Letter to the Editor

Proactive Response of Nuclear Medicine Department in Current Coronavirus Disease-19 Pandemic

Sir,

The current coronavirus disease-19 (COVID-19) epidemic has affected every field of life internationally. Business, politics, trade, and education have been shut down to prevent loss of lives and limit the transmission. Radiology has played a vital role in the initial evaluation of affected patients, especially in reverse transcription–polymerase chain reaction-negative cases; however, the current focus of most medical imaging departments has shifted from diagnostic capability to preparedness.\(^\text{1,2}\)

The current letter suggests a possible response of nuclear medicine departments during the current pandemic regarding the management of workflow. Given the circumstances, nuclear medicine workflow can be divided into nonurgent, urgent, and equivocal cases to reduce the risk of transmission of infection among the population. A general workflow management for the nuclear medicine department and its potential role in the current pandemic is discussed in Table 1.

**Alternate Radiotracers in Case of Shortage of Tc-99m Supply**

In case of nonavailability of Tc-99m generators, all main oncology bone and cardiology scans can be shifted to positron emission tomography/computed tomography (PET/CT) as per the current SNM and EANM guideline, keeping in view the reimbursement issues [Table 2].

**Incidental Findings of Coronavirus Disease-19 during Normal Flow**

Incidental pulmonary inflammatory findings during oncology PET/CT may be cautiously interpreted. In case of lower lobe/peripheral predominant, multiple, bilateral ground-glass opacities, crazy-paving, air bronchograms, a reversed halo pattern is highly suggestive of COVID-19 infection rather than non-COVID-19 pathology.\(^\text{3,4}\)

**Explorative Research Activities for Coronavirus Disease-19 Imaging**

Looking at the current picture, nonimaging diasporas, i.e., multinational companies, have poured billions of dollars to deal with COVID-19 pandemic, focusing to develop new diagnostic tools and curative therapies. Highly sensitive molecular imaging using \(^{18}\text{F}-\text{fluorodeoxyglucose}\) (\(^{18}\text{F-FDG}\)) has not been widely explored due to its high cost and theoretically is being labeled as of limited role without any large randomized controlled trials. Based on the diversity of the viral behavior limiting initial detection and equivocal postrecovery period diagnostics, it is suggested that large randomized controlled trials should be conducted to establish the role of \(^{18}\text{F-FDG}\), especially in initial diagnostic triage to detect early pneumonitis and in follow-up setting to evaluate residual/recurrent disease and monitoring response to therapy.\(^\text{5}\)

In acute lung injury, the rate of \(^{18}\text{F-FDG}\) uptake reflects the state of inflammatory process activation, i.e., C-reactive protein, CD4, CD8, and interleukin-6, pointing to an acute inflammatory response.\(^\text{6,7}\) COVID-19 infection is believed to comprise the initial infiltration of inflammatory cytokines into the lung, followed by delayed morphological changes that are apparent on HRCT approximately 4–5 days postinfection with a peak reported between 6 and 11 days.\(^\text{8}\) The cost of trials may be covered through multiple agencies in the world ready to fund the COVID-19 research; however, it is a fact that in the gulf region, \(^{18}\text{F-FDG}\) is free of cost for the nationals.

**Staff and Department Safety**

All radiology staff dealing with suspects must practice proper PPE, fluid-resistant (Type IIR) surgical face masks, filtering facepiece (Class 3) respirators, disposable eye protection, preferably visor, long-sleeved gown, gloves, scrubs, and strict hand hygiene. Separate gamma-cameras can be dedicated for COVID-19-confirmed or COVID-19-suspected cases with management of physicians in teams/groups so that in case of any COVID-19 suspicion, other teams may continue the department flow. Postimaging deep cleaning procedures must be adopted using chlorine-based antiseptics and ultraviolet light (if available) for 60–90 min. Patient waiting areas must be cleaned every 3–4 h. A continuous flow of air must be maintained to avoid air stagnation.

**Online Reporting**

Keeping minimal nuclear medicine physicians on-site, the department can offer online reporting through cloud-based image processing stations, i.e., MIM™.

**Future of Nuclear Medicine in Coronavirus Disease-19 Pandemic**

The current epidemic has brought the humanity down on the knees, but we should fight united against the current pandemic in our respective domains. If this would have happened two decades back, nuclear medicine would have been locked down, but now, as we have highly sensitive
targeted radio-tracers with high-tech state of the art digital gamma-cameras, nuclear medicine should be proactive and should take the responsibility to a level to be able to answer the questions of humanity using molecular radiology.

Financial support and sponsorship  
Nil

Conflicts of interest  
There are no conflicts of interest.

Table 1: Suggested nuclear medicine workflow in current COVID-19 pandemic

<table>
<thead>
<tr>
<th>Suggested cancellation</th>
<th>Suggested continuation</th>
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<tr>
<td>C14-UBT, salivary gastric emptying, morphone HIDA, red cell mass, colonic transit sinalcle HIDA, CSF studies, dacrosciintigraphy, small-bowel transit, lymphoscintigraphy, and protocosciintigraphy</td>
<td>GI bleed study, Meckel’s, lung perfusion (SOB), oncology new cases (18F-FDG), preoperative SLN, GFR/DMSA, Y90-SIRT, MPS with acute chest pain, radium-223, Lu-177 DOTATATE, MUGA oncology, amyloid DPD, MPS (chest pain), octreotide/tektrotyd, Ga-68 DOTATATE (staging/therapy, decision), 68Ga PSMA/18F-choline (new case), thyroid Tc-99m/I-123 (adults)</td>
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Equivocal cases

MPS routine, white cell use alternate FDG PET/CT, TI-201 hibernation, 68Ga-PSMA/F-18 choline follow-up cases, lung VQ, MIBG pheochromocytoma, MUGA – cardiac, parathyroid, MAG-3, thyroid Tc-99m/ I-123 (pediatrics), 68Ga-68 DOTATATE follow-up, Ga-68 PSMA follow-up, F-18 FDG follow-up, DaTscan, MIBG heart, general bone scan

Radionuclide therapies

Benefit-to-risk ratio be discussed with the treating physicians, and each patient needs to be assessed at individual basis. Benign 131I therapy can be delayed except for those who cannot tolerate ATT and have comorbid conditions. 177Lu and alpha therapies can be done on OPD basis if the dose is available


| Table 2: List of alternative approved imaging tracers |
| --- | --- | --- | --- |
| Primary radiotracer | Alternate radiotracer | Regions | Reference |
| 99mTc-MDP (prostate and nonprostate) | 18F-NaF PET/CT | Skeletal imaging, tumor imaging, infection/inflammation imaging | EANM |
| 99mTc-sestami 99mTc-tetrofosmin | Thallous chloride-201 | Myocardial perfusion imaging | EANM |
| 99mTc-MDP (prostate cancer) | 68Ga-PSMA | Prostate cancer | Joint EANM and SNMMI |
| 99mTc-HYNIC-TOC | 68Ga-DOTA-TOC | Neuroendocrine tumors | EANM |
| 99mTc-HMPOAO | 68Ga-DOTA-NOC, 68Ga-DOTATATE | Neurodegenerative disease, cerebrovascular disease, epilepsy, brain tumors, brain inflammation and infections | EANM |
| 99mTc-O4 | 123Iodine | Thyroid scan | EANM/SNM |
| 99mTc-DTPA | 123I (sodium iodihippurate) | Renal function | EANM/SNM |
| 99mTc-sulesomab | 111Indium, 67Gallium | Inflammation/infection | EANM/SNM |

WBCs: White blood cells, NAF: Sodium fluoride, PET: Positron emission tomography, CT: Computed tomography, 18F-FDG: 18F-fluorodeoxyglucose, MDP: methyl diphosphonate, HYNICTOC: ethylenediamine N, N’-diacetic acid/hydrazinonicotinamide-Tyr3-octreotide, HMPAO: hexamethylpropyleneamine oxime, ECD: ethyl cysteinate dimer, DTPA: diethylene-triamine-pentaacetate, PSMA: Prostate specific membrane antigen, EANM: European Association of Nuclear Medicine, SNM: Society of nuclear medicine, SNMMI: Society of nuclear medicine and molecular imaging
Letter to the Editor

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Received: 06-04-2020
Accepted: 07-04-2020
Published: 01-07-2020

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