

Letter to Editor: Radiation Treatments, Autoimmune Inflammation and PET Imaging

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Running title: Radiation and PET

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PET is a common diagnostic modality and radiation treatments (radiotherapy and radionuclide treatments) are common therapeutic modalities for cancer. PET imaging is commonly used for planning of radiation treatments and to assess response to those treatments. In this letter, I wanted to emphasize possible autoimmune inflammatory PET uptake after radiation treatments which may mimic tumor-metastases. Radiation mainly kills the cancer cells via DNA damage but radiation treatment induced activation of immune system (activation of T cells and other immune cells) via release of tumor antigens, pro-inflammatory cytokines, chemokines, and other danger signals may also contribute to death of cancer cells [1]. Radiobiological effects of radiotherapy can be seen in nearby non-irradiated cells (bystander effect), in nearby cancer cells receiving lower dose (cohort effect) and distant non-irradiated cancer cells (abscopal effect) due to activation of immune system [2]. In abscopal effect, metastatic foci away from the radiotherapy field can shrink secondary to activated immune system and this effect may be visible on PET images. In systemic radionuclide treatments, activation of immune system may contribute to cancer cell death and also may enhance the effect of immunotherapies [3, 4]. Activation of immune system by radiation treatments may cause autoimmune inflammation in various local or remote tissues such as lungs (immune mediated pneumonitis) and these may be visible on PET images, particularly on ^{18}F -FDG PET (similar to side effects of immune check point inhibitor treatments seen on FDG PET images), and require careful evaluation of the images for not mistaking autoimmune inflammation for tumor [5, 6].

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