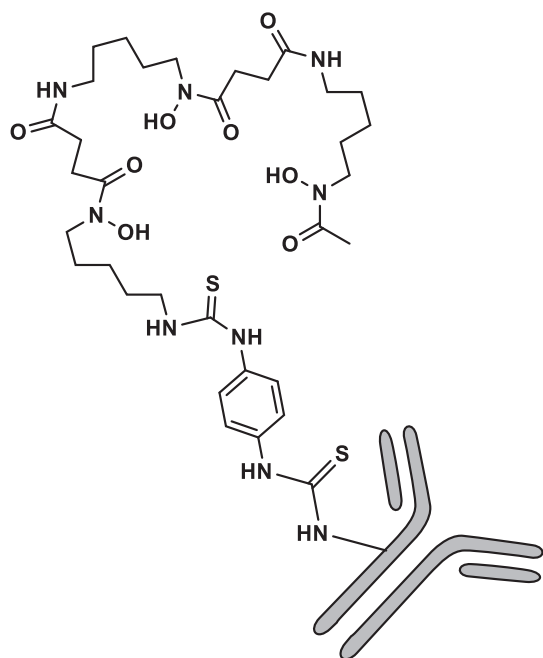
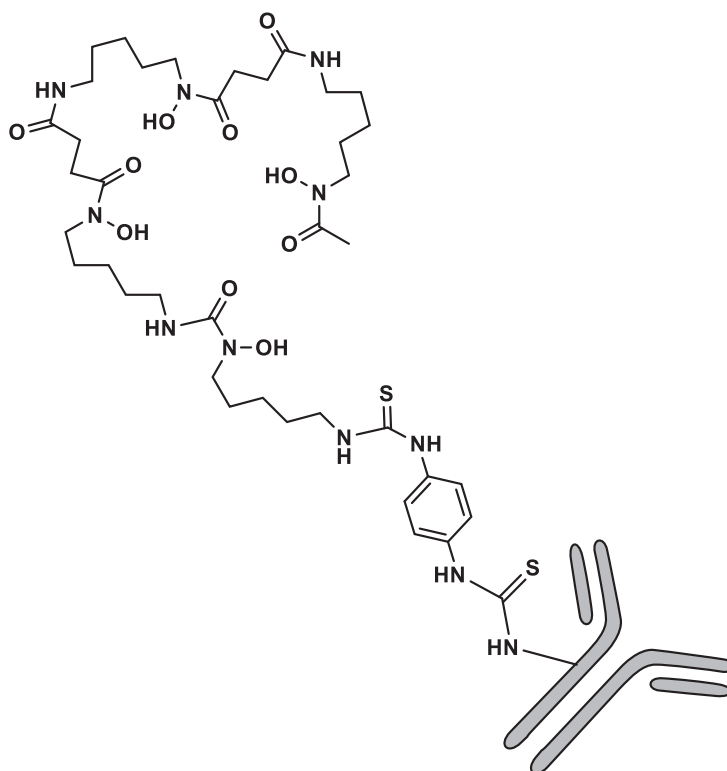


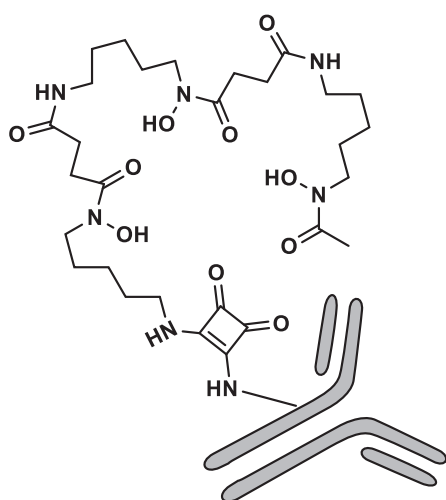
***DFO-Bz-NCS-anti-gD***



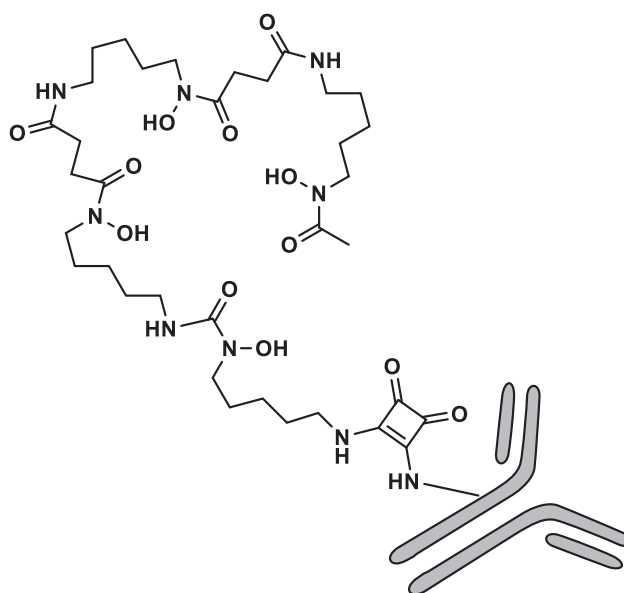
***DFO\*-Bz-NCS-anti-gD***



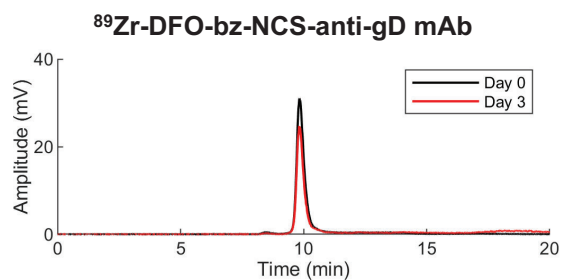
***DFO-squaramide-anti-gD***



***DFO\*-squaramide-anti-gD***

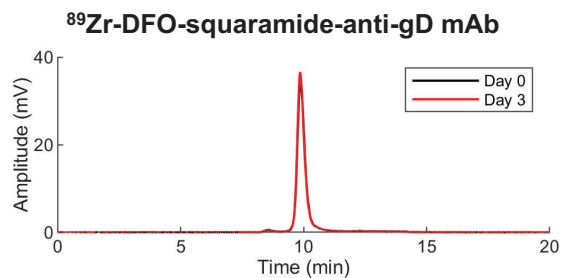


**Supplemental Figure 1.** Chemical structures of the four chelator-linker combinations investigated in this study. (Courtesy of Lan Na, Chemistry, UC Davis).



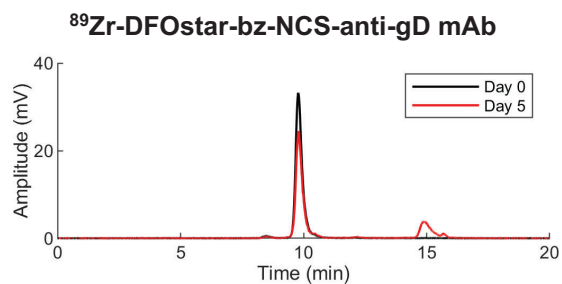
**Day 0:** 2.0% aggregates, 93.7% monomer, 2.3% free <sup>89</sup>Zr, 2.0% peak at 17-19 min (presumed to be <sup>89</sup>Zr-DFO-bz-NCS analog)

**Day 3:** 1.0% aggregates, 83.3% monomer, 15.7% peak at 17-19 min (presumed to be <sup>89</sup>Zr-DFO-bz-NCS analog)



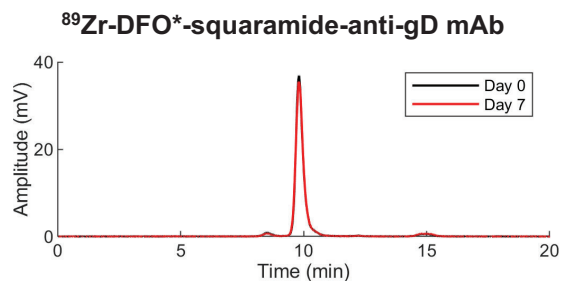
**Day 0:** 1.9% aggregates, 96.6% monomer, 1.5% free <sup>89</sup>Zr

**Day 3:** 1.3% aggregates, 97.4% monomer, 1.3% free <sup>89</sup>Zr



**Day 0:** 2.0% aggregates, 97.1% monomer, 0.4% free <sup>89</sup>Zr, 0.5% <sup>89</sup>Zr-DFO\*

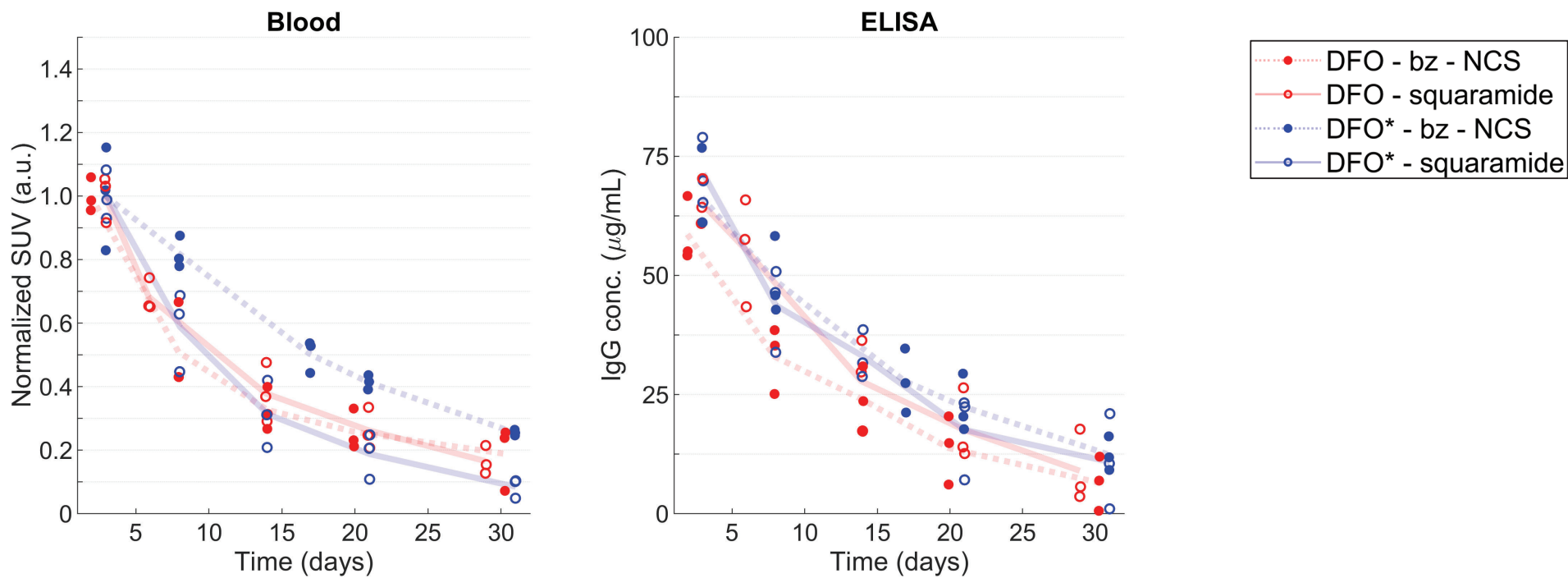
**Day 5:** 1.3% aggregates, 75.2% monomer, 0.5% mAb fragments, 1.5% free <sup>89</sup>Zr; 21.5% <sup>89</sup>Zr-DFO\*



**Day 0:** 3.0% aggregates, 93.5% monomer, 0.6% free <sup>89</sup>Zr, 2.9% peak at ~15 min (presumed to be <sup>89</sup>Zr-DFO\*-squaramide analog)

**Day 7:** 2.6% aggregates, 90.7% monomer, 1.1% free <sup>89</sup>Zr, 5.5% peak at ~15 min (presumed to be <sup>89</sup>Zr-DFO\*-squaramide analog)

**Supplemental Figure 2.** Chemical purities of each chelator-linker measured by size-exclusion HPLC (System C in the text).



**Supplemental Figure 3.** Comparison of blood SUV and ELISA antibody concentration for days 2 – 30. The blood SUV for each group are normalized by the mean value on day 2/3.