Supplemental Table 1: Radiopharmaceutical, special patient consideration, and dosimetry.

Radiopharmaceutical	Patient preparation	Special consideration	Administered Activity (intravenous)	Uptake time	Dosimetry
^{123}I-MIBG	Procedure guidelines (*1*). No fasting required. Thyroid blockade (*2*,*3*). Abstain from blocking medication that interfere with MIBG uptake (*4*-*7*)	Control hypertension/catecholamine excess: alpha +/- beta blockade (*8*). Beta blocker without alpha blockade should be avoided (*9*). Avoid certain drugs that can result in hypertensive crisis such as steroids or metoclopramide (the above are generally applicable consideration prior to any procedure). Patients often have prominent uptake in brown fat (*10*), not to be confused with lesions.	Adult weight base 80-370 MBq or Children: 5.2 MBq/kg with minimum of 20-37 MBq and maximum 370-400 MBq IV (*1*,*11*,*12*)	Typically, 24h planar/SPECT-CT (*1*)	Effective dose equivalent 0.018mSv/MBq for adult and higher for children (*13*).

^{18}F-FDOPA	Procedure guidelines (*14*); Bozkurt, 2017 #38}. Fasting: 4h. No interfering medication. Consider carbidopa pretreatment (*15-17,18*)		Adults or children: 2-4 MBq/kg typically 150 to 400 MBq IV in adults.	30-90min	The effective dose for adults is 0.025 mSv/MBq for adults and higher for children (*19*)
^{18}F-FDG	Procedure guidelines generally applicable to PHEO/PGL (*20*). Patient are prone to hyperglycemia. Control glycemia prior to injection of FDG if possible. Fasting overnight or at least 4-6h	Patients often have prominent uptake in brown fat (*10*), thus avoid cold temperature.	Adults: 2.5-5 MBq/kg, not to exceed 530 MBq IV(*20*). Pediatric weight-based (*11*).	Typically , 60 min	Adults receive 0.019 mSv/MBq effective dose with dose to children that are slightly higher per administered activity (*19*)
^{68}Ga-DOTA-SSA	Procedure guidelines (*21,22*). No fasting required.	Stopping of somatostatin therapy, is recommended, prior to imaging or therapy. Recent studies suggest it may not to be necessary (*23,24*).	^{68}Ga-DOTATATE 2 MBq/kg up to 200 MBq IV in adults.	60-90 min	Effective dose for ^{68}Ga-DOTATATE is 0.021 mSv/MBq and higher for children (package insert

					https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/208547s011lbl.pdf) . Effective dose for ^{68}Ga-DOTATOC is 0.021 mSv/MBq https://www.accessdata.fda.gov/drugsatfda_docs/label/2019/210828s000lbl.pdf Effective dose for ^{64}Cu-DOTATATE is 0.032 mSv/MBq (https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/21322

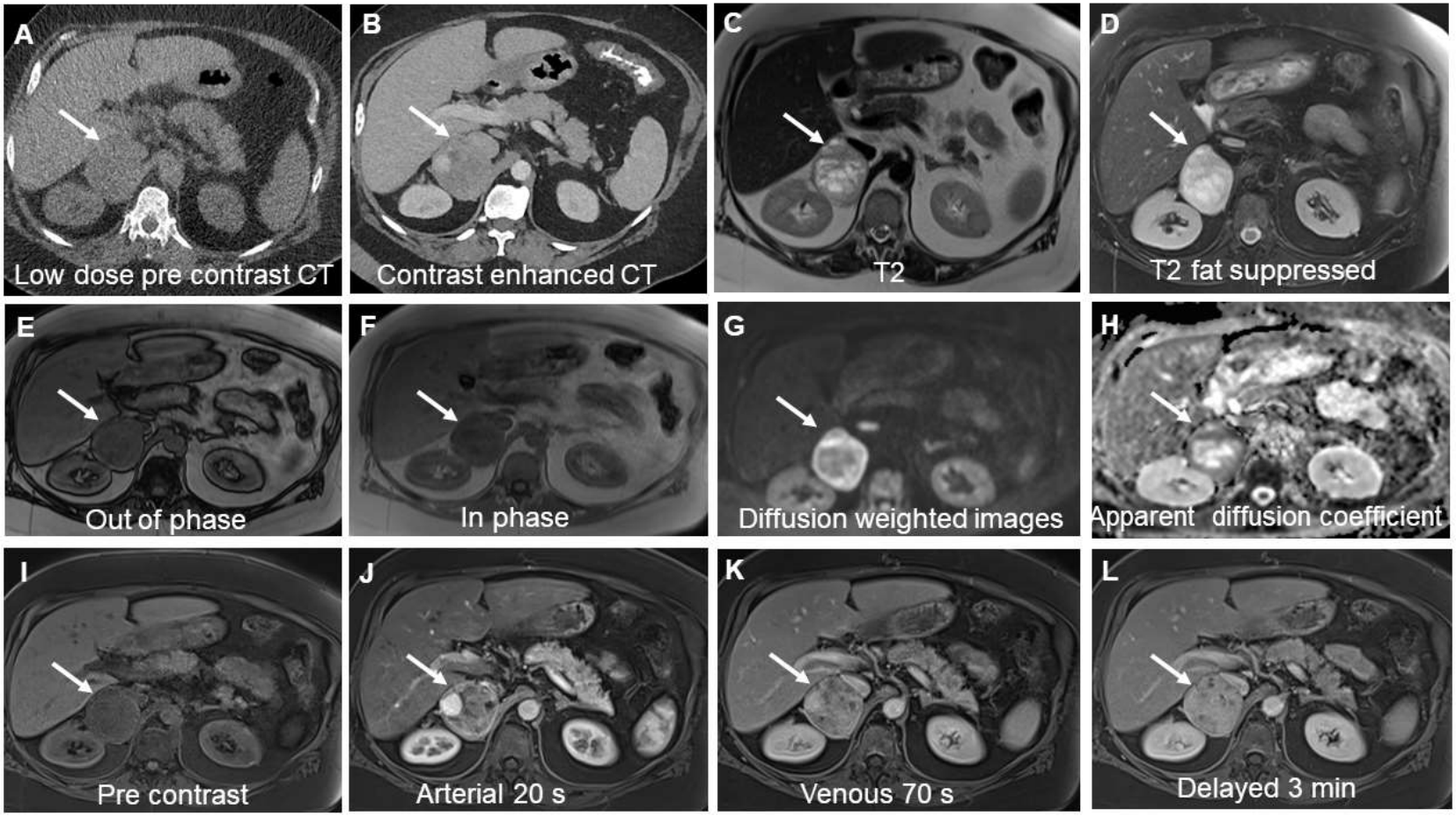
					7s000lbl.pdf)

Supplemental Table 2: Germline mutations, imaging sensitivity.

Gene	Relevant clinical presentation to imaging	^{123}I-/^{131}I-MIBG	DOTA-SST	^{18}F-FDG	^{18}F-FDOPA
RET	MEN2: Predominantly PHEO, PGL are rare (*25*). Usually benign PHEO. Bilateral in 20-72% (*26-29*). Some develop other unrelated tumors. CT/MRI anatomical imaging is usually adequate in MEN2 patients with suspected PHEO.	80-100% sensitivity and lower specificity (*30,31*). Second choice for functional imaging.	100% ^{68}Ga-DOTANOC (*30*). Additional studies needed, preliminary study promising.	33% (*31*)	90%-100% sensitivity and high specificity (*32,33*). (*34*) Modality of choice when functional imaging is needed
VHL	Predominantly benign PHEO, with 2-5% malignant. 20% to 50% of PHEO occur bilaterally/multifocal (*35-37*). Some develop other unrelated tumors.	57%-78% (*38,39*). 40% of bilateral tumors detected (*40*)	Limited data	100% (*39*)	89-100% (*41*) (*42,43*) Modality of choice

MAX	15.8% develop PGL, and 10.5% develop metastatic disease (*44,45*). Very small numbers imaged.	Limited data	57% ^{68}Ga-DOTATATE (*46*)	16% (*46*)	91% (*46*) Modality of choice based on limited data
NF1	Neurofibromatosis 1, PHEO are more common than PGL (*47*); bilateral in 11.5%-20% (*48-51*); 7.3%-10% malignant disease (*49,50*).	50% (*51*)	Limited data	Limited data	100% (*33,51*) Modality of choice
EPAS 1 (HIF2 A) and EGLN 1	Patients develop polycythemia, some also develop somatostatinoma and are associated with PHEO/PGL (*52,53*).	Limited data	35.3% for ^{68}Ga-DOTATATE, (*54*).	42.3% for ^{18}F-FDG (*54*).	98.7% (*54*). ^{18}F-FDOPA is modality of choice

SDHx	Variable phenotype depending on specific genotype. PGL more common than PHEO, some predominantly have HNPGL. Higher incidence of malignancy, specially *SDHB* and *SDHA*. (*55-57*). Imaging results for HNPGL ie predominantly SDHx related can be found in table 3.	43-65%, in metastatic (*58-61*)	94-99% in metastatic (*62,63*). Modality of choice	79-97%, in metastatic (*58,60,62,63*). Second choice for imaging	20%-61% in metastatic (*60,62*)


A
Low dose pre contrast CT
B
Contrast enhanced CT
C
T2
D
T2 fat suppressed
E
Out of phase
F
In phase
G
Diffusion weighted images
H
Apparent diffusion coefficient
I
Pre contrast
J
Arterial 20 s
K
Venous 70 s
L
Delayed 3 min

Supplemental Figure 1. CT and MRI. A 58-year-old female with a 6.0 cm right sporadic PHEO (arrows). (A) CT before contrast administration showing a right adrenal mass with radiodensity 36 HU (B) CT after contrast, portal venous phase. Mass is heterogeneous, with highest 131 HU, intermediate 71 HU, and lowest density 29 HU. (C) T2-weighted and (D) fat-suppressed T2-weighted images depict heterogeneity of mass, with T2-bright character most pronounced relative to normal anatomy in fat-suppressed image. (E) Out-of-phase and (F) in-phase images. There is no measurable signal loss in the out-of-phase images, implying a lipid-poor lesion. (G) Heavily diffusion-weighted and (H) apparent diffusion coefficient images. The bright area in the periphery of the mass in (G) corresponds to the less visually conspicuous dark periphery in (H), both indicating diffusion restriction in parts of the mass. (I) Pre-injection, and (J, 20 sec) early, (K, 70 sec) intermediate, and (L, 3 min) delayed post-injection fat-suppressed images demonstrating heterogeneity and typical intense early enhancement of a portion of the mass, which rapidly fades even as remaining portions of the mass gradually accrete contrast material over the 3 min post-injection interval.

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