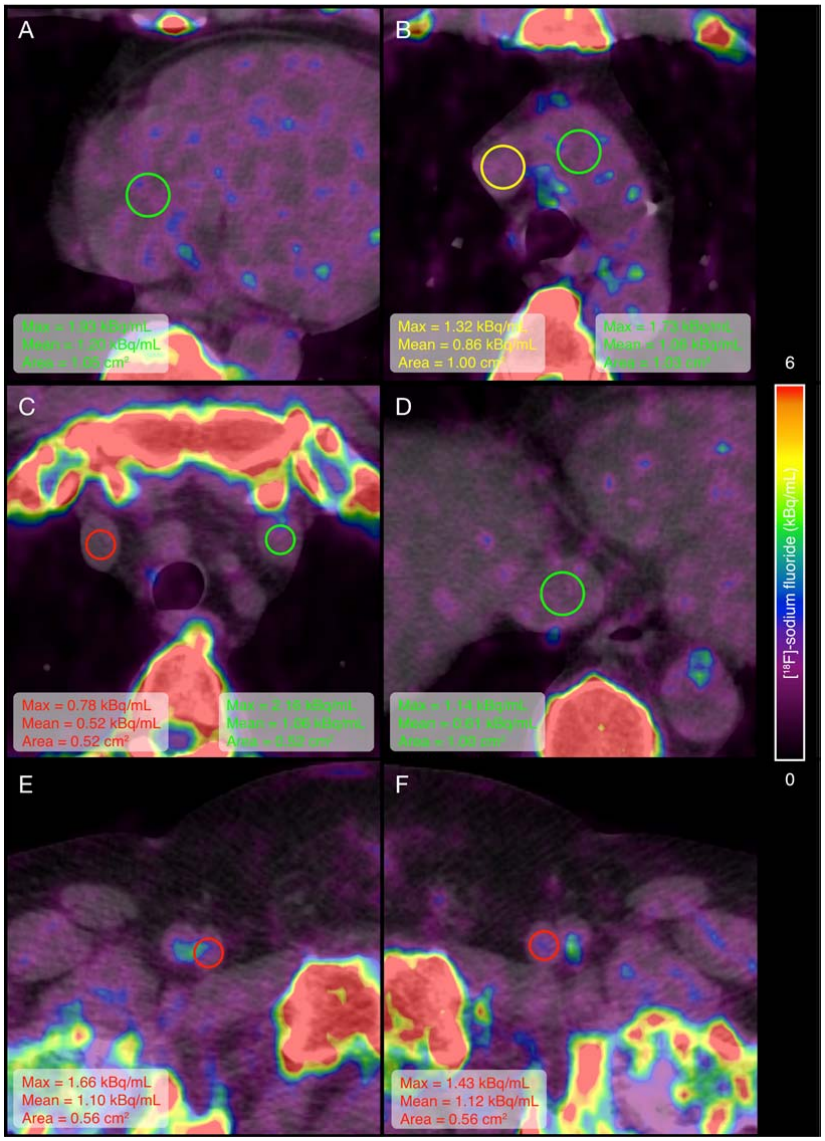
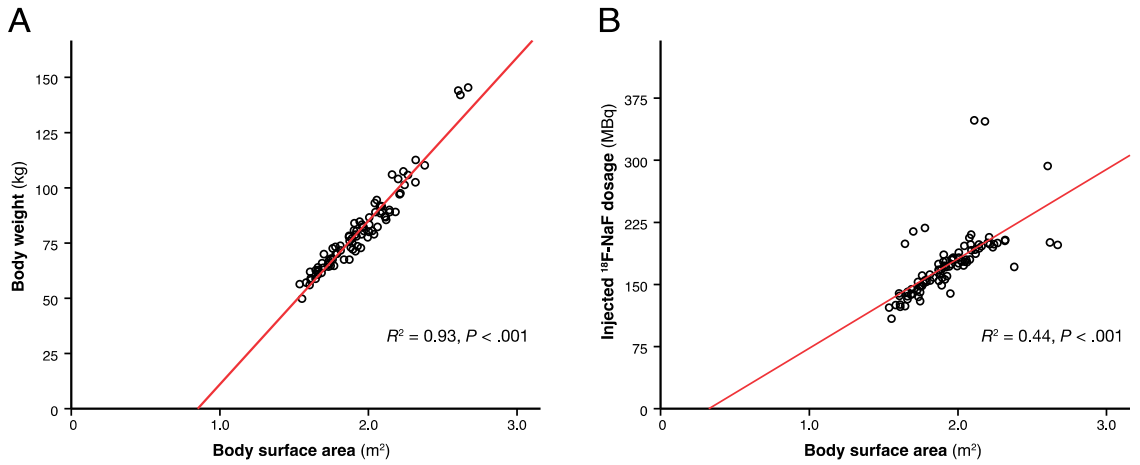


SUPPLEMENTAL FIGURE 1 – Illustration demonstrating quantification of mean ^{18}F-NaF blood activity (bloodNaFMEAN). On axially oriented ^{18}F-NaF PET/CT images, a circular region of interest (ROI), with an approximate area of 1 cm^2, was drawn in the center of the right atrium (**A**), superior vena cava (**B**), aortic arch (**B**), and proximal inferior vena cava (**D**). Similarly, a ROI, with an approximate area of 0.5 cm^2, was drawn in the right and left internal jugular vein (**C**) and right (**E**) and left femoral vein (**F**). Per ROI, the mean ^{18}F-NaF activity (kBq/mL) was determined.



SUPPLEMENTAL FIGURE 2 – Scatter plot of body weight (**A**) and injected dose (**B**) against body surface area. Body surface area significantly associated to body weight (R^2 = 0.93, P < .001) and injected ^{18}F-NaF dose (R^2 = 0.44, P < .001) indicating multicollinearity. Multicollinearity was confirmed statistically by a tolerance statistic of 0.05, 0.06, and 0.35 for body surface area, body weight, and injected dose, respectively. Outliers observed in plot **B** are explained by differences in manual (n = 17) and automatic ^{18}F-NaF administration (n = 72).

$$\mathrm{SUV} = \frac{\mathrm{Na}^{18}\mathrm{F\ activity\ (kBq \cdot mL^{-1}) \cdot body\ weight\ (g)}}{\mathrm{Injected\ dose\ (MBq)}} =$$

$$= \frac{\mathrm{Na}^{18}\mathrm{F\ activity\ (kBq \cdot mL^{-1}) \cdot body\ weight\ (g)}}{\mathrm{2.2\ MBq \cdot body\ weight\ (kg)}} =$$

$$= \frac{\mathrm{Na}^{18}\mathrm{F\ activity\ (kBq \cdot mL^{-1})}}{\mathrm{2.2\ kBq}}$$

SUPPLEMENTAL FIGURE 3 – Equation to normalize ^{18}F-NaF uptake (kBq/mL) in the target of interest to injected dose (MBq) and body weight (g) known as the standardized uptake value (SUV). Body weight dependent ^{18}F-NaF dose administration makes calculation of SUV problematic.

SUPPLEMENTAL TABLE 1 – **Summary of PET/CT system specifications and image reconstruction parameters**

Vender and type	System specifications		Image reconstruction parameters			
	PET scintillator	CT	Iterations/ subsets	Post-hoc filter	Reconstruction matrix	ToF/PSF
GE Discovery STE *(1)*	BGO	16-slice	2/28	6 mm	128x128	No/No
GE Discovery VCT *(1)*	BGO	64-slice	2/28	6 mm	128x128	No/No
GE Discovery RX *(2)*	LYSO	16-slice	2/21	6 mm	128x128	No/No
GE Discovery 690/710 *(3)*	LYSO	64-slice	3/24	5 mm	256x256	Yes/Yes

BGO = bismuth germanate, LYSO = lutetium yttrium oxyorthosilicate, ToF/PSF = time-of-flight and/or point spread function image reconstruction.

1. Teräs M, Tolvanen T, Johansson JJ, et al. Performance of the new generation of whole-body PET/CT scanners: Discovery STE and Discovery VCT. *Eur J Nucl Med Mol Imaging*. 2007;34:1683-92.

2. Kemp BJ, Kim C, Williams JJ, et al., National Electrical Manufacturers Association (NEMA). NEMA NU 2-2001 performance measurements of an LYSO-based PET/CT system in 2D and 3D acquisition modes. *J Nucl Med*. 2006;47:1960-7.

3. Bettinardi V, Presotto L, Rapisarda E, et al. Physical performance of the new hybrid PET/CT Discovery-690. *Med Phys*. 2011;38:5394-411.

SUPPLEMENTAL TABLE 2 – **Intra-rater reliability and agreement of NaFmax and bloodNaFmean**

	ICC	**95 % CI**	**Mean difference** (kBq/mL)	**95% Limits of agreement**
NaFmax				
- Ascending aorta	0.99 *	0.98 to 1.00	0.02	-0.09 to 0.12
- Aortic arch	1.00 *	0.99 to 1.00	-0.02	-0.11 to 0.07
- Descending aorta	1.00 *	0.99 to 1.00	0.01	-0.09 to 0.11
- Coronary arteries	1.00 *	1.00 to 1.00	0.00	-0.04 to 0.04
bloodNaFmean				
- Right atrium	0.90 *	0.60 to 0.97	-0.06	-0.23 to 0.11
- Aortic arch	0.94 *	0.63 to 0.99	-0.08	-0.27 to 0.10
- Right jugular vein	0.95 *	0.81 to 0.99	-0.04	-0.18 to 0.10
- Left jugular vein	0.58	-0.01 to 0.88	0.12	-0.62 to 0.86
- Superior vena cava	0.94 *	0.77 to 0.98	-0.02	-0.13 to 0.10
- Inferior vena cava	0.98 *	0.93 to 1.00	0.00	-0.10 to 0.11
- Right femoral vein	0.97 *	0.79 to 0.99	0.06	-0.08 to 0.19
- Left femoral vein	0.88 *	0.60 to 0.97	-0.03	-0.32 to 0.26

ICC = intraclass correlation coefficient (two-way random effects model assessing absolute agreement of single measures). CI = confidence interval. * $P < .001$.

SUPPLEMENTAL TABLE 3 – **Inter-rater reliability and agreement of NaFmax and bloodNaFmean**

	ICC	**95 % CI**	**Mean difference** (kBq/mL)	**95% Limits of agreement**
NaF_{MAX}				
- Ascending aorta	0.98 *	0.90 to 1.00	0.06	-0.11 to 0.23
- Aortic arch	1.00 *	0.98 to 1.00	0.00	-0.14 to 0.13
- Descending aorta	0.99 *	0.97 to 1.00	0.00	-0.15 to 0.16
- Coronary arteries	1.00 *	1.00 to 1.00	0.00	0.00 to 0.00
$_{BLOOD}NaF_{MEAN}$				
- Right atrium	0.79 *	0.28 to 0.94	-0.11	-0.39 to 0.17
- Aortic arch	0.95 *	0.82 to 0.99	-0.05	-0.24 to 0.14
- Right jugular vein	0.95 *	0.82 to 0.99	0.01	-0.16 to 0.17
- Left jugular vein	0.45	-0.17 to 0.83	-0.16	-1.04 to 0.72
- Superior vena cava	0.98 *	0.94 to 1.00	-0.01	-0.07 to 0.05
- Inferior vena cava	1.00 *	0.99 to 1.00	0.00	-0.04 to 0.05
- Right femoral vein	0.96 *	0.88 to 0.99	-0.03	-0.20 to 0.14
- Left femoral vein	0.89 *	0.61 to 0.97	0.01	-0.29 to 0.31

ICC = intraclass correlation coefficient (two-way random effects model assessing absolute agreement of single measures). CI = confidence interval. * $P < .001$.

SUPPLEMENTAL TABLE 4 – **Determinants of ^{18}F-NaF uptake in the aortic arch**

	Regression coefficient	β	Adjusted R^2	*P* value
1. NaFmax, kBq/mL			.65	**< .001**
Intercept, kBq/mL	3.23 (2.62 to 3.77)			**< .001**
Blood activity, kBq/mL	0.97 (0.68 to 1.40)	0.39		**< .001**
PET/CT system				
- GE Discovery STE	-1.78 (-2.26 to -1.26)	-0.72		**< .001**
- GE Discovery VCT	-1.78 (-2.27 to -1.29)	-0.68		**< .001**
- GE Discovery RX	-1.42 (-1.85 to -1.00)	-0.62		**< .001**
2. TBRmax/mean			.52	**< .001**
Intercept	4.24 (3.44 to 4.91)			**< .001**
Blood activity, kBq/mL	-1.15 (-1.64 to -0.75)	-0.58		**< .001**
Injected dose, 100 MBq	0.46 (-0.04 to 1.09)	0.21		.058
PET/CT system				
- GE Discovery STE	-1.33 (-1.75 to -0.96)	-0.69		**< .001**
- GE Discovery VCT	-1.19 (-1.62 to -0.79)	-0.58		**< .001**
- GE Discovery RX	-1.15 (-1.47 to -0.84)	-0.63		**< .001**
3. bsNaFmax, kBq/mL			.55	**< .001**
Intercept, kBq/mL	3.18 (2.82 to 3.59)			**< .001**
PET/CT system				
- GE Discovery STE	-1.78 (-2.28 to -1.31)	-0.82		**< .001**
- GE Discovery VCT	-1.76 (-2.24 to -1.33)	-0.78		**< .001**
- GE Discovery RX	-1.42 (-1.90 to -0.98)	-0.71		**< .001**

Multivariable linear regression assessing the dependence of aortic arch ^{18}F-NaF uptake on superior vena cava blood activity, renal function, injected dose, circulating time, and PET/CT system. "PET/CT system" was entered as categorical variable into the model with the GE Discovery 690/710 as reference system. Stepwise selection of variables, based on Akaike's information criterion, was performed by a backward elimination strategy. The following quantifiers of arterial ^{18}F-NaF uptake were evaluated: NaFmax, TBRmax/mean, and bsNaFmax. β = standardized regression coefficient. The 95 % confidence interval is presented in parentheses.

SUPPLEMENTAL TABLE 5 – **Determinants of ^{18}F-NaF uptake in the descending thoracic aorta**

	Regression coefficient	β	Adjusted R^2	*P* value
1. NaFmax, kBq/mL			.69	**< .001**
Intercept, kBq/mL	3.84 (2.94 to 4.66)			**< .001**
Blood activity, kBq/mL	0.92 (0.69 to 1.20)	.44		**< .001**
MDRD-eGFR, mL/min/1.73 m^2	-0.01 (-0.02 to -0.00)	-.15		**.014**
PET/CT system				
- GE Discovery STE	-1.40 (-1.78 to -1.01)	-.69		**< .001**
- GE Discovery VCT	-1.36 (-1.76 to -0.95)	-.63		**< .001**
- GE Discovery RX	-1.16 (-1.51 to -0.80)	-.61		**< .001**
2. TBRmax/mean			.57	**< .001**
Intercept	4.83 (4.01 to 5.71)			**< .001**
Blood activity, kBq/mL	-1.21 (-1.70 to -0.87)	-.67		**< .001**
MDRD-eGFR, mL/min/1.73 m^2	-0.01 (-0.02 to 0.00)	-.14		.086
Injected dose, 100 MBq	0.42 (-0.06 to 0.89)	.21		.054
PET/CT system				
- GE Discovery STE	-1.06 (-1.46 to -0.73)	-.60		**< .001**
- GE Discovery VCT	-0.85 (-1.26 to -0.47)	-.46		**< .001**
- GE Discovery RX	-0.93 (-1.28 to -0.66)	-.57		**< .001**
3. bsNaFmax, kBq/mL			.44	**< .001**
Intercept, kBq/mL	3.71 (2.91 to 4.46)			**< .001**
MDRD-eGFR, mL/min/1.73 m^2	-0.01 (-0.02 to -0.00)	-0.18		**.016**
PET/CT system				
- GE Discovery STE	-1.39 (-1.77 to -1.04)	-0.81		**< .001**
- GE Discovery VCT	-1.33 (-1.69 to -0.97)	-0.73		**< .001**
- GE Discovery RX	-1.16 (-1.51 to -0.82)	-0.73		**< .001**

Multivariable linear regression assessing the dependence of descending thoracic aorta ^{18}F-NaF uptake on superior vena cava blood activity, renal function, injected dose, circulating time, and PET/CT system. "PET/CT system" was entered as categorical variable into the model with the GE Discovery 690/710 as reference system. Stepwise selection of variables, based on Akaike's information criterion, was performed by a backward elimination strategy. The following quantifiers of arterial ^{18}F-NaF uptake were evaluated: NaFmax, TBRmax/mean, and bsNaFmax. β = standardized regression coefficient. The 95 % confidence interval is presented in parentheses.

SUPPLEMENTAL TABLE 6 – **Determinants of ^{18}F-NaF uptake in coronary arteries**

	Regression coefficient	β	Adjusted R^2	*P* value
1. NaFmax, kBq/mL			.57	**< .001**
Intercept, kBq/mL	0.32 (-3.80 to 3.11)			.841
Blood activity, kBq/mL	0.86 (0.54 to 1.25)	.40		**< .001**
Injected dose, 100 MBq	0.40 (-0.04 to 1.14)	.17		.156
Circulating time, minutes	0.03 (-0.00 to 0.07)	.13		.091
PET/CT system				
- GE Discovery STE	-1.33 (-1.71 to -0.94)	-.63		**< .001**
- GE Discovery VCT	-1.17 (-1.56 to -0.75)	-.53		**< .001**
- GE Discovery RX	-1.39 (-1.79 to -1.01)	-.71		**< .001**
2. TBRmax/mean			.55	**< .001**
Intercept	4.55 (3.58 to 5.30)			**< .001**
Blood activity, kBq/mL	-1.63 (-2.37 to -1.09)	-.68		**< .001**
Injected dose, 100 MBq	0.79 (0.26 to 1.61)	.30		**.020**
PET/CT system				
- GE Discovery STE	-1.04 (-1.47 to -0.67)	-.44		**< .001**
- GE Discovery VCT	-0.58 (-1.00 to -0.16)	-.23		**.031**
- GE Discovery RX	-1.13 (-1.48 to -0.81)	-.51		**< .001**
3. bsNaFmax, kBq/mL			.43	**< .001**
Intercept, kBq/mL	0.19 (-3.73 to 2.87)			.910
Injected dose, 100 MBq	0.35 (-0.00 to 1.09)	.17		.168
Circulating time, minutes	0.03 (-0.00 to 0.07)	.15		.076
PET/CT system				
- GE Discovery STE	-1.32 (-1.67 to -0.93)	-.72		**< .001**
- GE Discovery VCT	-1.11 (-1.49 to -0.73)	-.57		**< .001**
- GE Discovery RX	-1.39 (-1.78 to -1.00)	-.81		**< .001**

Multivariable linear regression assessing the dependence of coronary artery ^{18}F-NaF uptake on superior vena cava blood activity, renal function, injected dose, circulating time, and PET/CT system. "PET/CT system" was entered as categorical variable into the model with the GE Discovery 690/710 as reference system. Stepwise selection of variables, based on Akaike's information criterion, was performed by a backward elimination strategy. The following quantifiers of arterial ^{18}F-NaF uptake were evaluated: NaFmax, TBRmax/mean, and bsNaFmax. β = standardized regression coefficient. The 95 % confidence interval is presented in parentheses.