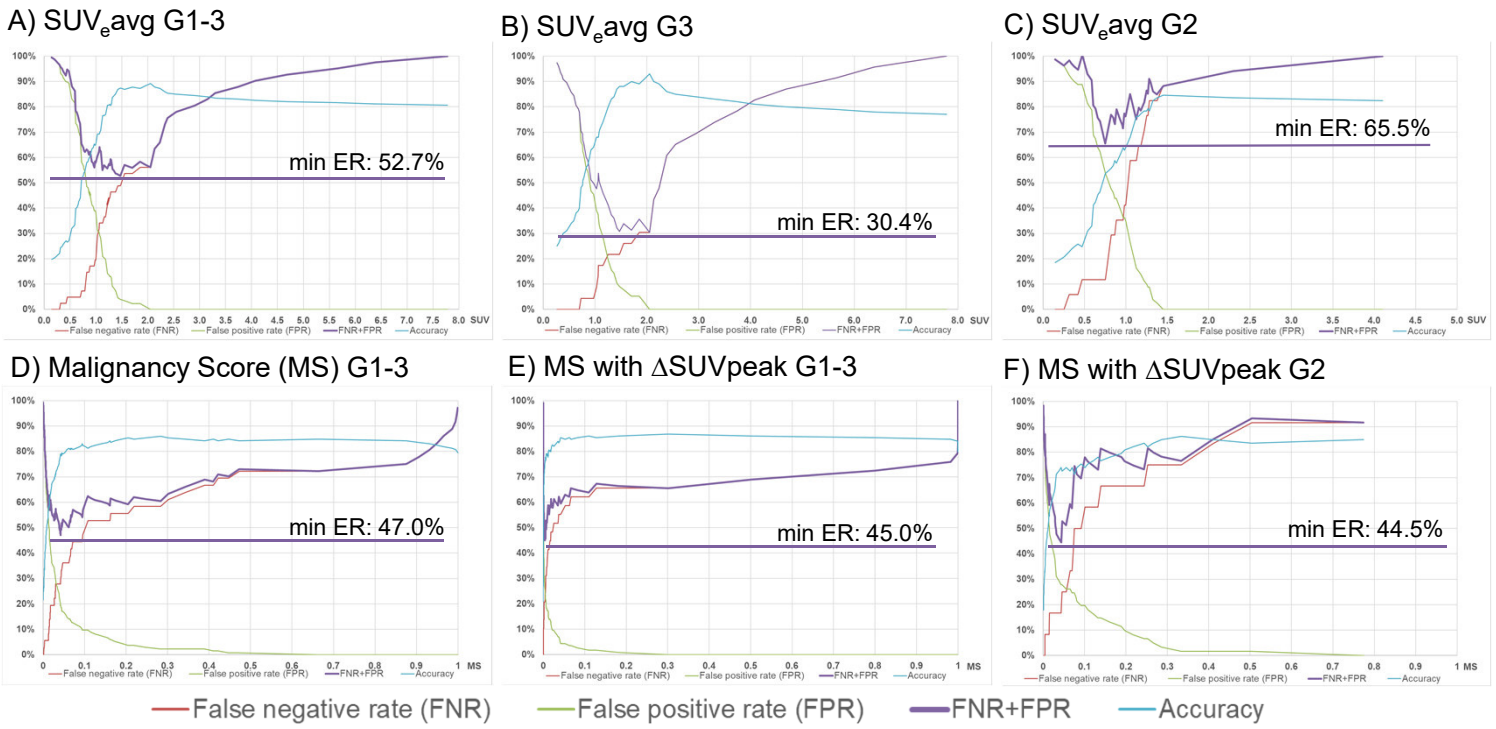


Figure S1. Error rates for the detection of lymph node metastases by single parameter and multiparametric malignancy score in dependence of tumor grading. The multiparametric malignancy score (MS) (**D**) lowers the error rate (ER = false positive rate FNR + false negative rate FPR) about 5 percentage points and stabilizes the ER over a wider range compared to the best single parameter SUV_eavg (**A**). Implementing dual timepoint kinetics (**E**) further enhances this effect and lowers the summed error rate ER by another 2 percentage points compared to the standard MS (**D**). In G2 tumors, this effect is most evident with a significant reduction in summed error rate ER of 21 percentage points from 65.5% (**C**) to 44.5% (**F**). Grade of primary tumor has an huge impact on detectability of lymph note metastases with an doubling of error rates in G2 LNM (C) compared to G3 LNM (**B**) with a sharp increase in FNR starting at an SUV of 1.

Table S1. MRI imaging parameters.

	Slice thickness	Acquisition matrix	In-plane resolution (mm²)	Repetition time	Echo time	Flip angle	Fat saturation
Wholebody							
T2w HASTE cor	5	320x320	1.5625\ 1.5625	1200	91	160	
T2w HASTE tra	5	256x172	0.785\ 0.78125	1200	95	160	
T1w GRE (VIBE) tra	3	384x234	1.3021\ 1.3021	3.95	1.23	10	Dixon fat saturation
DWI (b50/800)	6	128x104	1.7578\ 1.7578	2500	52	90	Water excitation
Post KM: T1w GRE (VIBE)	3	320x195	1.2813\ 1.2813	3.93	1.24/ 2.48	9	Dixon fat saturation
Pelvis							
T2w TSE tra.	3	320x320	0.78125\ 0.78125	5760	101	160	
T2w TSE cor.	3	320x310	0.78125\ 0.78125	5880	101	160	
T2w TSE sag.	3	320x310	0.625\ 0.625	5760	101	160	

HASTE: **H**alf fourier **A**cquisition single **S**hot **T**urbo spin **E**cho
VIBE: **V**olume **I**nterpolated **B**reath-hold **E**xamination

Table S2. Survey table of AUC analysis of the dual-time-point PET/MRI parameters for G2 and G3 cervical carcinoma. No lymph node present in G1 tumors.

Parameter	Grading	N	Prevalence	Method	AUC	95%CI	p-value	Std.Error
Size	**all**	**249**	**17.3%**	**short-axis**	**0.741**	**0.645-0.837**	**<0.001**	**0.049**
	G2	**105**	**17.1%**	**short-axis**	**0.520**	**0.352-0.679**	**0.838**	**0.083**
	G3	**119**	**20.2%**	**short-axis**	**0.900**	**0.846-0.961**	**<0.001**	**0.030**
SUV early PET	**all**	**218**	**18.8%**	**SUV_eavg**	**0.809**	**0.728-0.890**	**<0.001**	**0.041**
				SUV_emax	**0.805**	**0.723-0.887**	**<0.001**	**0.042**
				SUV_epeak	**0.807**	**0.726-0.888**	**<0.01**	**0.041**
	G2	**97**	**17.5%**	**SUV_eavg**	**0.673**	**0.529-0.817**	**0.025**	**0.073**
				SUV_emax	**0.648**	**0.500-0.796**	**0.056**	**0.075**
				SUV_epeak	**0.644**	**0.502-0.786**	**0.062**	**0.072**
	G3	**100**	**23.0%**	**SUV_eavg**	**0.901**	**0.820-0.982**	**<0.001**	**0.041**
				SUV_emax	**0.910**	**0.837-0.983**	**<0.001**	**0.037**
				SUV_epeak	**0.909**	**0.833-0.985**	**<0.001**	**0.039**
SUV early PET with bpc	**all**	**218**	**18.8%**	**bpcSUV_eavg**	**0.790**	**0.700-0.880**	**<0.001**	**0.046**
				bpcSUV_emax	**0.790**	**0.700-0.880**	**<0.001**	**0.046**
				bpcSUV_epeak	**0.761**	**0.668-0.855**	**<0.001**	**0.048**
	G2	**97**	**17.5%**	**bpcSUV_eavg**	**0.664**	**0.511-0.817**	**0.035**	**0.078**
				bpcSUV_emax	**0.646**	**0.489-0.802**	**0.060**	**0.080**
				bpcSUV_epeak	**0.588**	**0.255-0.431**	**0.255**	**0.080**

	G3	100	23.0%	bpcSUV$_e$avg	0.866	0.767-0.965	<0.001	0.051
				bpcSUV$_e$max	0.878	0.785-0.971	<0.001	0.048
				bpcSUV$_e$peak	0.857	0.755-0.958	<0.001	0.052
SUV delayed PET	all	212	17.0%	SUV$_d$avg	0.741	0.640-0.843	<0.001	0.052
				SUV$_d$max	0.768	0.671-0.866	<0.001	0.050
				SUV$_d$peak	0.748	0.649-0.846	<0.01	0.050
	G2	96	17.8%	SUV$_d$avg	0.570	0.411-0.729	0.364	0.081
				SUV$_d$max	0.640	0.481-0.799	0.070	0.081
				SUV$_d$peak	0.581	0.426-0.736	0.295	0.079
	G3	95	20.0%	SUV$_d$avg	0.883	0.788-0.978	<0.001	0.049
				SUV$_d$max	0.883	0.787-0.979	<0.001	0.049
				SUV$_d$peak	0.879	0.780-0.978	<0.001	0.050
SUV delayed PET with bpc	all	212	17.0%	bpcSUV$_d$avg	0.769	0.673-8.866	<0.001	0.049
				bpcSUV$_d$max	0.799	0.709-0.888	<0.001	0.046
				bpcSUV$_d$peak	0.768	0.676-0.860	<0.001	0.047
	G2	96	17.8%	bpcSUV$_d$avg	0.608	0.448-0.767	0.164	0.081
				bpcSUV$_d$max	0.677	0.524-0.830	0.023	0.078
				bpcSUV$_d$peak	0.634	0.479-0.789	0.079	0.079
	G3	95	20.0%	bpcSUV$_d$avg	0.895	0.814-0.977	<0.001	0.042
				bpcSUV$_d$max	0.905	0.836-0.975	<0.001	0.036
				bpcSUV$_d$peak	0.874	0.787-0.960	<0.001	0.044
ADC	all	218	17.9%	ADCmean	0.600	0.515-0.685	0.050	0.043

	G2	86	16.3%	ADCmean	0.580	0.458-0.103	0.343	0.062
	G3	109	22.0%	ADCmean	0.603	0.486-0.721	0.123	0.060
Dual-time-point kinetic - retentionindex	all	179	18.4%	RI-SUVavg	0.544	0.434-0.654	0.429	0.056
				RI-SUVmax	0.608	0.505-0.710	0.054	0.052
				RI-SUVpeak	0.665	0.554-0.777	0.003	0.057
	G2	88	18.2%	RI-SUVavg	0.382	0.234-0.529	0.141	0.075
				RI-SUVmax	0.501	0.352-0.649	0.991	0.076
				RI-SUVpeak	0.525	0.381-0-668	0.758	0.073
	G3	74	23.0%	RI-SUVavg	0.718	0.577-0.858	0.007	0.072
				RI-SUVmax	0.720	0.590-0.851	0.006	0.067
				RI-SUVpeak	0.674	0.530-0.818	0.030	0.073
Dual-time-point kinetic - absolute bpcSUV difference	all	179	18.4%	ΔSUVavg	0.613	0.487-0.739	0.043	0.064
				ΔSUVmax	0.673	0.557-0-790	0.002	0.060
				ΔSUVpeak	0.665	0.554-0.777	0.003	0.057
	G2	88	18.2%	ΔSUVavg	0.422	0.252-0.592	0.330	0.087
				ΔSUVmax	0.542	0.377-0.707	0.600	0.084
				ΔSUVpeak	0.571	0.417-0.725	0.379	0.078
	G3	74	23.0%	ΔSUVavg	0.791	0.644-0.938	<0.001	0.075
				ΔSUVmax	0.793	0.646-0.940	<0.001	0.075
				ΔSUVpeak	0.757	0.605-0.909	<0.001	0.077

bpc= blood pool correction

Table S3. Effect of the tumor grade on PET/MR parameters of lymph node metastases.

Parameter	Grading	N	Mean±SD	p-value
Short-axis diameter (cm)	G2	18	0.48±0.21	<0.01
	G3	24	1.00±0.48	
Sphericity	G2	18	0.58±0.21	0.08
	G3	24	0.67±0.13	
SUV_eavg	G2	17	1.01±0.83	<0.01
	G3	19	2.95±2.06	
bpcSUV_eavg	G2	17	1.17±0.82	0.03
	G3	19	2.65±1.69	
RI-SUVavg	G2	16	3.83± 29.91	0.03
	G3	17	31.30±37.72	
Δ SUVavg	G2	16	0.08±0.40	0.02
	G3	17	-0.68±0.85	
ADCmean	G2	14	1023±145	0.53
	G3	24	986±216	