Supporting Information

Comparison of ^{64}Cu-complexing bifunctional chelators for radioimmunoconjugation: labeling efficiency, specific activity and *in vitro/in vivo* stability.

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Bifunctional chelator	Concentration of Rituximab				
	500 nM	250 nM	125 nM	62.5 nM	31.3 nM
p-SCN-Bn-DOTA	98.7 (± 0.1)	96.3 (± 1.3)	64.5 (± 4.1)	19.6 (±14.6)	1.4 (± 1.0)
p-SCN-Bn-NOTA	99.4 (± 0.1)	99.4 (± 0.2)	99.2 (± 0.2)	99.4 (± 0.5)	95.2 (± 0.2)
p-SCN-Bn-oxo-DO3A	98.7 (± 0.1)	94.4 (± 5.7)	53.3 (± 9.2)	19.9 (± 3.7)	0.5 (± 0.1)
p-SCN-Bn-PCTA	97.2 (± 0.4)	91.6 (± 1.7)	48.1 (± 6.3)	15.8 (± 5.4)	0.7 (± 0.4)
Sar-CO_2H	96.8 (± 2.4)	97.7 (± 0.7)	48.6 (±34.6)	12.9 (±14.8)	2.2 (± 2.5)
p-SCN-Bn-DTPA	74.5 (± 5.5)	29.8 (±15.2)	4.5 (± 0.4)	2.7 (± 0.6)	1.0 (± 0.2)
CHX-A"-DTPA	97.1 (± 0.2)	96.2 (± 0.4)	94.2 (± 0.5)	74.7 (±16.7)	36.5 (±20.6)
2B3M-ITC-DTPA	97.0 (± 0.3)	96.4 (± 0.7)	94.0 (± 1.7)	67.3 (± 3.3)	26.8 (±24.5)

Table S1: Radiolabeling efficiency (% (±SD) n=3) of each immunoconjugate under increasingly dilute conditions.

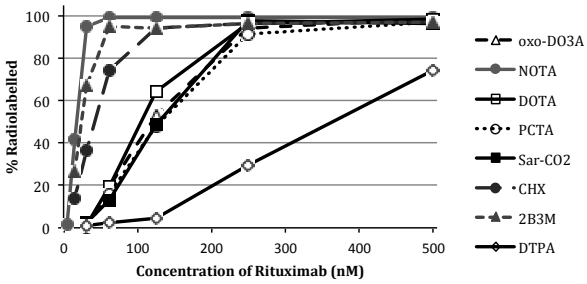


Figure S1: Radiolabeling efficiency of each immunoconjugate under increasingly dilute conditions expressed as concentration of rituximab against % labeling efficiency.

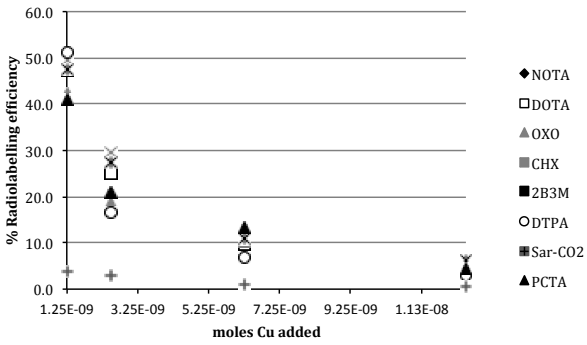


Figure S2: Radiolabeling efficiencies at different copper:immunoconjugate ratios were used to determine the number of bifunctional chelators per antibody molecule. Knowing the moles of Cu added, the number of moles of Cu bound can be calculated from the % radiolabeling efficiency[64]. The moles of Cu bound is divided by the moles of antibody added (1.25×10^{-10} moles) to give the ligand:antibody ratio. The average ratio across the different concentrations is taken as the number of BFC's per antibody.

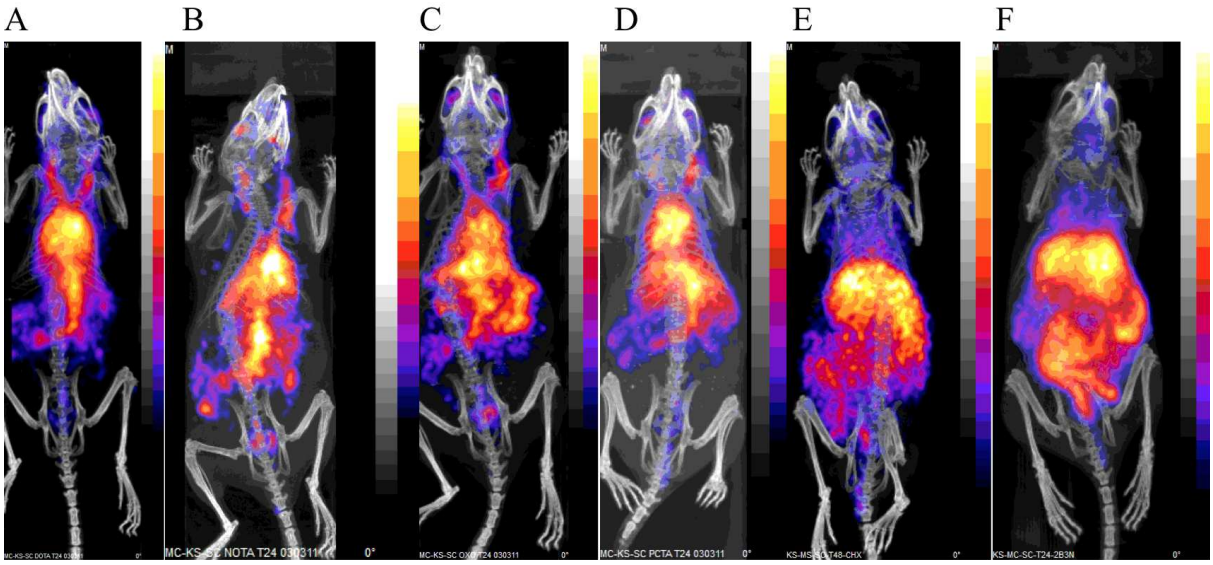
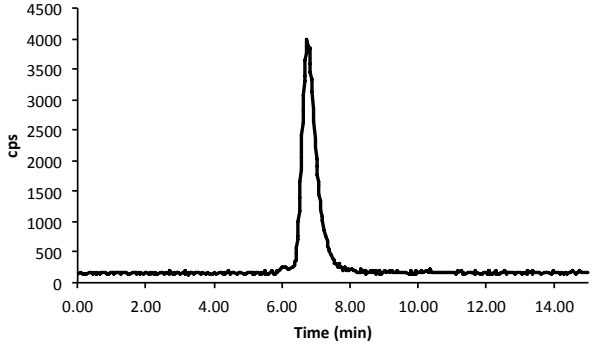


Figure S3: PET images (maximum intensity projection) of Balb/C mice 24 h post injection with ^{64}Cu-Rituximab-immunoconjugates. (A) ^{64}Cu-DOTA-Rituximab, (B) ^{64}Cu-NOTA-Rituximab (C) ^{64}Cu-oxo-DO3A-Rituximab, (D) ^{64}Cu-PCTA-Rituximab, (E) ^{64}Cu-CHX-A"-DTPA-Rituximab and (F) ^{64}Cu-2B3M-DTPA-Rituximab.

A



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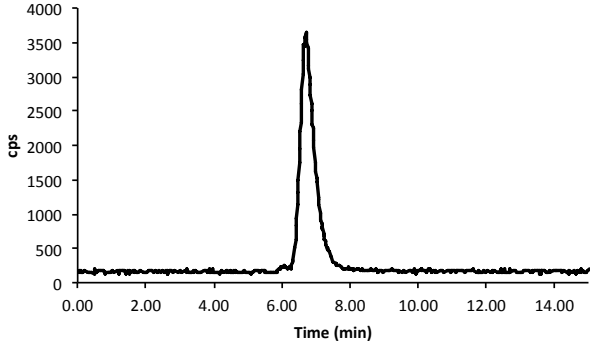

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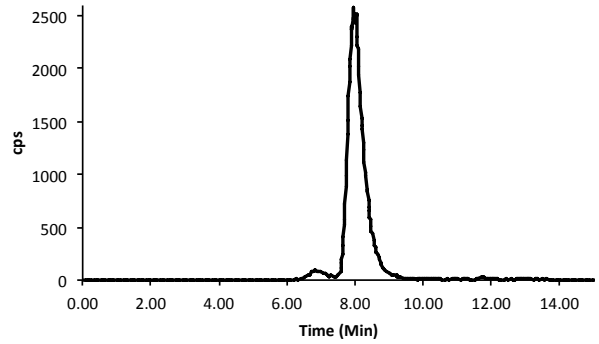

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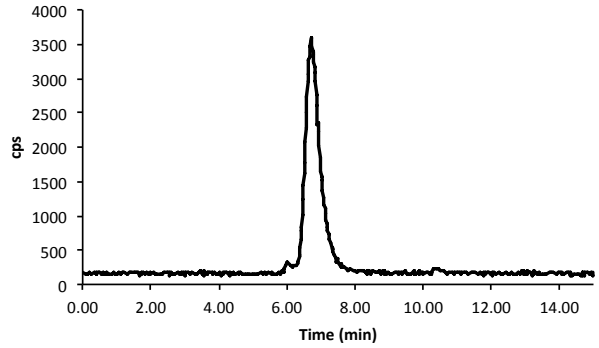

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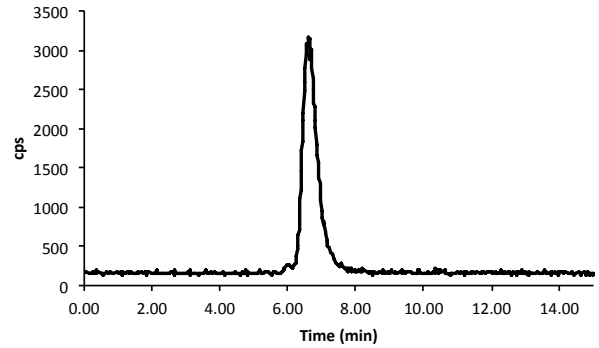

Figure S4: HPLC Radiochromatograms of Cu-64 labeled Rituximab conjugated with different bifunctional chelates (A) *p*-SCN-Bn-oxo-DO3A, (B) *p*-SCN-Bn-DOTA, (C) Sar-CO_2H, (D) CHX-A"-DTPA, (E) 2B3M-DTPA. The shift in retention time for ^{64}Cu-Sar-CO-Rituximab compared with the other radioimmunoconjugates is due to the presence of a guard column before the size exclusion column.