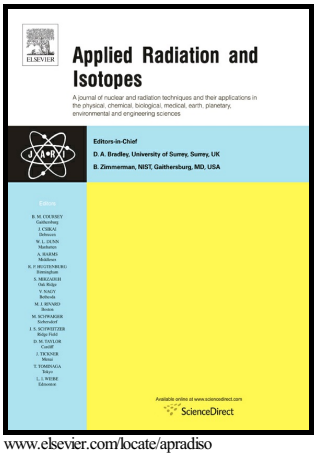

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Automated SPE-based synthesis of 16α-[^{18}F]fluoroestradiol without HPLC purification step

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Abstract

[^{18}F]fluoroestradiol ([^{18}F]FES) is well-established PET radiotracer for diagnosing and monitoring treatment of estrogen-positive breast cancer. The radiotracer is produced via one-pot two steps synthesis using cyclic sulfate precursor and is usually purified by semi-preparative HPLC. Here we suggested simple SPE purification procedure using OASIS WAX 3cc and Sep-Pak QMA light cartridges that afforded [^{18}F]FES in typically 15% RCY (corrected for decay) within 45 min formulated in 5% EtOH/saline. All purity parameters were well within specifications recommended in the Investigator's Brochure for [^{18}F]Fluoroestradiol.

Key words

Fluorine-18; 16α-[^{18}F]fluoroestradiol; [^{18}F]FES; SPE purification; estrogen receptor; PET

1. Introduction

Breast cancer is the most prevalent malignancy and one of the major causes of cancer death in women worldwide (Liao et al., 2016). Approximately 75% of all breast cancer cases can be classified as estrogen-receptor-positive (ER+) breast cancer associated with high rate of response to the endocrine therapy and generally a more favorable prognosis (Barnes et al., 1996; Forbes 2002; Liao et al., 2016). The information about the ER status of the primary tumor and the metastatic lesions in particular is obligatory for the choice of treatment modality. The classical biopsy is considered the gold standard to determine ER status in clinical environment, however sampling errors can occur due to the heterogeneity of estrogen receptor expression within the tumor mass. Whole-body positron emission tomography (PET) imaging with radiolabeled estrogen-type radiotracer 16a-[^{18}F]fluoro-17ß-estradiol ([^{18}F]FES) provides means for non-invasive determination of regional ER expression levels (Dehdashti et al., 1995). During recent years PET with [^{18}F]FES has been used worldwide for detection and staging of the ER+ human breast cancer with a proved impact on the patient management (van Kructen et al., 2013).