Supplemental Table 1. Biodistribution of ^{18}F-AV-45 (Florpiramine F 18) in normal male and female mice. (avg of 3 mice each +/- sem)

%dose/g:Male

Organ	2 min	60 min	120 min	180 min
Blood	2.51 ± 0.31	2.37 ± 0.27	1.96 ± 0.23	1.39 ± 0.13
Heart	6.64 ± 1.39	2.01 ± 0.05	1.70 ± 0.07	1.23 ± 0.08
Muscle	3.49 ± 0.13	1.33 ± 0.08	1.02 ± 0.07	0.78 ± 0.09
Lung	6.61 ± 0.92	2.58 ± 0.28	1.84 ± 0.15	1.37 ± 0.11
Kidney	12.8 ± 2.27	5.94 ± 0.90	3.97 ± 0.72	2.24 ± 0.48
Spleen	3.01 ± 0.59	1.51 ± 0.13	1.38 ± 0.11	0.87 ± 0.06
Liver	16.3 ± 5.38	11.07 ± 1.83	8.96 ± 0.28	5.39 ± 0.31
Skin	1.07 ± 0.05	1.60 ± 0.03	1.28 ± 0.13	0.93 ± 0.12
Brain	7.33 ± 1.54	1.88 ± 0.14	1.80 ± 0.07	1.48 ± 0.15
Bone	1.33 ± 0.24	3.66 ± 0.30	6.48 ± 0.34	7.83 ± 1.08
Thyroid	5.00 ± 1.44	2.63 ± 1.06	1.73 ± 0.46	1.71 ± 0.35
Pancreas	3.94 ± 0.88	2.27 ± 0.64	1.42 ± 0.18	0.96 ± 0.11
Stomach	2.82 ± 0.85	4.39 ± 1.56	4.06 ± 1.75	1.49 ± 0.10
Intestine	5.11 ± 0.82	12.46 ± 0.67	12.9 ± 0.75	11.8 ± 0.38
Urogenital system	1.95 ± 0.43	26.1 ± 3.85	22.2 ± 0.99	5.38 ± 4.13
Testes	2.09 ± 0.50	1.60 ± 0.16	1.25 ± 0.21	0.92 ± 0.10
Tail	26.8 ± 14.63	2.54 ± 0.14	2.35 ± 0.21	4.77 ± 4.23
Fat	1.63 ± 0.34	1.91 ± 0.36	1.29 ± 0.28	0.49 ± 0.33
Carcass	2.95 ± 0.21	1.80 ± 0.05	1.85 ± 0.05	1.60 ± 0.09

	2 min	60 min	12 0min	180 min
% total counted	96.70 ± 0.24	78.59 ± 3.69	72.36 ± 3.14	61.06 ± 2.98

%dose/g:Female

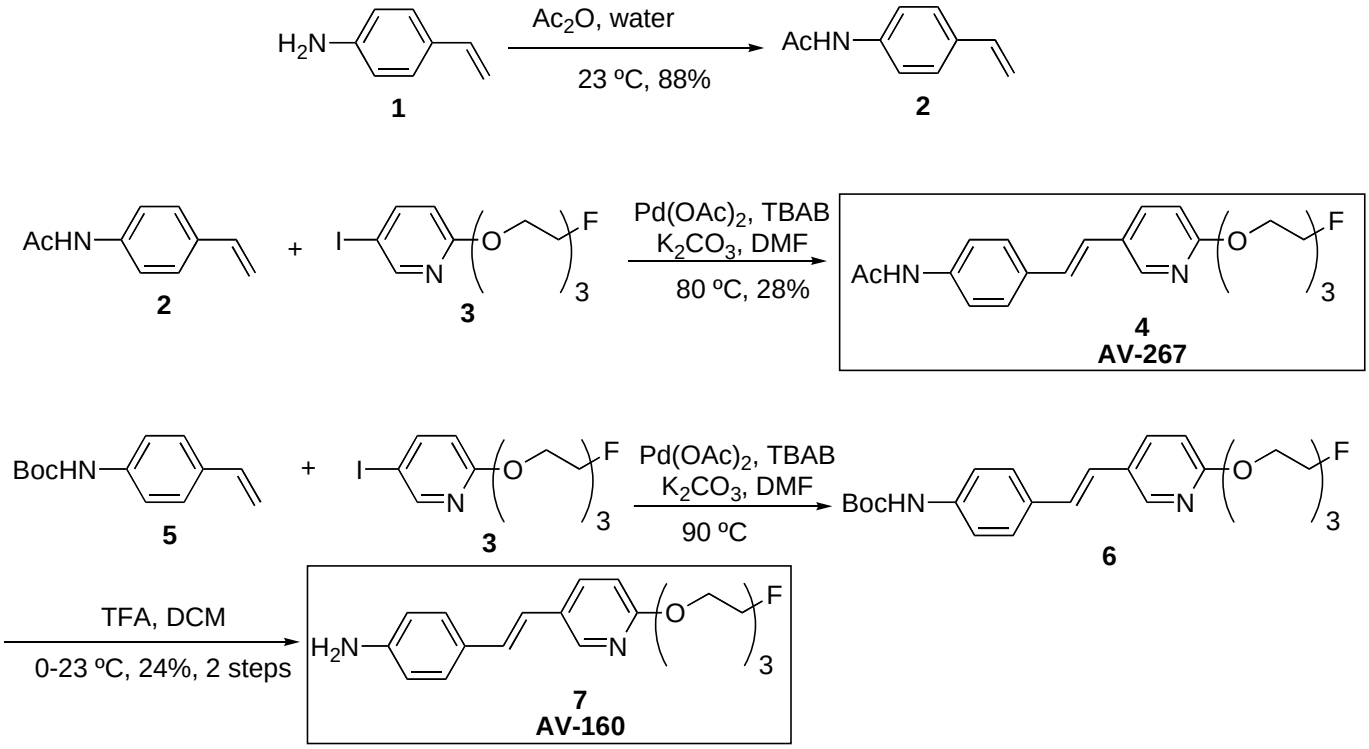
Organ	2 min	60 min	120 min	180 min
Blood	1.94 ± 0.19	2.52 ± 0.23	1.69 ± 0.11	1.55 ± 0.44
Heart	4.75 ± 0.21	1.96 ± 0.28	1.42 ± 0.20	1.22 ± 0.19
Muscle	3.27 ± 0.56	1.29 ± 0.12	0.83 ± 0.08	0.69 ± 0.12
Lung	4.82 ± 0.42	2.41 ± 0.49	1.64 ± 0.18	1.41 ± 0.28
Kidney	9.62 ± 0.71	4.29 ± 0.84	2.40 ± 0.35	1.88 ± 0.38
Spleen	2.40 ± 0.12	1.42 ± 0.25	0.99 ± 0.03	0.85 ± 0.18
Liver	13.2 ± 4.21	9.99 ± 0.95	6.98 ± 0.32	5.07 ± 0.72
Skin	0.68 ± 0.14	1.71 ± 0.07	1.12 ± 0.15	0.95 ± 0.26
Brain	6.23 ± 1.05	1.84 ± 0.25	1.55 ± 0.18	1.38 ± 0.23
Bone	1.19 ± 0.18	3.19 ± 0.45	5.43 ± 0.40	6.66 ± 0.59
Thyroid	4.67 ± 1.33	2.05 ± 0.34	2.57 ± 0.66	1.60 ± 0.31
Pancreas	3.34 ± 0.26	1.82 ± 0.11	1.17 ± 0.17	0.98 ± 0.18
Stomach	1.86 ± 0.69	4.20 ± 0.34	3.55 ± 0.97	2.24 ± 0.55
Intestine	3.99 ± 0.55	11.3 ± 1.99	12.2 ± 0.24	12.7 ± 1.58
Urogenital system	1.66 ± 0.09	5.02 ± 0.84	2.23 ± 0.63	1.58 ± 0.49
Ovary & Uterus	1.96 ± 0.17	1.74 ± 0.28	1.12 ± 0.13	1.03 ± 0.27
Tail	22.5 ± 3.93	2.29 ± 0.10	1.99 ± 0.21	2.17 ± 0.22
Fat	0.74 ± 0.03	2.19 ± 0.24	1.03 ± 0.34	0.59 ± 0.26
Carcass	2.80 ± 0.29	1.69 ± 0.17	1.43 ± 0.12	1.45 ± 0.23

	2 min	60 min	120min	180 min
% total counted	95.0 ± 2.43	77.3 ± 0.48	66.6 ± 3.61	61.4 ± 2.37

Experimental Procedure for Biodistribution in Mice

CD-1 mice (20-26 g, male and female) were injected with ^{18}F-AV-45 (10 μCi, 150 μl formulated in10% EtOH in 90% Saline with 0.5% ascorbic acid) directly into the tail vein. The mice were sacrificed by cardiac puncture under isoflurane anesthesia at various time-points (2, 60, 120 and 180 min) post injection. The organs were removed and weighed, and the radioactivity were counted with an automatic gamma counter. The percentage dose per organ was calculated by a comparison of the tissue counts to suitably diluted aliquots of the injected material. The %dose/g of samples was calculated by comparing the sample counts with the count of the diluted initial dose. Each time points consisted of a group of 3 animals.

Preparation of two major metabolites (AV-267 and AV-160):



Supplemental Scheme 1. Synthetic route to metabolites of ^{18}F-AV-45 (florpiramine F-18), non-radioactive analogs.

Experimental

***N*-(4-vinylphenyl)acetamide**. A suspension 1.32 g of 90% vinyl aniline in 40 mL of deionized water was stirred vigorously, and 2.5 mL of Ac_2O was added dropwise over three min. A precipitate formed during the addition. The mixture was stirred 14 h, vacuum filtered, washed with 100 mL of water, and dried under vacuum to give 1.42 g (88%) of the title compound as a light brown solid. ^{1}H NMR ($CDCl_3$) 7.47 (d, J = 8.4 Hz, 2H), 7.34 (d, J = 8.4 Hz, 2H), 6.67 (dd, J = 17.6, 10.9 Hz, 1H); 5.67 (d, J = 17.6 Hz, 1H), 5.18 (d, J = 10.9 Hz, 1H), 2.16 (s, 3H). HRMS (ESI) calcd for $C_{10}H_{12}NO$ $(M+H)^+$ 162.0919, found 162.0923.

(*E*)-*N*-(4-(2-(6-(2-(2-(2-fluoroethoxy)ethoxy)ethoxy)pyridin-3-yl)vinyl)phenyl)-acetamide. A solution of 0.20 g of styrene **2** and 0.38 g of known iodide **3** was dissolved in 5 mL of dry DMF. The solution was treated at once with 1.07 g of tetra-*n*-butyl ammonium bromide (TBAB) and 0.66 g of K_2CO_3. The resulting suspension was degassed by purging with N_2 for 5 minutes and then 0.030 g of $Pd(OAc)_2$ was added. The reddish-brown mixture was stirred 16 h at 80 ºC and poured into 50 mL of water. The resulting suspension was vacuum filtered, dried, and purified by column chromatography to yield 0.108 g (28%) of the title compound as a brown solid. ^{1}H NMR ($CDCl_3$) 8.15 (d, J = 2.4 Hz, 1H), 7.75 (dd, J = 2.4, 8.8 Hz, 1H), 4.67 (m, 1H), 4.49 (m, 2H), 4.44 (m, 1H), 3.89-3.65 (m, 8H), 2.17 (s, 3H). ^{13}C NMR ($CDCl_3$) 168.2, 163.1, 145.6, 137.4, 135.4, 133.3, 127.4, 127.4, 127.0, 126.8, 124.0, 120.0, 111.4, 84.8, 81.5, 70.9, 70.8, 70.6, 70.3, 69.8, 65.3, 24.6. HRMS (ESI) Calcd for $C_{21}H_{26}FN_2O_4$ $(M+H)^+$ 389.1877, found 389.1877.

(*E*)-4-(2-(6-(2-(2-(2-fluoroethoxy)ethoxy)ethoxy)pyridin-3-yl)vinyl)benzenamine. A solution of 0.560 g of known styrene **5** and 0.681 g of known iodide **3** was dissolved in 20 mL of dry DMF. This solution was treated at once with 2.50 g of tetra-*n*-butyl ammonium bromide (TBAB) and 1.50 g of K_2CO_3. The resulting suspension was degassed by purging with N_2 for 5 minutes, and 0.061 g of $Pd(OAc)_2$ was added. The reddish-brown mixture was stirred 18 h at 90 ºC and poured into a mixture of 50 mL water and 50 mL brine. The resulting suspension was vacuum filtered, dried, and purified by preparative thin-layer chromatography to yield crude (*E*)-*tert*-butyl 4-(2-(6-(2-(2-(2-fluoroethoxy)ethoxy)ethoxy)pyridin-3-yl)vinyl)phenylcarbamate (**6)**, which was immediately taken on to the next step without further purification. The crude **6** was dissolved in 60 mL DCM, the solution cooled to 0 ºC, and treated dropwise with 5 mL of TFA. The mixture was allowed to warm to 23 ºC after the addition of TFA and stirred at that temperature for 24 h. The reaction was carefully quenched with 5 mL of 10 N aq. NaOH and diluted with 20 mL of H_2O. The layers were separated, the aqueous layer was extracted three times 20 mL with DCM, and the organics were dried and concentrated to yield crude **7**, which was purified by preparative thin-layer chromatography to yield 0.160 g (24% over two steps) of the title compound as a dark brown solid. ^{1}H NMR ($CDCl_3$) 8.14 (d, J = 2.1 Hz, 1H), 7.74 (dd, J = 8.8, 2.1 Hz, 1H) 7.33 (d, J = 8.4 Hz, 2H), 6.86-6.74, overlapping peaks, 5 H), 5.0-4.4 (bs, 2H), 4.67 (m, 1H), 4.48 (m, 2H), 4.44 (m, 1H), 3.89-3.65 (overlapping peaks, m, 8H). HRMS (ESI) calcd for $C_{19}H_{24}FN_2O_3$ $(M+H)^+$ 347.1771, found 347.1755.