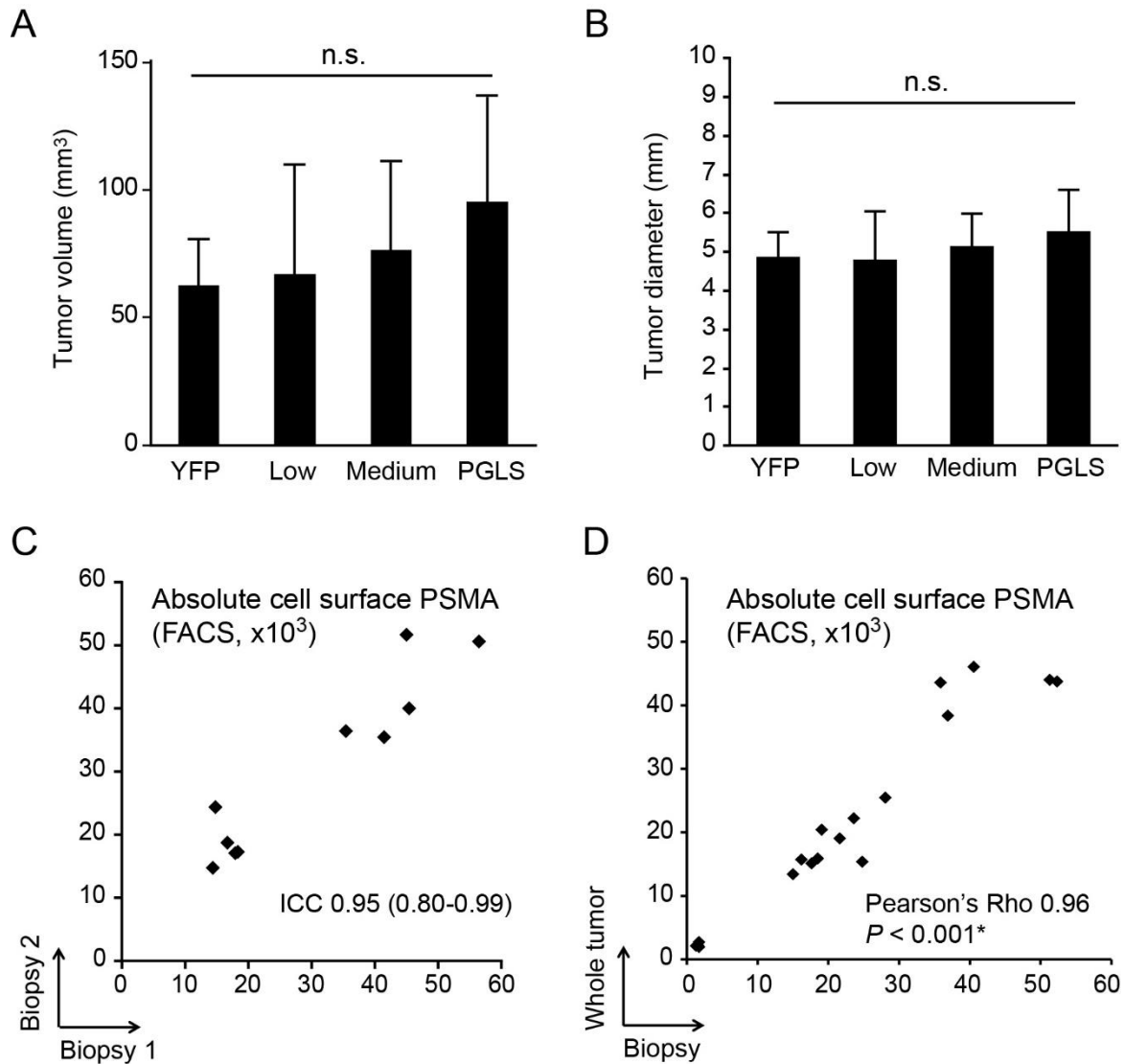**Supplemental Table 1: PET activity and tumor volume.** Mean ± SD for the different experimental groups are given for reader 1 *vs.* 2 and days 7 *vs.* 8. Background readings are averages across groups.

Parameter	Reader 1		Reader 2	
	day 7	day 8	day 7	day 8
Tumor				
Maximum %IA/g				
RM1-YFP	4±1.0			
RM1-low	10±5.6	15±4.7	10±5.6	16±4.9
RM1-medium	23±8.3			
RM1-PGLS	27±12	25±11	27±12	26±13
Average %IA/g				
RM1-YFP	2±0.8			
RM1-low	5±2.7	7±2.7	5±2.7	7±2.5
RM1-MEDIUM	8±4.0			
RM1-PGLS	11±4.0	12±4.9	12±5.2	12±4.7
Volume (mm^3)				
RM1-YFP	62±18			
RM1-low	67±42	97±55	96±42	131±73
RM1-medium	76±34			
RM1-PGLS	95±41	115±45	86±29	104±53
Visual score				
RM1-YFP	0±0.6			
RM1-low	1±0.4	2±0.4	2±0.0	2±0.0
RM1-medium	2±0.4			
RM1-PGLS	3±0.4	2±0.4	3±0.4	2±0.4
Background average %IA/g				
Bloodpool	2±0.9	3±1.3	2±0.9	4±0.9
Liver	3±0.9	4±1.3	3±1.3	3±1.7
Muscle	2±0.9	3±0.9	1±1.3	2±0.9

Supplemental Figure 1: Validation of methods. Day 7 mean ± standard deviation tumor volume **(A)** and diameter **(B)** as determined by CT delineation shown for mice bearing YFP, low, medium or PGLS tumors. Difference was assessed by Mann-Whitney test. **(C)** Inter-day reproducibility of cell surface PSMA quantification by FACS from FNA tumor biopsies. Reproducibility was assessed by intraclass correlation (ICC, with 95% CI). **(D)** Absolute cell surface PSMA as determined by FACS for biopsies versus *ex vivo* whole tumor cell suspensions. Correlation was assessed by Pearson's test. *$P < 0.05$ was defined as significant. n.s. = non-significant.