



Article

Decorating sdAbs with Chelators: Effect of Conjugation on Biodistribution and Functionality

Henri Baudhuin ^{1,*}, Janik Puttemans ¹, Heleen Hanssens ¹, Philippe Vanwolleghem ¹, Sophie Hernot ¹, Geert Raes ^{2,3}, Catarina Xavier ¹, Tony Lahoutte ^{1,4} and Pieterjan Debie ¹

¹ Department of Medical Imaging (MIMA), Vrije Universiteit Brussel, Laarbeeklaan 103, B-1090 Brussels, Belgium; Janik.Puttemans@vub.be (J.P.); Heleen.Hanssens@vub.be (H.H.); philippe.vanwolleghem@ppms.be (P.V.); Sophie.Hernot@vub.be (S.H.); Catarina.Xavier@vub.be (C.X.); Tony.Lahoutte@uzbrussel.be (T.L.); Pieterjan.Debie@vub.be (P.D.)

² Unit of Cellular and Molecular Immunology (CMIM), Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussels, Belgium; Geert.Raes@vub.be

³ Myeloid Cell Immunology Laboratory, VIB Center for Inflammation Research, Pleinlaan 2, B-1050 Brussels, Belgium

⁴ Nuclear Medicine Department (NUCG), Universitair Ziekenhuis Brussel (UZ Brussel), Laarbeeklaan 101, B-1090 Brussels, Belgium

* Correspondence: Henri.Baudhuin@vub.be; Tel.: +32-2-477-49-91

Supplemental data

Table S1. Parameters for concentration measurement *via* UV spectrophotometry.

Compound	Chelator	# of Chelator/sdAb	Extinction coefficient ($M^{-1}cm^{-1}$) at 280 nm	Molecular weight (kDa)
Anti-HER2	NOTA	1	41.44	13.08
		2	57.44	13.53
		3	73.44	13.98
	DTPA	1	42.44	13.23
		2	59.44	13.83
		3	76.44	14.43
	NOTA	1	40.66	13.13
		2	56.66	13.58
		3	72.66	14.03
	DTPA	1	41.66	13.28
		2	58.66	13.88
		3	75.66	14.48

Table S2. Number of moles of compound use for radiolabeling and injection.

Compound	Chelator	# of Chelator/sdAb	Moles used for radiolabeling (nmol)	Moles injected per mouse (nmol)
Anti-HER2	NOTA	1	2.29	0.38
		2	2.22	0.37
		3	2.15	0.36
	DTPA	1	3.78	0.38
		2	3.62	0.36
		3	3.47	0.35
	NOTA	1	2.28	0.38
		2	2.21	0.37
		3	2.14	0.36
	DTPA	1	3.77	0.38
		2	3.60	0.36
		3	3.45	0.35

Table S3. Injected activities of each fraction per mouse.

Compound	N/group	1 chelator-fraction	2 chelator-fraction	3 chelator-fraction
[⁶⁸ Ga]Ga-(NOTA) _n -anti-HER2-sdAb	3	12.6 MBq, $\sigma = 0.7$ MBq	12.4 MBq, $\sigma = 0.4$ MBq	11.6 MBq, $\sigma = 0.4$ MBq
[¹¹¹ In]In-(DTPA) _n -anti-HER2-sdAb	6	9.3 MBq, $\sigma = 0.4$ MBq	9.4 MBq, $\sigma = 0.6$ MBq	10.0 MBq, $\sigma = 0.7$ MBq
[⁶⁸ Ga]Ga-(NOTA) _n -anti-MMR-sdAb	6	17.3 MBq, $\sigma = 0.1$ MBq	13.5 MBq, $\sigma = 0.2$ MBq	11.7 MBq, $\sigma = 0.3$ MBq
[¹¹¹ In]In-(DTPA) _n -anti-MMR-sdAb	6	9.7 MBq, $\sigma = 0.3$ MBq	10.1 MBq, $\sigma = 0.3$ MBq	8.9 MBq, $\sigma = 0.3$ MBq
[⁶⁸ Ga]Ga-(NOTA) _n -anti-MMR-sdAb KO mice	4/5/4	9.0 MBq, $\sigma = 0.3$ MBq	7.2 MBq, $\sigma = 0.2$ MBq	5.9 MBq, $\sigma = 0.2$ MBq

Mass spectrometry data

1. NOTA-anti-HER2

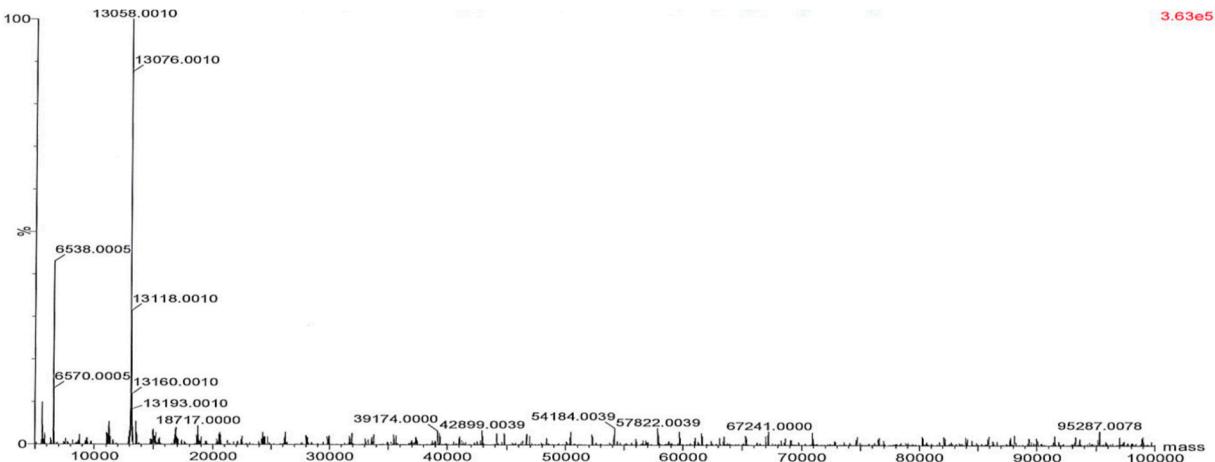
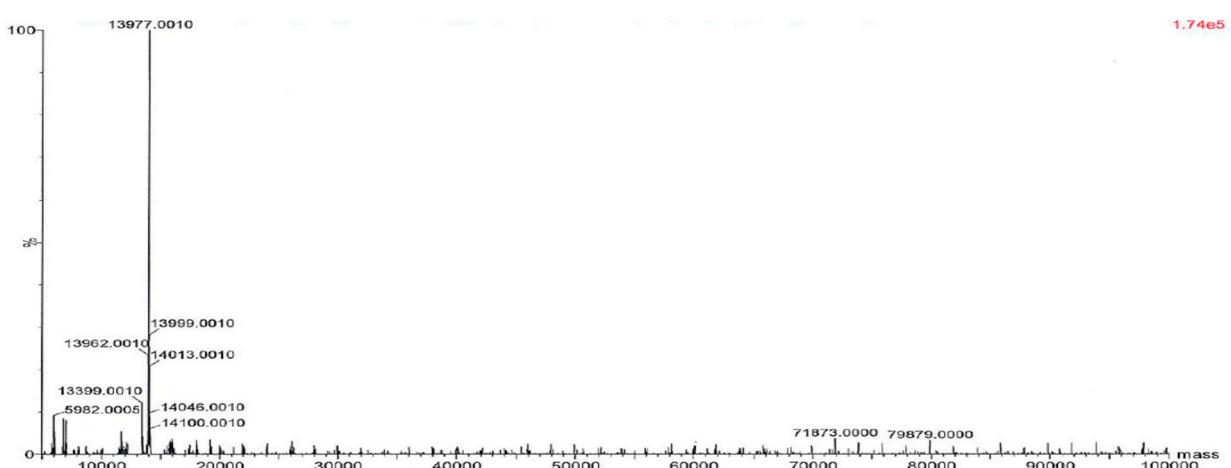
A**B****C**

Figure S1. Mass spectrometry spectrum of (A) (NOTA)₁-anti-HER2 (theoretical mass: 13,078), (B) (NOTA)₂-anti-HER2 (theoretical mass: 13,528) and (C) (NOTA)₃-anti-HER2 (theoretical mass: 13,978).

2. DTPA-anti-HER2

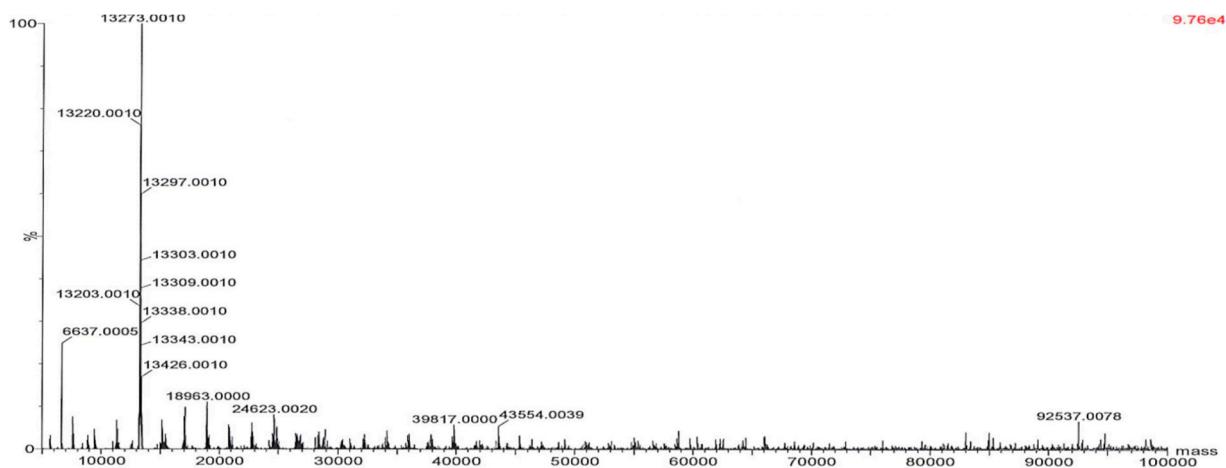
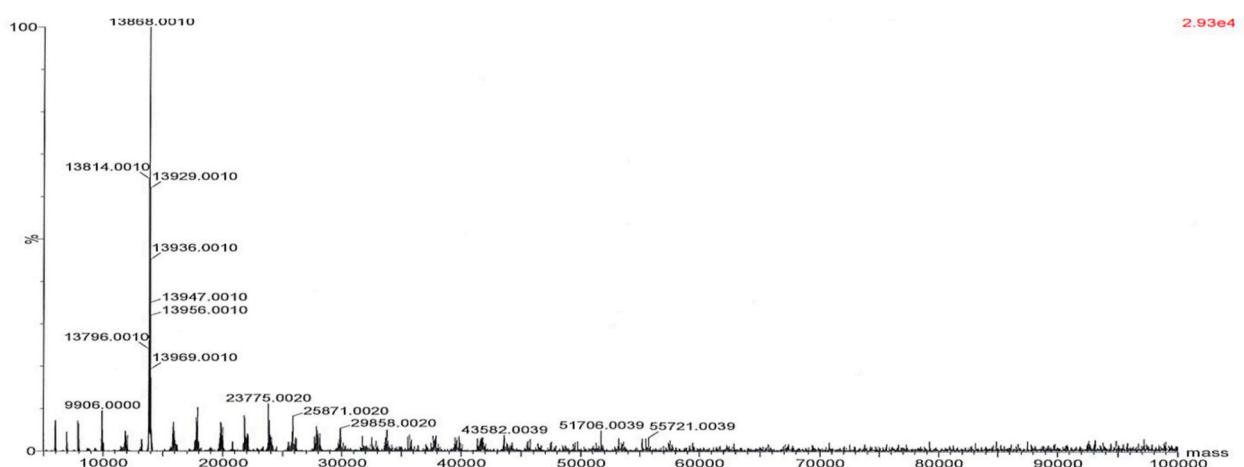
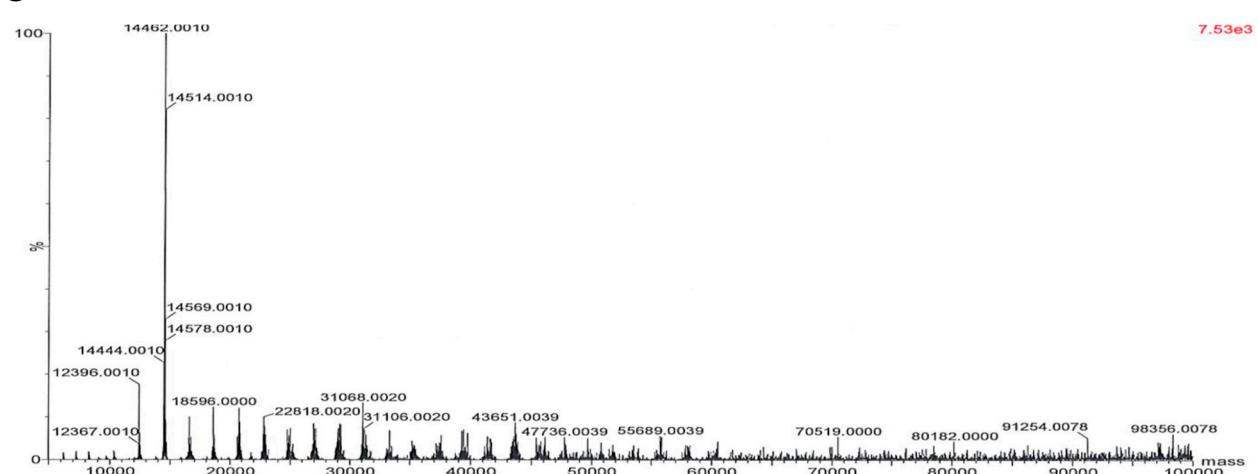
A**B****C**

Figure S2. Mass spectrometry spectrum of (A) (DTPA)₁-anti-HER2 (theoretical mass: 13,228), (B) (DTPA)₂-anti-HER2 (theoretical mass: 13,828) and (C) (DTPA)₃-anti-HER2 (theoretical mass: 14,428).

3. NOTA-anti-MMR

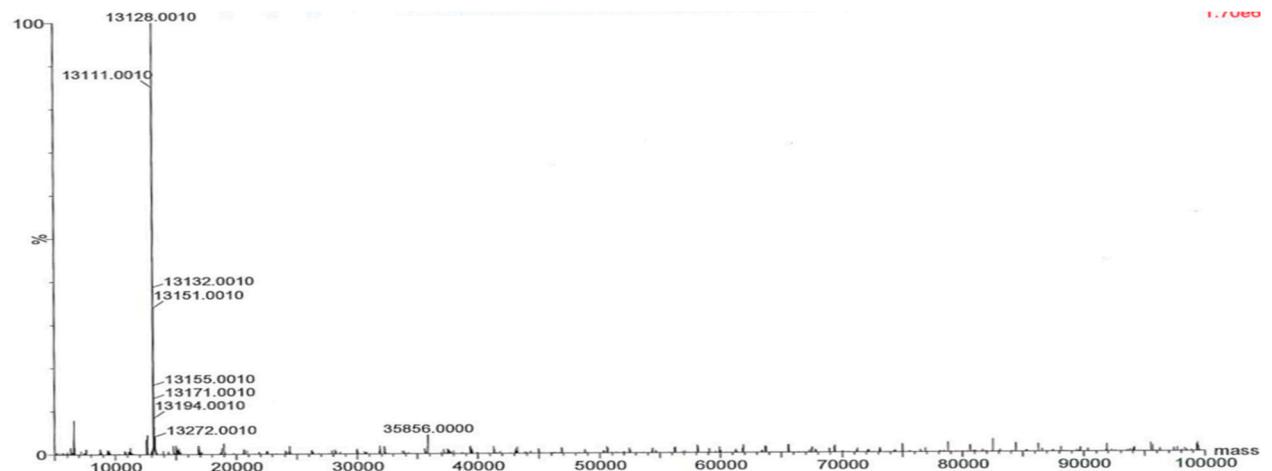
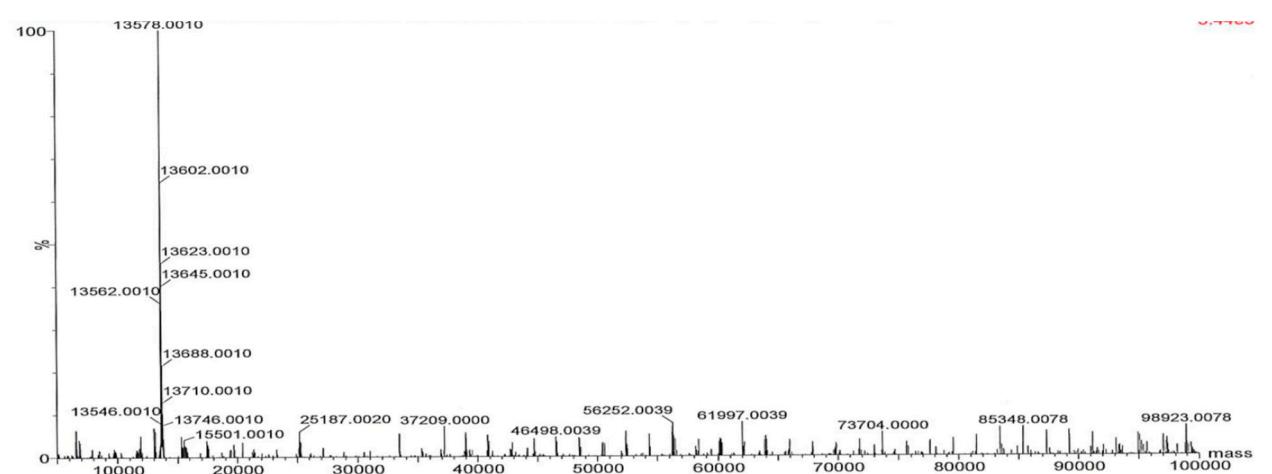
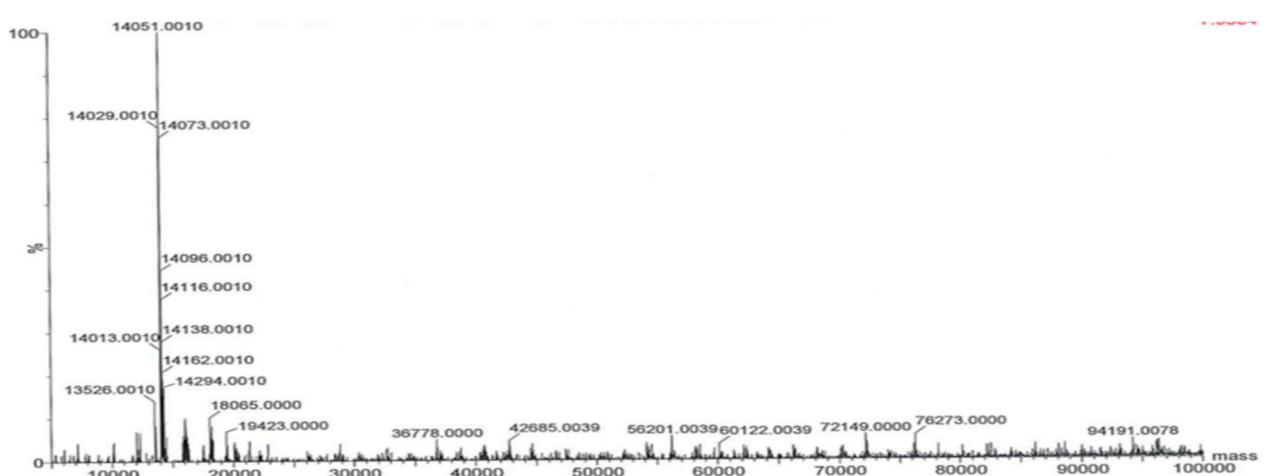
A**B****C**

Figure S3. Mass spectrometry spectrum of (A) (NOTA)₁-anti-MMR (theoretical mass: 13,128), (B) (NOTA)₂-anti-MMR (theoretical mass: 13,578) and (C) (NOTA)₃-anti-MMR (theoretical mass: 14,028).

4. DTPA-anti-MMR

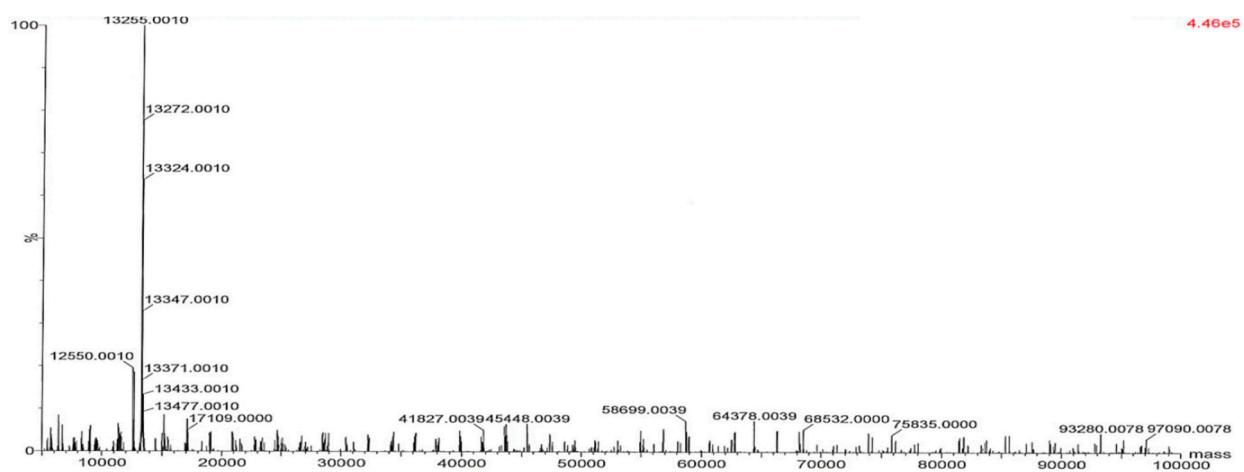
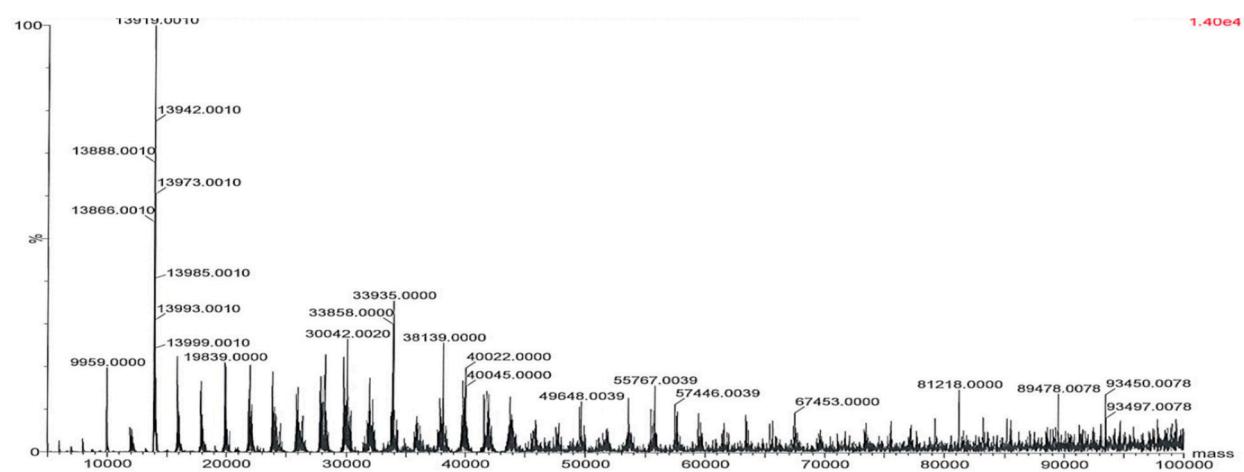
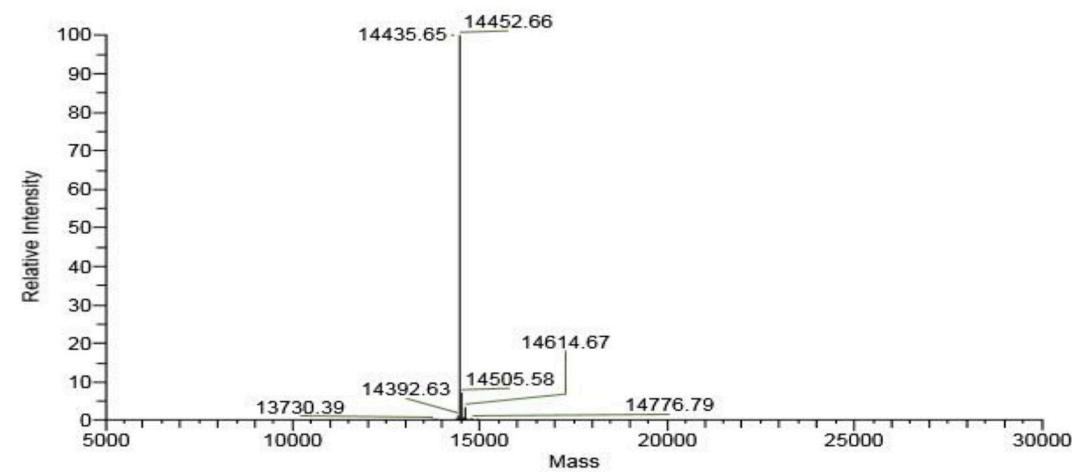
A**B****C**

Figure S4. Mass spectrometry spectrum of (A) (DTPA)₁-anti-MMR (theoretical mass: 13,278), (B) (DTPA)₂-anti-MMR (theoretical mass: 13,878) and (C) (DTPA)₃-anti-MMR (theoretical mass: 14,478).

Isoelectric focusing

Table S4. Setup Iso-electric focusing gel electrophoresis.

Lane	1	2	3	4	5
Setup Gel A	Ladder	(NOTA) ₁ -anti-HER2	(NOTA) ₂ -anti- HER2	(NOTA) ₃ -anti- HER2	Ladder
Setup Gel B	Ladder	(DTPA) ₁ -anti- HER2	(DTPA) ₂ -anti- HER2	(DTPA) ₃ -anti- HER2	Ladder
Setup Gel C	Ladder	(NOTA) ₁ -anti-MMR	(NOTA) ₂ -anti-MMR	(NOTA) ₃ -anti-MMR	Ladder
Setup Gel D	Ladder	(DTPA) ₁ -anti-MMR	(DTPA) ₂ -anti-MMR	(DTPA) ₃ -anti-MMR	Ladder

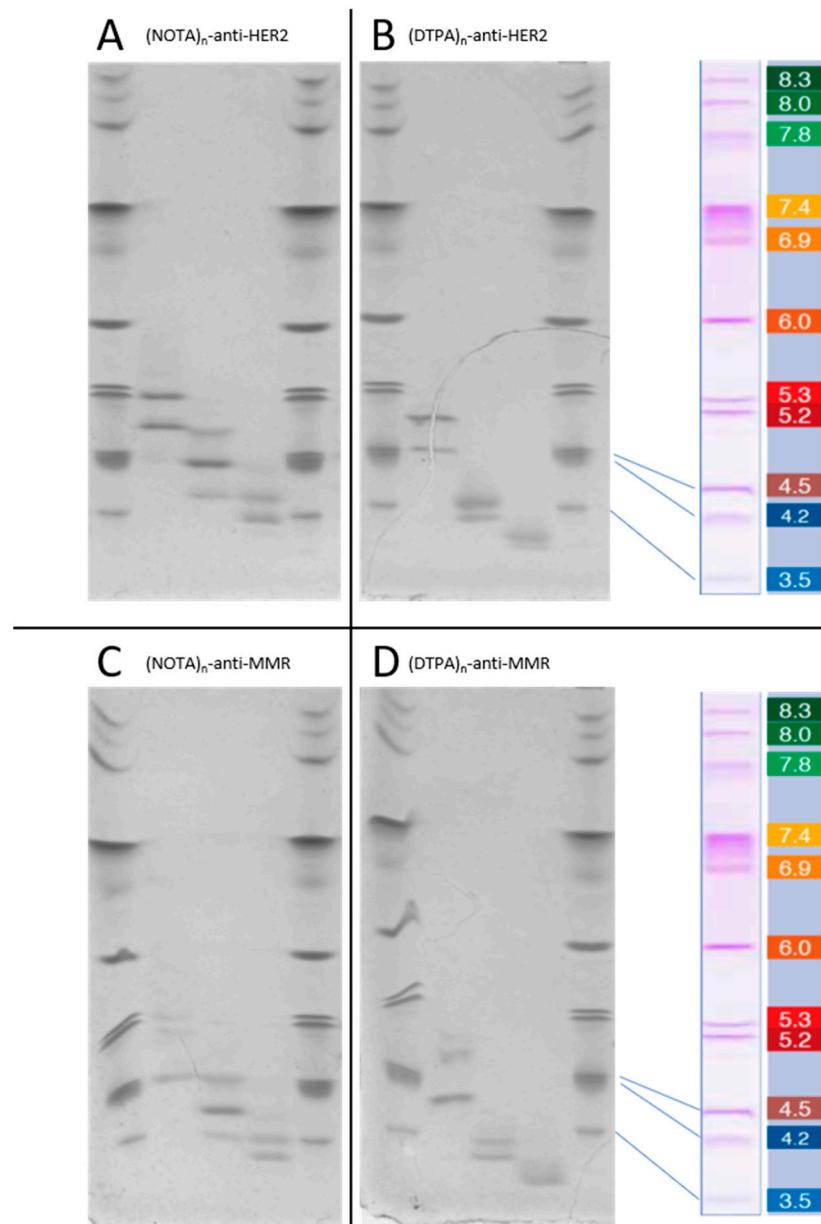


Figure S5. Imaging Iso-electric focusing gel electrophoresis.

*Ex vivo biodistribution data***Table S5.** Ex vivo biodistribution data [⁶⁸Ga]Ga-NOTA-anti-HER2.

Organs	[⁶⁸ Ga]Ga-NOTA-anti-HER2					
	%IA/g			%IA		
	F1	F2	F3	F1	F2	F3
Blood	0.10, $\sigma = 0.04$	0.17, $\sigma = 0.14$	0.11, $\sigma = 0.05$	0.06, $\sigma = 0.02$	0.13, $\sigma = 0.17$	0.08, $\sigma = 0.07$
Heart	0.07, $\sigma = 0.02$	0.08, $\sigma = 0.06$	0.07, $\sigma = 0.01$	0.01, $\sigma = 0.00$	0.01, $\sigma = 0.01$	0.01, $\sigma = 0.00$
Lungs	0.33, $\sigma = 0.04$	0.21, $\sigma = 0.08$	0.24, $\sigma = 0.11$	0.06, $\sigma = 0.01$	0.04, $\sigma = 0.02$	0.04, $\sigma = 0.01$
Liver	0.30, $\sigma = 0.10$	0.19, $\sigma = 0.04$	0.29, $\sigma = 0.09$	0.44, $\sigma = 0.12$	0.30, $\sigma = 0.07$	0.42, $\sigma = 0.13$
Spleen	0.14, $\sigma = 0.06$	0.09, $\sigma = 0.02$	0.12, $\sigma = 0.05$	0.03, $\sigma = 0.01$	0.02, $\sigma = 0.00$	0.02, $\sigma = 0.01$
Pancreas	0.15, $\sigma = 0.04$	0.12, $\sigma = 0.05$	0.11, $\sigma = 0.04$	0.03, $\sigma = 0.01$	0.02, $\sigma = 0.00$	0.02, $\sigma = 0.01$
Kidneys	53.07, $\sigma = 6.31$	34.21, $\sigma = 1.56$	20.19, $\sigma = 2.58$	11.76, $\sigma = 1.16$	7.62, $\sigma = 0.44$	4.95, $\sigma = 0.33$
Stomach	0.18, $\sigma = 0.04$	0.22, $\sigma = 0.14$	0.63, $\sigma = 1.12$	0.05, $\sigma = 0.01$	0.04, $\sigma = 0.02$	0.19, $\sigma = 0.34$
Small Intestine	0.10, $\sigma = 0.02$	0.13, $\sigma = 0.07$	0.43, $\sigma = 0.74$	0.02, $\sigma = 0.00$	0.03, $\sigma = 0.02$	0.08, $\sigma = 0.15$
Large Intestine	0.11, $\sigma = 0.02$	0.11, $\sigma = 0.06$	0.99, $\sigma = 1.94$	0.01, $\sigma = 0.01$	0.02, $\sigma = 0.01$	0.24, $\sigma = 0.50$
Muscle	0.07, $\sigma = 0.02$	0.07, $\sigma = 0.05$	0.10, $\sigma = 0.12$	0.01, $\sigma = 0.00$	0.01, $\sigma = 0.00$	0.02, $\sigma = 0.02$
Tumor	2.68, $\sigma = 0.61$	2.39, $\sigma = 1.57$	4.30, $\sigma = 2.13$	0.97, $\sigma = 0.90$	0.06, $\sigma = 0.08$	0.36, $\sigma = 0.30$
Bone	0.17, $\sigma = 0.06$	0.13, $\sigma = 0.08$	0.13, $\sigma = 0.05$	0.01, $\sigma = 0.01$	0.00, $\sigma = 0.00$	0.00, $\sigma = 0.00$
Lymph nodes	0.35, $\sigma = 0.23$	0.29, $\sigma = 0.24$	0.27, $\sigma = 0.14$	0.01, $\sigma = 0.00$	0.00, $\sigma = 0.00$	0.01, $\sigma = 0.00$

Table S6. Ex vivo biodistribution data [¹¹¹In]In-DTPA-anti-HER2.

Organs	[¹¹¹ In]In-DTPA-anti-HER2					
	%IA/g			%IA		
	F1	F2	F3	F1	F2	F3
Blood	0.45, $\sigma = 0.43$	0.39, $\sigma = 0.13$	0.43, $\sigma = 0.10$	0.04, $\sigma = 0.02$	0.11, $\sigma = 0.09$	0.09, $\sigma = 0.05$
Heart	0.21, $\sigma = 0.15$	0.21, $\sigma = 0.04$	0.24, $\sigma = 0.05$	0.02, $\sigma = 0.00$	0.03, $\sigma = 0.00$	0.03, $\sigma = 0.01$
Lungs	0.72, $\sigma = 0.33$	0.64, $\sigma = 0.15$	0.81, $\sigma = 0.22$	0.08, $\sigma = 0.02$	0.10, $\sigma = 0.03$	0.14, $\sigma = 0.06$
Liver	0.36, $\sigma = 0.09$	0.45, $\sigma = 0.09$	0.73, $\sigma = 0.09$	0.37, $\sigma = 0.06$	0.49, $\sigma = 0.09$	0.83, $\sigma = 0.12$
Spleen	0.18, $\sigma = 0.06$	0.24, $\sigma = 0.06$	0.34, $\sigma = 0.07$	0.02, $\sigma = 0.00$	0.03, $\sigma = 0.01$	0.05, $\sigma = 0.01$
Pancreas	0.13, $\sigma = 0.07$	0.14, $\sigma = 0.06$	0.21, $\sigma = 0.09$	0.01, $\sigma = 0.01$	0.01, $\sigma = 0.01$	0.03, $\sigma = 0.01$
Kidneys	87.94, $\sigma = 8.37$	76.96, $\sigma = 7.22$	47.66, $\sigma = 7.78$	13.24, $\sigma = 0.36$	10.55, $\sigma = 4.69$	8.01, $\sigma = 0.97$
Stomach	0.26, $\sigma = 0.16$	0.22, $\sigma = 0.05$	0.25, $\sigma = 0.07$	0.07, $\sigma = 0.06$	0.04, $\sigma = 0.01$	0.05, $\sigma = 0.01$
Small intestine	0.26, $\sigma = 0.16$	0.21, $\sigma = 0.09$	0.38, $\sigma = 0.24$	0.02, $\sigma = 0.01$	0.02, $\sigma = 0.01$	0.04, $\sigma = 0.04$
Large intestine	0.34, $\sigma = 0.18$	0.21, $\sigma = 0.10$	0.21, $\sigma = 0.03$	0.06, $\sigma = 0.05$	0.02, $\sigma = 0.01$	0.04, $\sigma = 0.02$
Muscle	0.23, $\sigma = 0.24$	0.14, $\sigma = 0.05$	0.30, $\sigma = 0.13$	0.02, $\sigma = 0.02$	0.02, $\sigma = 0.01$	0.03, $\sigma = 0.02$
Tumor	9.61, $\sigma = 3.23$	8.07, $\sigma = 1.76$	6.58, $\sigma = 2.85$	0.34, $\sigma = 0.44$	0.29, $\sigma = 0.20$	0.34, $\sigma = 0.43$
Bone	0.19, $\sigma = 0.05$	0.33, $\sigma = 0.10$	0.40, $\sigma = 0.11$	0.01, $\sigma = 0.01$	0.01, $\sigma = 0.01$	0.02, $\sigma = 0.01$
Lymph nodes	0.35, $\sigma = 0.20$	0.19, $\sigma = 0.05$	0.84, $\sigma = 0.47$	0.01, $\sigma = 0.00$	0.01, $\sigma = 0.00$	0.01, $\sigma = 0.01$

Table S7. Ex vivo biodistribution data [⁶⁸Ga]Ga-NOTA-anti-MMR.

Organs	[⁶⁸ Ga]Ga-NOTA-anti-MMR					
	%IA/g			%IA		
	F1	F2	F3	F1	F2	F3
Blood	0.64, $\sigma = 0.05$	0.51, $\sigma = 0.04$	0.61, $\sigma = 0.1$	0.12, $\sigma = 0.02$	0.14, $\sigma = 0.07$	0.19, $\sigma = 0.16$
Thymus	1.68, $\sigma = 0.18$	1.29, $\sigma = 0.22$	0.72, $\sigma = 0.1$	0.11, $\sigma = 0.01$	0.05, $\sigma = 0.00$	0.06, $\sigma = 0.03$
Heart	2.14, $\sigma = 0.20$	1.92, $\sigma = 0.20$	1.14, $\sigma = 0.3$	0.27, $\sigma = 0.05$	0.20, $\sigma = 0.03$	0.13, $\sigma = 0.03$
Lungs	1.75, $\sigma = 0.26$	1.58, $\sigma = 0.13$	1.36, $\sigma = 0.5$	0.23, $\sigma = 0.03$	0.22, $\sigma = 0.04$	0.20, $\sigma = 0.07$
Liver	6.15, $\sigma = 1.85$	6.70, $\sigma = 1.05$	3.62, $\sigma = 0.5$	5.19, $\sigma = 0.55$	4.32, $\sigma = 0.82$	2.87, $\sigma = 0.92$
Spleen	4.88, $\sigma = 0.76$	3.27, $\sigma = 0.58$	1.72, $\sigma = 0.0$	0.43, $\sigma = 0.16$	0.33, $\sigma = 0.12$	0.15, $\sigma = 0.02$
Pancreas	1.90, $\sigma = 0.06$	1.63, $\sigma = 0.16$	0.80, $\sigma = 0.0$	0.17, $\sigma = 0.03$	0.20, $\sigma = 0.06$	0.08, $\sigma = 0.01$
Kidneys	36.86, $\sigma = 4.41$	50.83, $\sigma = 9.48$	43.85, $\sigma = 2.2$	5.35, $\sigma = 0.41$	7.22, $\sigma = 0.59$	5.95, $\sigma = 0.56$
Stomach	0.92, $\sigma = 0.30$	1.26, $\sigma = 0.71$	1.44, $\sigma = 0.1$	0.44, $\sigma = 0.02$	0.57, $\sigma = 0.26$	0.53, $\sigma = 0.14$
Small Intestine	0.99, $\sigma = 0.26$	0.84, $\sigma = 0.34$	0.63, $\sigma = 0.3$	0.21, $\sigma = 0.07$	0.13, $\sigma = 0.02$	0.12, $\sigma = 0.05$
Large Intestine	1.09, $\sigma = 0.66$	1.53, $\sigma = 0.46$	0.76, $\sigma = 0.4$	0.40, $\sigma = 0.26$	0.50, $\sigma = 0.02$	0.18, $\sigma = 0.08$
Muscle	0.76, $\sigma = 0.06$	0.71, $\sigma = 0.09$	0.60, $\sigma = 0.1$	0.09, $\sigma = 0.05$	0.06, $\sigma = 0.02$	0.11, $\sigma = 0.06$
Tumor	2.41, $\sigma = 0.09$	2.29, $\sigma = 1.04$	1.88, $\sigma = 0.3$	0.79, $\sigma = 0.74$	0.44, $\sigma = 0.32$	0.23, $\sigma = 0.15$
Bone	2.19, $\sigma = 0.37$	1.57, $\sigma = 0.21$	0.94, $\sigma = 0.3$	0.05, $\sigma = 0.02$	0.02, $\sigma = 0.01$	0.03, $\sigma = 0.02$
Lymph nodes	2.59, $\sigma = 0.35$	2.38, $\sigma = 0.16$	2.19, $\sigma = 0.8$	0.08, $\sigma = 0.02$	0.05, $\sigma = 0.02$	0.06, $\sigma = 0.03$

Table S8. Ex vivo biodistribution data [¹¹¹In]In-DTPA-anti-MMR.

Organs	[¹¹¹ In]In-DTPA-anti-MMR					
	%IA/g			%IA		
	F1	F2	F3	F1	F2	F3
Blood	0.48, $\sigma = 0.04$	0.56, $\sigma = 0.13$	0.63, $\sigma = 0.07$	0.20, $\sigma = 0.02$	0.22, $\sigma = 0.09$	0.11, $\sigma = 0.03$
Thymus	1.62, $\sigma = 0.24$	1.17, $\sigma = 0.15$	0.75, $\sigma = 0.10$	0.06, $\sigma = 0.02$	0.06, $\sigma = 0.04$	0.05, $\sigma = 0.01$
Heart	2.09, $\sigma = 0.33$	1.36, $\sigma = 0.15$	0.96, $\sigma = 0.07$	0.24, $\sigma = 0.02$	0.16, $\sigma = 0.01$	0.10, $\sigma = 0.01$
Lungs	1.64, $\sigma = 0.17$	1.18, $\sigma = 0.14$	1.05, $\sigma = 0.04$	0.27, $\sigma = 0.04$	0.20, $\sigma = 0.04$	0.19, $\sigma = 0.01$
Liver	12.16, $\sigma = 2.12$	5.78, $\sigma = 0.88$	3.91, $\sigma = 0.59$	9.90, $\sigma = 2.94$	4.73, $\sigma = 0.92$	2.78, $\sigma = 0.64$
Spleen	6.26, $\sigma = 0.73$	2.89, $\sigma = 0.90$	1.87, $\sigma = 0.16$	0.61, $\sigma = 0.10$	0.30, $\sigma = 0.12$	0.20, $\sigma = 0.4$
Pancreas	1.99, $\sigma = 0.27$	1.48, $\sigma = 1.07$	0.79, $\sigma = 0.08$	0.14, $\sigma = 0.07$	0.12, $\sigma = 0.09$	0.05, $\sigma = 0.02$
Kidneys	121.44, $\sigma = 12.50$	117.28, $\sigma = 16.26$	167.75, $\sigma = 16.52$	16.04, $\sigma = 1.40$	15.24, $\sigma = 0.98$	21.20, $\sigma = 1.07$
Stomach	2.39, $\sigma = 0.30$	1.87, $\sigma = 0.27$	1.16, $\sigma = 0.06$	0.39, $\sigma = 0.03$	0.29, $\sigma = 0.04$	0.16, $\sigma = 0.04$
Small intestine	1.35, $\sigma = 0.21$	0.94, $\sigma = 0.18$	0.61, $\sigma = 0.07$	0.14, $\sigma = 0.02$	0.09, $\sigma = 0.07$	0.08, $\sigma = 0.03$
Large intestine	3.41, $\sigma = 2.05$	2.08, $\sigma = 1.32$	1.38, $\sigma = 0.55$	0.33, $\sigma = 0.21$	0.18, $\sigma = 0.09$	0.16, $\sigma = 0.02$
Muscle	0.95, $\sigma = 0.41$	0.80, $\sigma = 0.19$	0.47, $\sigma = 0.08$	0.11, $\sigma = 0.05$	0.10, $\sigma = 0.03$	0.06, $\sigma = 0.04$
Tumor	3.38, $\sigma = 1.90$	2.87, $\sigma = 0.47$	1.24, $\sigma = 0.95$	0.42, $\sigma = 0.21$	0.68, $\sigma = 0.39$	0.56, $\sigma = 0.38$
Bone	2.17, $\sigma = 0.32$	1.44, $\sigma = 0.31$	1.45, $\sigma = 0.28$	0.05, $\sigma = 0.02$	0.02, $\sigma = 0.02$	0.02, $\sigma = 0.01$
Lymph nodes	3.22, $\sigma = 2.56$	2.75, $\sigma = 2.19$	0.62, $\sigma = 0.41$	0.04, $\sigma = 0.02$	0.02, $\sigma = 0.01$	0.01, $\sigma = 0.00$

Table S9. Ex vivo biodistribution data [⁶⁸Ga]Ga-NOTA-anti-MMR in KO mice.

Organs	[⁶⁸ Ga]Ga-NOTA-anti-MMR in KO mice					
	%IA/g			%IA		
	F1	F2	F3	F1	F2	F3
Blood	0.51, $\sigma = 0.13$	0.51, $\sigma = 0.06$	0.52, $\sigma = 0.03$	0.17, $\sigma = 0.06$	0.08, $\sigma = 0.01$	0.14, $\sigma = 0.07$
Thymus	0.16, $\sigma = 0.05$	0.19, $\sigma = 0.04$	0.21, $\sigma = 0.07$	0.01, $\sigma = 0.01$	0.01, $\sigma = 0.01$	0.01, $\sigma = 0.01$
Heart	0.22, $\sigma = 0.06$	0.20, $\sigma = 0.01$	0.21, $\sigma = 0.05$	0.03, $\sigma = 0.01$	0.02, $\sigma = 0.00$	0.02, $\sigma = 0.01$
Lungs	0.38, $\sigma = 0.08$	0.40, $\sigma = 0.04$	0.53, $\sigma = 0.27$	0.08, $\sigma = 0.03$	0.07, $\sigma = 0.03$	0.09, $\sigma = 0.05$
Liver	0.30, $\sigma = 0.03$	0.31, $\sigma = 0.02$	0.39, $\sigma = 0.05$	0.34, $\sigma = 0.11$	0.35, $\sigma = 0.09$	0.46, $\sigma = 0.07$
Spleen	0.19, $\sigma = 0.05$	0.20, $\sigma = 0.02$	0.23, $\sigma = 0.03$	0.02, $\sigma = 0.01$	0.02, $\sigma = 0.00$	0.02, $\sigma = 0.00$
Pancreas	0.12, $\sigma = 0.03$	0.16, $\sigma = 0.03$	0.16, $\sigma = 0.03$	0.02, $\sigma = 0.00$	0.01, $\sigma = 0.00$	0.02, $\sigma = 0.01$
Kidneys	118.97, $\sigma = 27.18$	111.33, $\sigma = 10.02$	91.22, $\sigma = 7.44$	18.68, $\sigma = 3.84$	15.36, $\sigma = 1.91$	11.95, $\sigma = 1.33$
Stomach	0.21, $\sigma = 0.09$	0.52, $\sigma = 0.35$	0.46, $\sigma = 0.20$	0.05, $\sigma = 0.02$	0.11, $\sigma = 0.08$	0.25, $\sigma = 0.33$
Small intestine	0.19, $\sigma = 0.05$	0.28, $\sigma = 0.05$	0.24, $\sigma = 0.07$	0.04, $\sigma = 0.02$	0.04, $\sigma = 0.02$	0.03, $\sigma = 0.01$
Large intestine	0.34, $\sigma = 0.25$	0.28, $\sigma = 0.06$	0.37, $\sigma = 0.19$	0.04, $\sigma = 0.02$	0.03, $\sigma = 0.01$	0.04, $\sigma = 0.02$
Muscle	0.14, $\sigma = 0.06$	0.14, $\sigma = 0.03$	0.13, $\sigma = 0.04$	0.02, $\sigma = 0.01$	0.02, $\sigma = 0.01$	0.02, $\sigma = 0.01$
Bone	0.13, $\sigma = 0.06$	0.15, $\sigma = 0.05$	0.21, $\sigma = 0.16$	0.01, $\sigma = 0.01$	0.01, $\sigma = 0.00$	0.01, $\sigma = 0.01$
Lymph nodes	0.21, $\sigma = 0.07$	0.30, $\sigma = 0.04$	0.37, $\sigma = 0.20$	0.00, $\sigma = 0.00$	0.00, $\sigma = 0.00$	0.00, $\sigma = 0.00$