







































































Scintillator Materials										
	Nal (TI)	BGO	GSO	LSO	LYSO	LaBr <sub>3</sub>				
Density [g/ml]	3.67	7.13	6.71	7.35	7.1	5.29				
1/μ [cm]	2.88	1.05	1.43	1.16	1.2	~2				
Index of Refraction	1.85	2.15	1.85	1.82	1.81	1.9				
Hygroscopic	Yes	No	No	No	No	Yes				
Rugged	No	Yes	No	Yes	Yes	Yes				
Peak Emission [nm]	410	480	430	420	420	380				
Decay Constant [ns]	230	300	60	40	41	25				
Light Output	100	15	35	75	75	>100				
Energy Resolution	7.8	20	8.9	<9	11	7.5				











































Time-of-flight PET - 1980's

Problems with TOF in the 80's Poor detection efficiency of available scintillators

TOF Gain did not offset the poor efficiency

To improve the efficiency, large detector modules were used

A more significant gain in S/N could be achieved by using high resolution detectors and conventional detection methods (Phelps, Hoffman, Huang, 1982).



## Geminit TF - patient studyRectal carcinoma metastases in<br/>mesentery and bilateral iliac chains114 kg; BMI = 38.1<br/>2 mCi; 2 hr post-inj<br/>3min/bedImage: Image: Image:





Hopele (F) Deso: Section (C) Revers) Tracer (FDG Reversing Physicaer Unknown					Control and patters average pixel value	- where the norm	miliped to the miliped to the	and a sale france for the			
R	6	3	LR				6	3	۲	0	0
1	Ç		2		2	Tetars	And Parent Due	(Denters 20)	0	0	6
Mont Brail	K	4	FDS-Br	an-Normal		-			-	-	
Hypote	tinbolic Plag	kana .		-					6.23	6.7.2	6.2
	-	- Segion	Mean AC	SD AC	Patient (Pt)	PEMEAC2	ASD trut MI)	NO.I	176 N.	10030	0000
	1	raft and	1.00	0.04	0.83	-0.67	.1.78		<b>U 1 1 1</b>	812.7	8 22 4
		rPL #18	1.05	0.04	0.75	-0.27	-6.71	-	1997	1907	1007
	- 4	rófnat7	1.09	0.04	1.02	0.07	-1.67			100	
	5	r3N p17	+ 87	0.04	0.92	-0.17	-4.57		34	35	36
	8	nAVC.p18	1.02	0.04	0.77	0.25	-6.83		-	and the second s	100
	7	ePLată	1.06	0.05	0.75	-0.32	-8.42		1.00	A DOMESTIC:	
	8	rBroce g20	1.08	0.06	0.98	-0.09	-1.75		100 A	00	100
	9	1000 p.m.	1.12	0.02	1.00	0.12	-2.09		E all and	CO.	10.00
	- 10	78VC 020	1.05	0.04	0.55	.0.35	.8.40	-	No.	1000	6.8.2
		6						3 C			
(Dette)	Reache								42	46	12
		Peoper	Mean AC	-SD AC	Patient (PO	R-MAC)	ISD NON MER	01	REGIO	NAL HYPOMETABOLI	SM
	1	rofe	1.01	0.05	1.00	-0.01	-0.18	6	ROI Harris: Juft pos Cing	ulate Cortex	
	2	rona	1.07	0.04	1.15	0.08	2.22		Magnitude of Difference	-9.89	
	3	1071	0.98	0.05	1.00	0.51	2.23		AND HOM M(AC): -2.48	to branching a Mana art	
		1073	1.06	0.03	1,52	0.67	2.15		Negative/.) sign correspon	ale to variants + Minas II C	
	.9	194	1.04	0.04	0.95	.0.92	.284	_	REGIONAL AND CLUSTER	DATA	
	7	LIFL.	0.92	0.05	0.96	0.04	0.04		14VC p36 (Difference)	-0.46) is the most typ	ternet.witchc
		.Pan	0.97	0.05	0.82	-0.04	-0.05		region		
	3	estra .	5.12	0.00	1.03	-0.0%	-2.93		IAVE.p24 (#SD from I	M(AC) -12.73) is the si	igion with the
	10	K0Em	1,12	0.05	1.15	0.03	1.06		most signal are nyper	instances series	
	28	9R.	1.07	0.00	0.77	-0.00	-8.83	*	pAVC (Difference -0.1	(6) is the most hypome	tahtelic cluster
	_		AVC (#SD from M(AC) -15.74) is the cluster with the most								



loopful D: 35350 iracer: NIA			Series Reterni	Series Deep 029-035 Retering Physician DUARA			Reformatted Patient Brain with Cluster Regions					
1	ł	-	LR	And Contraction						18		
9	ę	3		0	0		O O					
fort Drain	/Pre-proc	ssed (Ngld)	Artyke	Hist-Brwn		ų		100	10	De	100	
righ In	Car rorse a	Rection	Mein MC	SDAC	Patient (Pf)	PENCACO	TED from MIG()	2.5	A 1000	855	(2010)	
1	.117	r0Fn.#32	1.2082	0.1597	1,9013	0.6932	1.4252			20	85.76	
	118	rGfs p32	1.1652	0.1576	1.7701	0.5039	10005		7			
	119	r0Fd.p32	0.5007	0.1089	1.6419	0.7412	5 BD63					
	120	IOF1432	1.3189	0.1527	1,9440	0.5251	3.6 (6)	34		35	35	
	121	K9Pm p32	1.0405	0.1307	1.7425	0.7018	5:3717	6440	1.00	100	anim.	
	122	0Fxp32	1.0716	0.1505	1.3813	0.3097			1.154	6 A	40.000	
	123	10F0,µ32	0.9083	0.1116	1.5314	0.6251	5 6007		6 Jaa	20	10.00	
	124	PGP1.032	12/02	0.1004	1,0911	0.6210	ALCON.	1000			10000001	
	125	100a p32	1.0441	0.1596	1,0500	0.0239	CALCULATION OF THE OWNER		1.00	a (20)	1.000	
	107	15M n32	1,0303	0.1360	1.7393	0.6290	1 2241			087		
		PL CA					3			-		
	Regione:							Cortex / Cereb	ellum Ratio:	1.522	02	
Clister		Region	Mean AC	SDAC	Psőent (Pt)	Pt-M(AC)	#SD from M(AC)	FOIr adapted from Cl Database Average	erk Florbebepir 201 en Raties:	2		
Cluster	1	1GP x	1.0445	0.1222	1.5983	0.5537	62317	Low: 1.97	9			
Cluster	2	KOFil	0.9171	0.0695	1,9961	0.6491	7589	High: 1.52	4			
Cluster	3	IGP3	0.9639	0.1101	1.4010	0.4919	1110	Show FIDIs				
Cluster		EN4	1.0295	0.1009	1.5082	0.2492	67700	Rod Barrow				
Cluster	4	DLM	1 1005	0.1060	1,3300	0.5100	19676	Magnitude of Differ	ence			
Cluster	4	1251	0.0034	0.1175	1,2916	0.3982	1000	#SE from M(AC):				
Cluster	4 5 8 7	ISM NOL	11 204 38	- 117.4	1 2260	0.9479	2610	Positive(+) sign correct	pends to values > I	Viean AC		
Cluster	4 5 8 7 8	rSM IsPL rsPL	0.8779	0.0913	1.6600			and the second se		1 C		
Cluster	4 5 8 7 8	rSM ISPL rsPL rGPn	0.8779	0.0913 0.1356	1.7655	0.5740	4 2256	Negative(-) ogn conter	spondo lo values <	NearAL		
Cluster	4 5 9 7 8 9	rSH IsPL rsPL rsPn ISPn	0.8779 1.1916 1.1238	0.0913 0.1356 0.1297	1.7655	0.5740	4.009	Negative() ogn borter	spondo to values «	NeanAL		















































