ROLE OF SPECT/CT IN ONCOLOGY

Essay

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Content

List of Abbreviation

AJCC	American joint committee on cancer
ALND	Axillary lymph node dissection
APUD	Amine precursor uptake and decarboxylase
ATP	Adinosine triphosphate
BDFS	Biochemical disease free survival
C.I.	Confidence interval
CAT	Computed axial tomography
CIS	Carcinoma in situ
Co-57	Cobalt 57
DRE	Digital rectal examination
DTC	Differentiated thyroid cancer
DTPA	Diethylene triamine pentaacetic acid
EBR	External beam radiotherapy
EDTMP	Ethylene diamine tetramethylene phosphonate
FAM	Functional anatomical mapping
FBP	Filter backprojectoion
Ga-67	Gallium 67
Ga-68	Gallium 68
GBq	Giga Bicquerel
GE	General electric
GI tract	Gastrointestinal tract
Gy	Gray
HD	Hodgkin disease
HPGe	High purity germanium
I-123	Iodine 123
I-131	Idoine 131
IMT	I-123 alpha methyle tyrosine

In-111	Indium 111
IRAC	Iteration with attenuation correction
IRNC	Iteration without attenuation correction
KD	Kilo Dalton
keV	Kilo electron volt
LEHR	Low energy high resolution
LN	Lymph node
Lu-177	Lutinum 177
mA	Milli Ampere
MAA	Macroaggregated albumin
MBq	Mega Becquerel
mCi	Milli Curi
MDCT	Multidetector computed tomography
MDP	Methylene diphosphonate
MEN	Multiple endocrine neoplasia
MIBG	Metaiodobenzylguanidine
Mm	Millimeter
Mmol	Millimole
MRI	Magnatic resonance imaging
mSv	MilliSievert
MTC	Medullary thyroid cancer
NaI(Tl)	Sodium iodide thallium
NET	Neuroendocrine tumor
Ng	Nanogram
NHL	Non Hodgkin lymphoma
NIS	Sodium iodide symporter
NSCLC	Non small cell lung cancer
OSEM	Order subset expectation maximization
P	Propability

PET/CT	Positron emission tomography/computed tomography
PMT	Photomultiplier tube
PPV	Positive predictive value
PSA	Prostate specific antigen
PSMA	Prostate surface membrane antigen
rh-TSH	Recombinant human-thyroid stimulating hormone
RIT	Radioimmunotherapy
RP	Radical prostatectomy
RT	Radiotherapy
SCC	Squamous cell carcinom
SCLC	Small cell lung cancer
SD	Standard deviation
SIRT	Selective internal radiation therapy
SM	Sestamibi
Sm-153	Sammarium 153
SN	Sentinel node
SNB	Sentinel node biopsy
SPECT/CT	Single photon emission computed tomography/computed tomography
SPN	Solitary pulmonary nodule
SRS	Somatostatin receptor scintigraphy
Ssr	Somatostatin subtype receptor
Tc-99m	Technetium 99m
TF	Tetrofosmin
Tg	Thyroglobulin
Tl-201	Thallium 201
TSH	Thyroid stimulating hormone
UCSF	University of California, Sanfrancisco
US	United State

WB	Whole body
WBS	Whole body scan
WHO	World health organization
Xe-131	Xenon 131
Y-90	Yttrium 90

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Abstract

Single-photon emission computed tomography (SPECT) is accurate methods for detecting cancer and related metabolic abnormalities, but they often do not provide the anatomical landmarks needed to precisely localize lesions. Computed tomography (CT) scan, on the other hand, offer excellent anatomic detail but are less sensitive because they do not provide functional detail. Hybrid imaging in oncological applications improve the anatomical landmarks as well as the attenuation and accurate assessment of radiation dosimetry. The system will lead medical imaging to new horizons.

Key words: SPECT/CT, cancer

Introduction
&
Aim of the Work

Introduction

The increasing clinical demand for more specific diagnostic systems and improved algorithms aimed at optimizing patients' management has contributed to the recent development of hybrid imaging devices capable of coregistering anatomical and functional data. The diffusion into clinical practice of multimodality imaging performed with PET/CT and SPECT/CT enhances both sensitivity and specificity of the non-invasive diagnostic approach to patients with various disorders (1).

Single-photon emission computed tomography (SPECT) has been a mainstay of nuclear medicine practice for several decades. More recently, combining the functional imaging available with SPECT and the anatomic imaging of computed tomography (CT) has gained more acceptance and proved useful in many clinical situations. Most vendors now offer integrated SPECT/CT systems that can perform both functions on one gantry and provide fused functional and anatomic data in a single imaging session. In addition to allowing anatomic localization of nuclear imaging findings, SPECT/CT also enables accurate and rapid attenuation correction of SPECT studies (2).

The recent introduction of a hybrid imaging device containing a low dose CT system and a gamma camera on a single gantry enabled the sequential acquisition of the two imaging modalities, with subsequent merging of data into a composite image display. These hybrid studies have led to a revolution in the field of imaging, with highly accurate localization of tumor sites, assessment of invasion into surrounding tissues, and characterization of their functional status (3).

Aim of the work

The aim of the work is to review the literature of the value of SPECT/CT in :

- *Diagnosis of the primary tumor.*
- *Staging of the disease.*
- *Followup and monitoring of the therapy.*
- *Detection of recurrence.*
- *Dosimetric estimations for target radionuclide therapy.*

Chapter 1

SPECT/CT imaging system