Supporting Information for

Targeted Gold Nanoparticle-Oligonucleotide Contrast Agents in Combination with a New Local Voxel-wise MRI Analysis Algorithm for *In Vitro* Imaging of Triple Negative Breast Cancer

Rajat Chauhan[1+], Nagwa ElBaz[4+], Robert S. Keynton[1*], Kurtis T. James[1], Danial A. Malik[1+], Mingming Zhu[3], Ayman ElBaz[1], Chin K. Ng[3], Paula J. Bates[2], Tariq Malik[2], Martin G. O' Toole[1*]

[1]Department of Bioengineering
[2]Department of Medicine and James Graham Brown Cancer Center
[3]Department of Radiology
[4]Department of Pharmacology and Toxicology
University of Louisville, Louisville, Kentucky USA

[+]Co-first authors; *Co-Corresponding authors

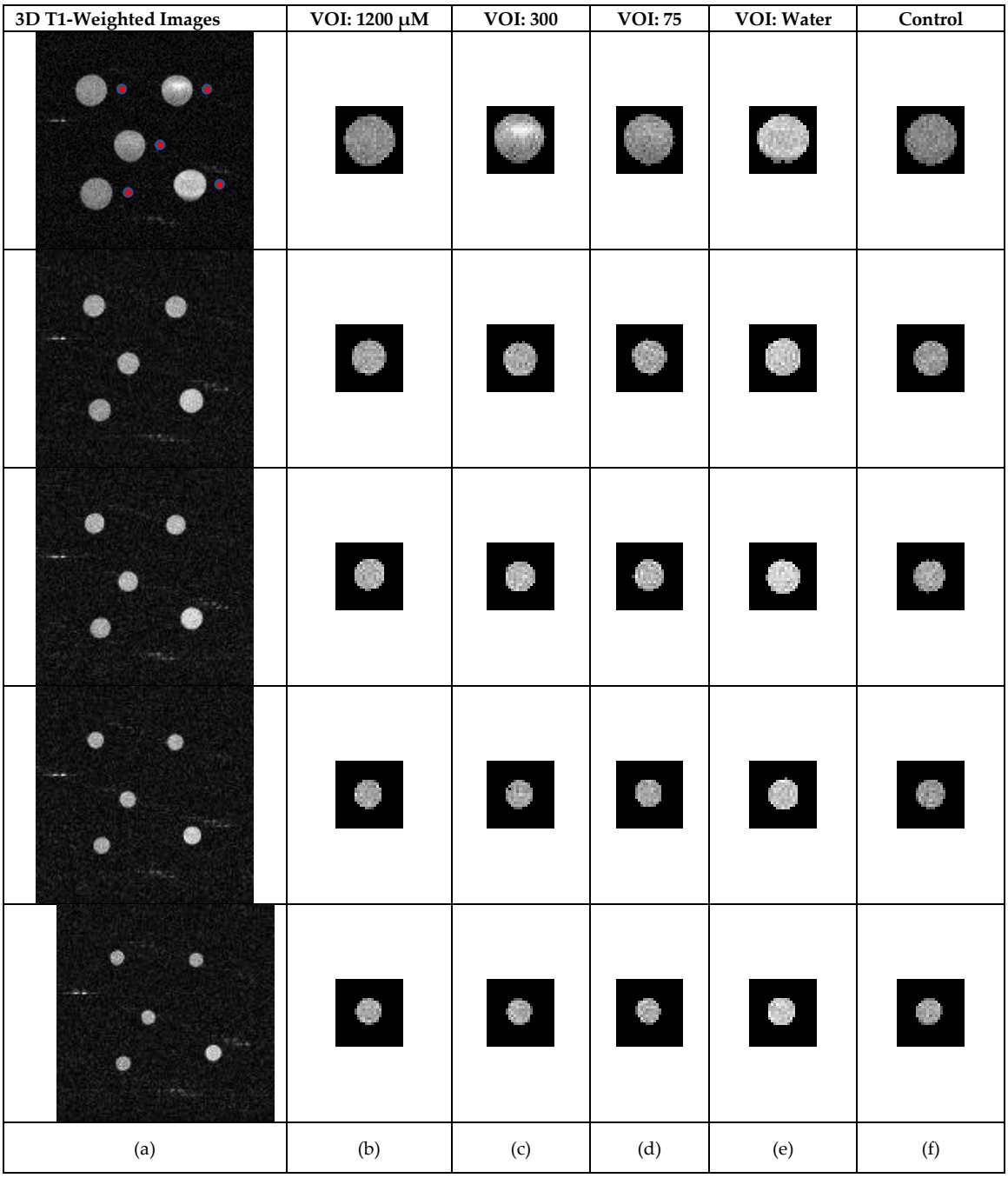

Figure S1. Illustration results of the automatic extraction of VOI.

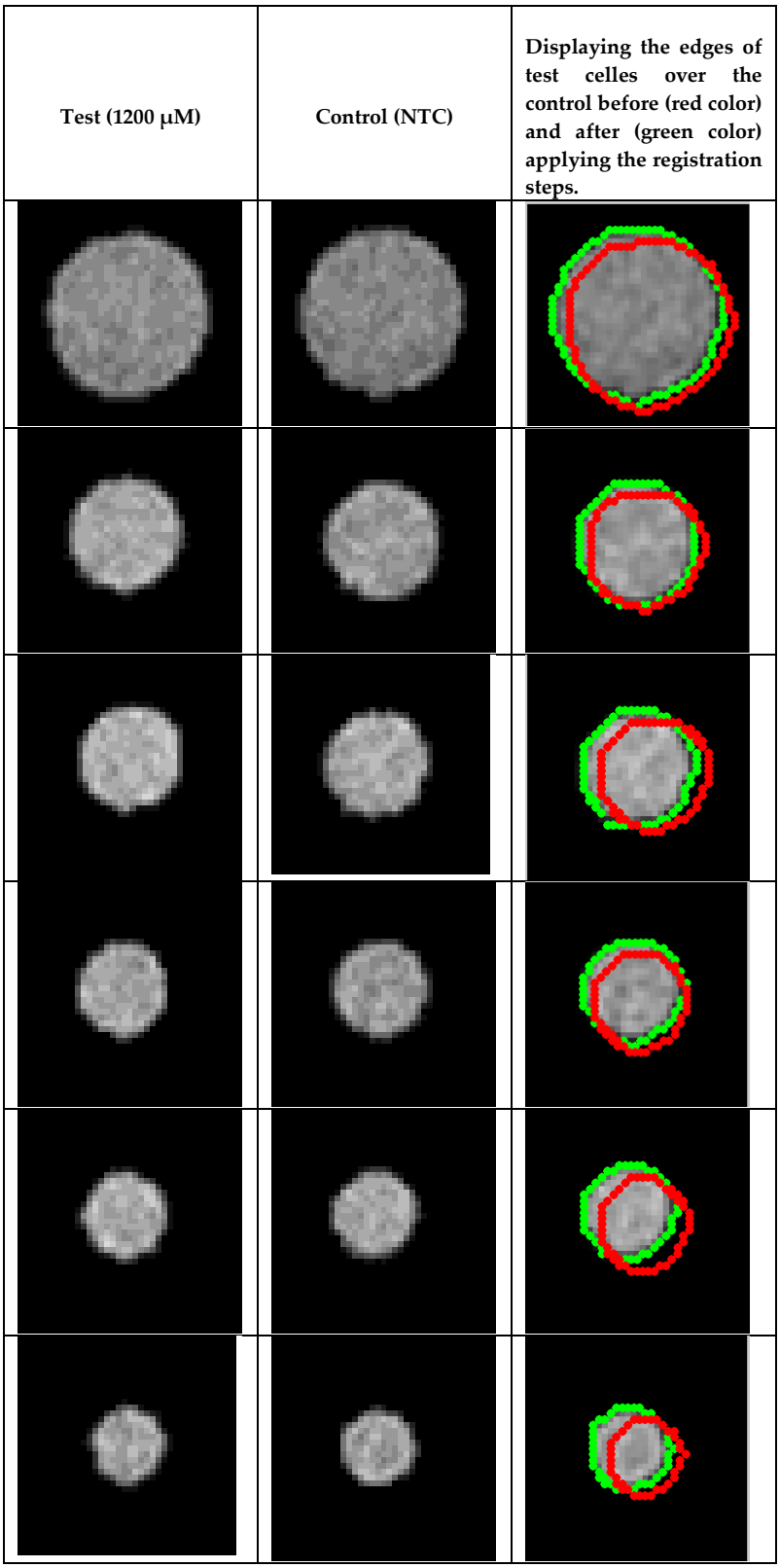

Figure S2. Illustration results of the non-rigid registration step.

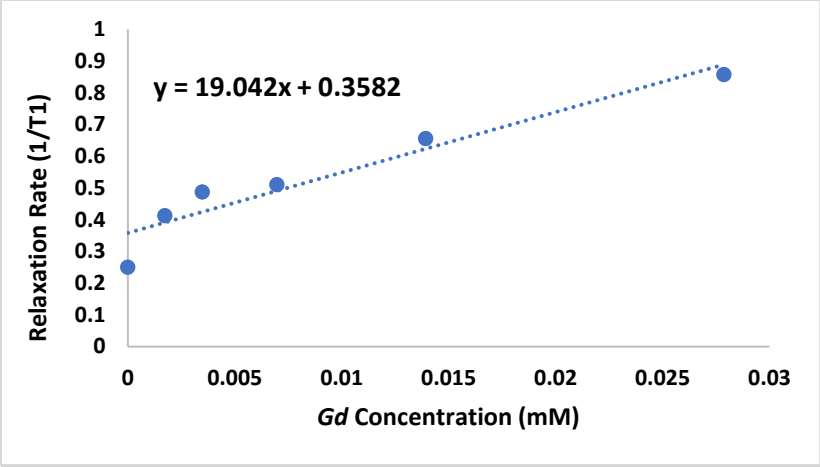

Figure S3. Relaxivity Curve for GNP-Gd(III) DO3A-SH-AS1411 in 0.7% agarose solution (9.4 T MRI scanner).

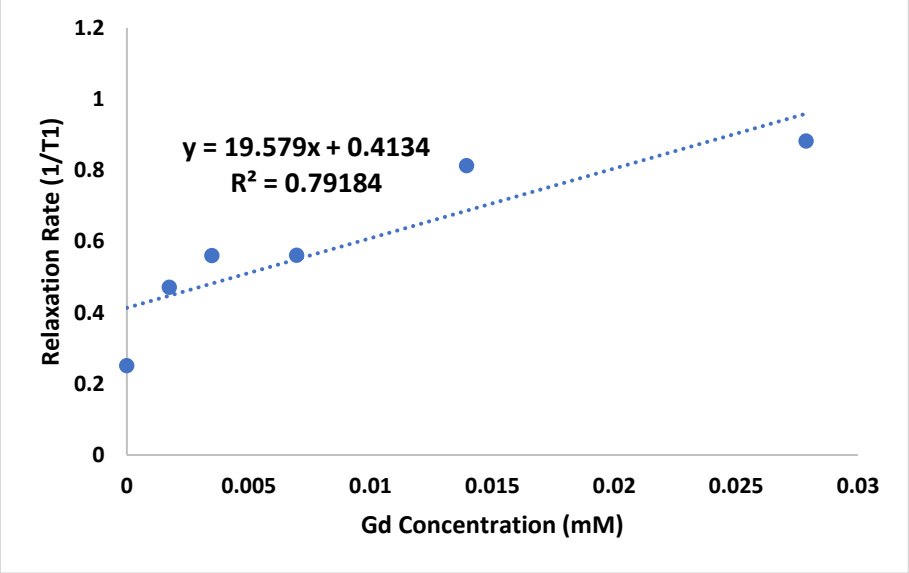

Figure S4. Relaxivity Curve for GNP-Gd(III) DO3A-SH-CRO in 0.7% agarose solution (9.4 T MRI scanner).

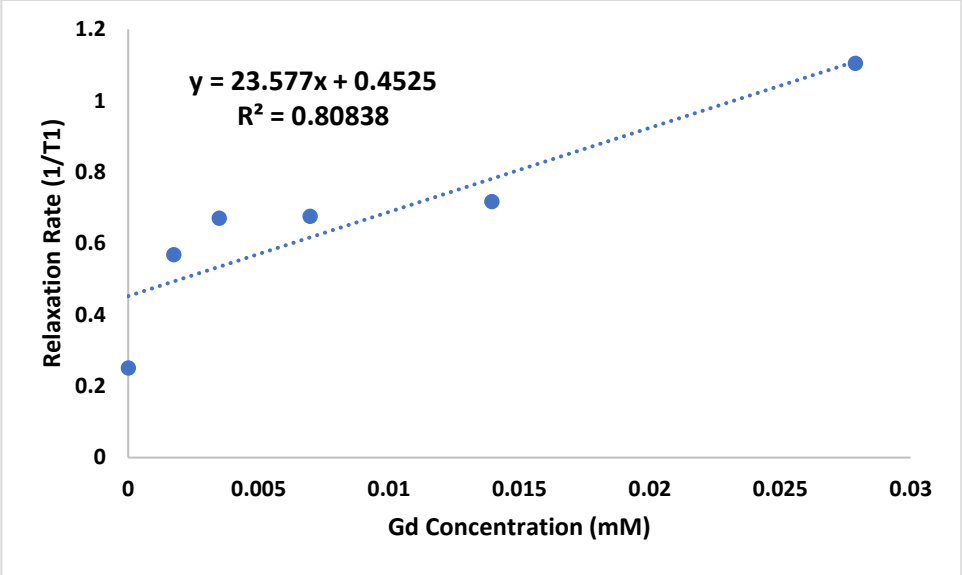

Figure S5. Relaxivity Curve for GNP-Gd(III) DO3A-SH-CRO in 0.7% agarose solution (9.4 T MRI scanner).

Table S1. Oligreen staining fluorescence values (FL) obtained for GNP Samples using Blue Module (*Excitation* 460 nm ; *Emission* 515-570 nm).

Samples	**Fluorescence (FLU)**
GNP *Gd(III) DO3A-SH* AS1411	3988.6
GNP *Gd(III) DO3A-SH*	37.5
GNP Gd(III) DO3A-SH AS1411 Filtrate	161.4
GNP *Gd(III) DO3A-SH* Filtrate	90.4
Oligreen 200X Solution	511.9
1 X PBS Buffer	74.6

Table S2. Gadolinium quantification per gold nanoparticle in GNP-Gd(IIII) DO3A-SH-Oligonucleotide.

Sample	**At% Au**	**At% Gd**	*# Gd(III) DO3A-SH*
GNP *Gd(III)-DO3A-SH*-AS1411	1.68	0.31	24.36
GNP-*Gd(III0DO3A-SH*-CRO	4.21	0.59	18.50
GNP-*Gd(III0DO3A-SH*-CTR	22.79	1.8	10.43

Table S3. Atomic and Weight percentages of elements analyzed in Energy Dispersive X-Ray Analysis of GNP Gd(III) DO3A-SH AS1411.

Element	*Wt %*	*At %*
C K	21.34	38.95
O K	16	21.93
NaK	27.57	26.29
AuM	15.06	1.68
ClK	14.95	9.24
K K	2.88	1.61
GdL	2.21	0.31

Table S4. Atomic and Weight percentages of elements analyzed in Energy Dispersive X-Ray Analysis of GNP-*Gd(III)DO3A-SH*-CRO.

Element	*Wt%*	*At%*
CK	27.13	52.39
OK	22.84	33.11
NaK	8.04	8.11
MgK	0.62	0.59
ClK	0.89	0.58
KK	0.67	0.4
GdL	4.02	0.59
AuL	35.78	4.21

Table S5: Atomic and Weight percentages of elements analyzed in Energy Dispersive X-Ray Analysis of GNP-Gd(III)DO3A-SH-CTR

Element	*Wt %*	*At %*
C K	7.85	40.77
SiK	15.6	34.64
AuM	71.99	22.79
GdL	4.55	1.8

Table S6. Gadolinium Quantification using xylenol orange Gd(III) protocol.

Gd content (# of atoms) per GNP-*Gd(III)DO3A-SH* -Oligonucleotide ; {Oligonucleotide = AS1411/CRO/CTR}		
AS1411	CRO	CTR
23.23 ± 0.93	19.21 ± 5.57	13.95 ± 0.73