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Special Issue Reprint

Quantitative PET and SPECT

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Since the introduction of personalized medicine, the primary focus of imaging has moved from detection and diagnosis to tissue characterization, the determination of prognosis, prediction of treatment efficacy, and measurement of treatment response. Precision (personalized) imaging heavily relies on the use of hybrid technologies and quantitative imaging biomarkers. The growing number of promising theragnostics require accurate quantification for pre- and post-treatment dosimetry. Furthermore, quantification is required in the pharmacokinetic analysis of new tracers and drugs and in the assessment of drug resistance. Positron Emission Tomography (PET) is, by nature, a quantitative imaging tool, relating the time–activity concentration in tissues and the basic functional parameters governing the biological processes being studied. Recent innovations in single photon emission computed tomography (SPECT) reconstruction techniques have allowed for SPECT to move from relative/semi-quantitative measures to absolute quantification. The strength of PET and SPECT is that they permit whole-body molecular imaging in a noninvasive way, evaluating multiple disease sites. Furthermore, serial scanning can be performed, allowing for the measurement of functional changes over time during therapeutic interventions. This Special Issue highlights the hot topics on quantitative PET and SPECT.

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