Introduction: Breast cancer (BC) remains one of the leading causes of cancer morbidity and mortality among women. Accurate staging of the tumor process at the time of initial diagnosis is one of the key factors determining treatment success. In recent years, the introduction of positron emission tomography with ^{18}F-fluorodeoxyglucose (^{18}F-FDG PET/CT) has significantly expanded diagnostic capabilities in oncology. This molecular imaging method makes it possible not only to determine the localization and metabolic activity of the tumor but also to detect distant and occult metastases that are inaccessible to traditional imaging methods such as ultrasound, MSCT, and MRI.

Aim of the Study To assess the clinical significance of ^{18}F-FDG PET/CT in the primary staging of invasive breast cancer and in detecting occult metastatic lesions compared with conventional imaging techniques.

Materials and Methods This retrospective study included 72 female patients with histologically confirmed invasive breast cancer who underwent evaluation at the Department of Nuclear Medicine of the National Children's Medical Center from 2023 to 2025. All patients underwent comprehensive clinical, laboratory, and imaging assessments, including physical examination, breast ultrasound, MSCT/MRI, and ^{18}F-FDG PET/CT. Tumor staging was verified based on surgical outcomes and histopathological analysis, including immunohistochemical (IHC) profiling.

Results and Discussion PET/CT led to a revision of the disease stage in 34 (47%) patients; in 19 of them, previously undetected metastases were revealed in mediastinal lymph nodes, bones, and liver. In 8 patients, the treatment plan was altered in favor of primary systemic therapy (polychemotherapy or immunotherapy), thereby avoiding unjustified surgical intervention. In 5 cases, PET/CT clarified false-positive findings noted on MSCT. The diagnostic sensitivity of the method was 94%, and specificity — 89%.

Conclusion ^{18}F-FDG PET/CT is a highly informative imaging technique that enables accurate staging of breast cancer and early detection of metastatic lesions. Its integration into the initial diagnostic algorithm promotes a personalized approach to treatment, reduces unnecessary surgical procedures, and improves overall therapeutic outcomes.

USE OF THE SYNACTHEN TEST FOR CONFIRMING SUSPECTED ADRENAL INSUFFICIENCY IN CHILDREN.

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Objective: To assess the effectiveness of the Synacthen test in diagnosing secondary, tertiary or iatrogenic adrenal insufficiency, as well as non-classic congenital adrenal hyperplasia (NCCAH).

Methods: Serum cortisol levels were determined to use an electrochemiluminescence immunoassay (ECLIA) on the Cobas e601 analyzer (Roche Diagnostics). The assay was performed in accordance with the manufacturer's guidelines. To ensure the reliability and consistency of the measurements, internal quality of control samples were included each day.

We performed the Synacthen test on 13 pediatric patients (mean age 3.5 months; 6 female, 7 male). Suspected diagnoses included secondary or tertiary adrenal insufficiency (6 patients), iatrogenic adrenal insufficiency due to topical or oral glucocorticoid use (6 patients), and one case of suspected non-classic congenital adrenal hyperplasia. Baseline morning cortisol, ACTH, and 17-hydroxyprogesterone levels were measured at 08:00 to rule out primary adrenal insufficiency and classic CAH. All patients were suspected of having adrenal dysfunction.

Between 08:00 and 09:00, an intravenous line was placed, and baseline cortisol (time 0) was drawn. A bolus dose of intravenous Synacthen (250 micrograms-1.0 ml), (36 micrograms/kg body weight) was administered, and follow-up cortisol levels were taken at 30 minutes. In one patient, additional samples for cortisol and 17-OH progesterone were collected at 0, 30 and 60 minutes. A normal response is an increase in plasma serum cortisol more than >430 nmol at 30 minutes after Synacthen.