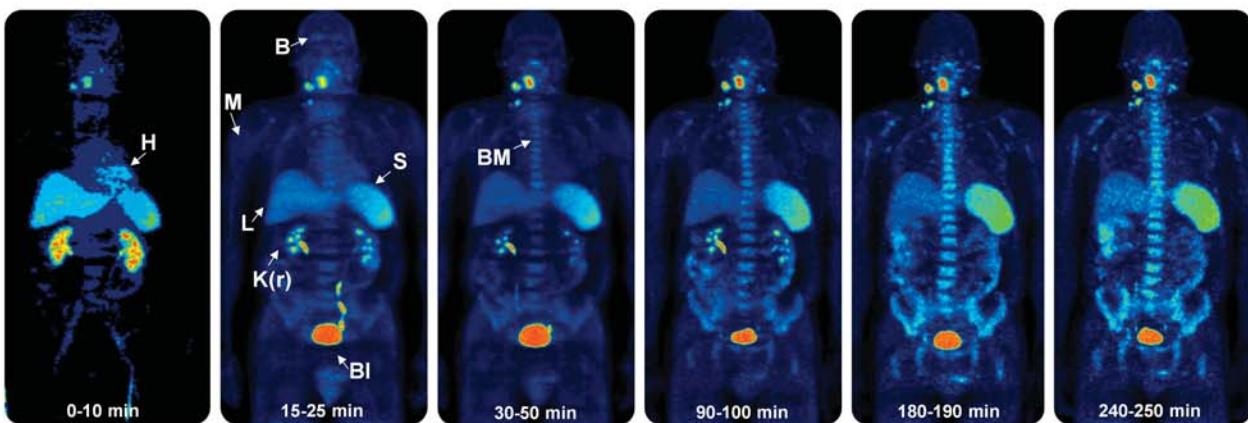
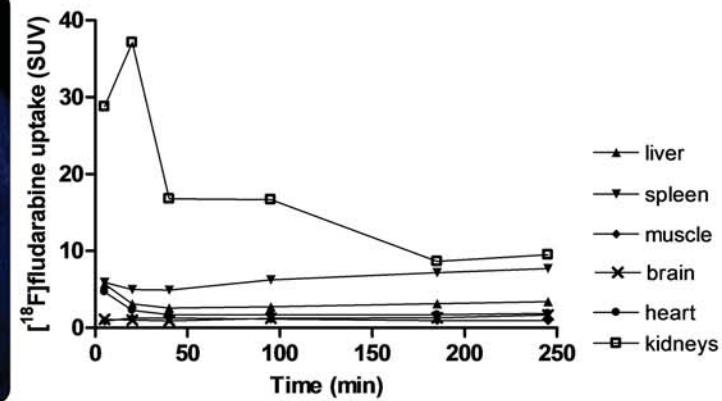
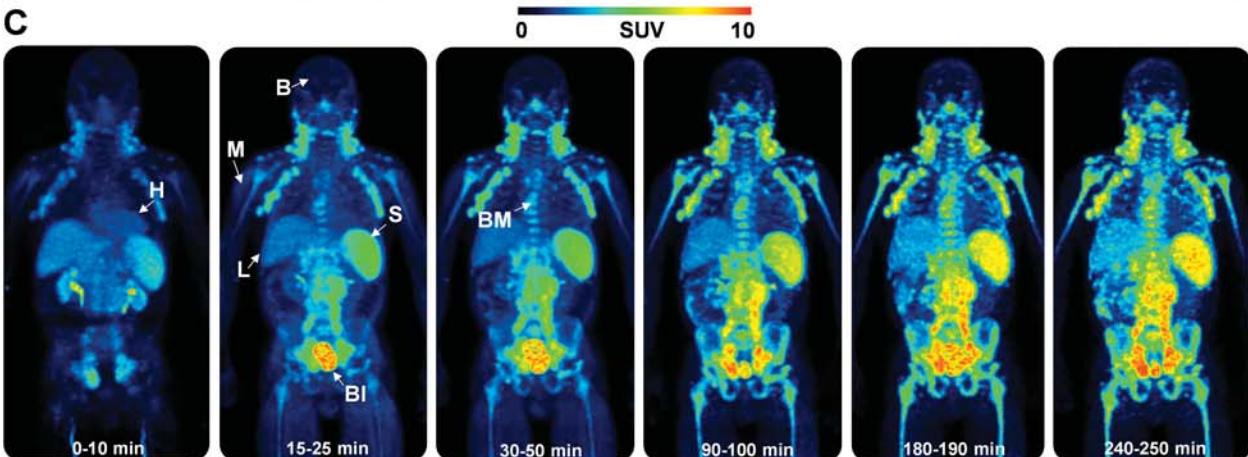
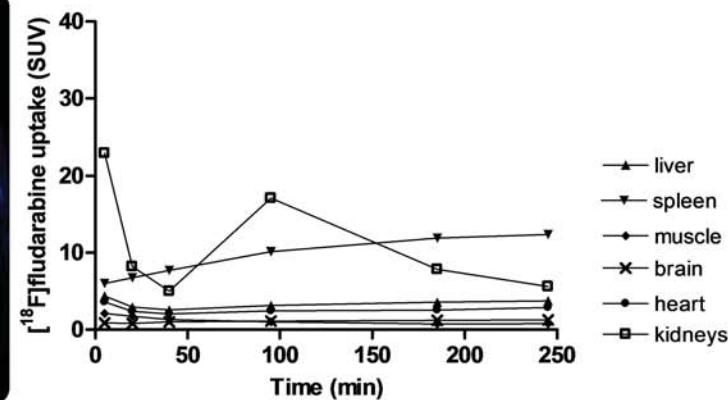


Supplemental Figure 1. Plasma-to-blood radioactivity at two time points (60 and 240 min post-administration) for DLBCL and CLL groups. The plasma-to-blood radioactivity indicated that for DLBCL group 94% of the [¹⁸F]fludarabine remained in plasma at 60 min after injection and 91% at 240 min. For CLL group, these proportions were 57% and 38%, respectively. The results were highly representative of these two lymphoproliferative malignancies: lymphocytosis in CLL as reflected by the elevated activity in blood cells compartment.

A**B****C****D**

Supplemental Figure 2. Decay corrected anterior maximum-intensity projections (MIP) of PET scans with imaging intervals of 0-10, 15-25, 30-50, 90-100, 180-190, 240-250 minutes after injection of $[^{18}\text{F}]$ -fludarabine A. DLBCL patient (ID5) and C. CLL patient (ID3), displayed using the same color scale. Dynamic changes in radiotracer accumulation (expressed in maximum standardized uptake value) with time in several organs; average of 4 patients per group: B. DLBCL and D. CLL. Immediately after injection, the kidneys and urinary bladder experienced considerable uptake, indicating, in agreement with preclinical studies, the renal route of biological clearance of the $[^{18}\text{F}]$ -fludarabine. B: brain, Bl: bladder, BM: bone marrow, H: heart, K(r): right kidney, L: liver, M: muscle (deltoid), S: spleen.

Supplemental Table 1: Characteristics of DLBCL patients.

ID	Age	Sex	Biopsy		aaIPI*	Staging†
			sites	bone marrow		
2	76	male	right cervical node	failure	0	I
5	58	male	right tonsil	normal	0	II
6	76	male	nasal and right testis	normal	1	IV
8	69	male	mesenteric node	normal	2	IV
9	65	male	right axillary node	normal	1	III

* aaIPI: Adjusted-Age International Pronostic Index; † Lugano classification

Supplemental Table 2: Nodal and Extra-nodal sites detected in DLBCL patients according to CT, ¹⁸F-FDG-PET (60-80 min post administration) and ¹⁸F-fludarabine-PET (I: 30-50 min, II: 90-100 min and III: 240-250 min post administration).

ID	Scan	Cervical	Infraclavicular	Axillary	Mediastinal	Hilar	Mesenteric	Para-aortic	Iliac	Inguinal	Spleen	Others
	CT	+										
	FDG	+										
2	Fluda I	8.3		NA	NA	NA	NA	NA	NA	NA	NA	
	Fluda II	NA		NA	NA	NA	NA	NA	NA	NA	NA	
	Fluda III	NA		NA	NA	NA	NA	NA	NA	NA	NA	
	CT	+										right-tonsil
	FDG	+										right-tonsil
5	Fluda I	9.1										4.5 right-tonsil(11.5)
	Fluda II	12.6										5.5 right-tonsil(13.7)
	Fluda III	14.3										7.7 right-tonsil(17.9)
	CT	+										nasal/pharynx
	FDG	+	+									nasal/pharynx/testis
6	Fluda I	8.8	4.1									5.9 nasal(7.9)/pharynx(6.1)
	Fluda II	10.4	6.2									7.9 nasal(10.2)/pharynx(8.4)
	Fluda III	10.8	6.2									8.5 nasal(10.7)/pharynx(8.9)
	CT	+			+	+	+	+				
	FDG	+	+		+	+	+	+	+			humerus/iliac-lytic
8	Fluda I	5.2	4.3		4.4	3.6	4.6	4.0	4.7	3.1	3.5	humerus(4.1)/iliac-lytic(3.0)
	Fluda II	5.2	5.7		5.8	4.5	5.5	4.7	4.5	3.2	4.2	humerus(4.8)/iliac-lytic(3.1)
	Fluda III	4.5	5.2		6.3	5.3	6.2	5.3	5.9			humerus(5.1)
	CT	+			+	+	+	+	+			
	FDG	+		+	+	+	+	+	+			
9	Fluda I	5.8			3.3		4.9	4.5	3.5		5.7	
	Fluda II	8.0		3.4	3.9		8.5	7.2	5.3		7.5	
	Fluda III	8.9		3.9	4.2		15.9	13.6	11.9		9.8	

SUV_{max} of ¹⁸F-fludarabine > liver uptake are indicated. Liver (SUV_{max} 2.58±0.37_{30-50min}, 2.74±0.36_{90-100min}, 3.43±0.35_{240-250min}) was considered as reference region. NA: regions not included in the field of view (FOV) or short acquisition period – the FOV was limited with cervical region (1 bed position) and the scan acquisition was 60 min.

Supplemental Table 3: Characteristics of CLL patients.

ID	Age	Sex	ALC x1000/ μ L*	Splenomegaly	Staging†
1	70	male	209	yes	B
3	69	male	181	yes	B
4	51	female	58	yes	B
7	65	female	200	no	B
10	69	female	89	yes	B

*ALC: absolute lymphocyte count; † Binet classification

Supplemental Table 4: Nodal and Extra-nodal sites detected in CLL patients according to CT and ^{18}F -fludarabine-PET (I: 30-50 min, II: 90-100 min and III: 240-250 min post administration).

ID	Scan	Cervical	Axillary	Mediastinal	Hilar	Mesenteric	Para-aortic	Iliac	Inguinal	Spleen	Bone marrow	Others
	CT		+									
1	Fluda I		5.0			NA	NA	NA	NA	NA	NA	
	Fluda II		NA			NA	NA	NA	NA	NA	NA	
	Fluda III		NA			NA	NA	NA	NA	NA	NA	
	CT	+	+	+	+	+	+	+	+	+	+	
3	Fluda I	6.3	5.8	3.7	2.7	4.3	7.2	7.4	4.4	6.4	3.8	
	Fluda II	8.3	7.9	6.5	3.5	6.8	10.1	10.9	6.4	7.8	5.2	
	Fluda III	8.7	9.9	7.9	4.3	7.5	11.8	12.2	8.3	10.5	6.7	
	CT	+	+	+	+	+	+	+	+	+	+	liver
4	Fluda I	6.7	6.9	4.3	3.1	4.4	5.4	6.5	3.5	7.7	5.4	liver(4.2)/nasal(3.5)
	Fluda II	7.5	8.9	5.7	3.6	5.8	6.6	9.3	4.7	10.0	6.7	liver(5.3)/nasal(3.8)
	Fluda III	8.2	8.9	7.3	5.4	8.6	8.1	11.9	6.0	11.2	8.9	liver(5.8)/nasal(4.1)
	CT	+	+				+					
7	Fluda I	5.8	4.8	3.7			3.4	5.4	7.0	3.6	nasal(4.0)	
	Fluda II	7.3	7.1	5.4	4.5		4.8	5.4	9.2	5.3	nasal(4.7)	
	Fluda III	9.7	9.1	5.1	4.2		5.1	7.0	11.5	6.9	nasal(5.7)	
	CT	+	+	+			+		+		liver	
10	Fluda I	6.8	5.7	4.7		4.0	3.4	4.8	9.9	4.7	skull(4.8)	
	Fluda II	9.2	8.2	6.1		5.6	4.1	7.2	13.7	6.4	skull(6.5)	
	Fluda III	9.4	10.2	8.5		7.3	5.3	10.2	16.4	8.0	skull(8.0)	

SUV_{max} of ^{18}F -fludarabine > liver uptake are indicated; in case of bilateral nodal involvements, the highest uptake value is reported. Liver ($\text{SUV}_{\text{max}} 2.59 \pm 0.07_{30-50\text{min}}, 3.14 \pm 0.10_{90-100\text{min}}, 3.76 \pm 0.08_{240-250\text{min}}$) was considered as reference region. NA: regions not included in the field of view (FOV) or short acquisition period – the FOV was limited with axillary region (1 bed position) and the scan acquisition was 60 min.

Supplemental Table 5: Organ absorbed doses (mGy/MBq) estimates for ^{18}F -fludarabine for A. DLBCL and B. CLL patients

A

Organ	Mean (n=4)	%CV	Minimum	Maximum
Brain	0.0069	30.16	0.0053	0.0099
heart wall	0.0112	7.80	0.0103	0.0119
kidneys	0.0127	38.53	0.0085	0.0189
liver	0.0181	22.84	0.0126	0.0216
lungs	0.0056	7.23	0.0051	0.0061
spleen	0.0228	31.40	0.0173	0.0330
Effective dose (mSv/MBq)	0.0081	6.26	0.0074	0.0085

B

Organ	Mean (n=4)	%CV	Minimum	Maximum
Brain	0.0076	26.56	0.0059	0.0098
heart wall	0.0146	17.97	0.0120	0.0180
kidneys	0.0202	39.66	0.0152	0.0320
liver	0.0290	21.68	0.0225	0.0372
lungs	0.0078	21.56	0.0063	0.0102
spleen	0.0523	58.92	0.0218	0.0951
Effective dose (mSv/MBq)	0.0126	14.73	0.0105	0.0144