Development of a Recombinant Antibody with Specificity for Chelated Uranyl Ions

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Abstract

The goal of our project is to develop novel approaches to identify and study antibodies with specificity for chelated uranyl ions. Our hypothesis is that recombinant phage-display libraries, generated from animals that have been immunized with uranyl chelate complexes, will identify high-affinity antibodies that can be isolated and expressed in high yields. To test this hypothesis, we designed and expressed a recombinant phage-display antibody that specifically binds to chelated uranyl ions.

Introduction

In a separate series of experiments, a recombinant phage-display antibody library has been prepared using RNA isolated from the spleens of sheep and rabbits immunized with specific metal-chelate complexes. Phage-display technology has been developed as an economical and efficient method for generating antibodies specific for a desired antigen. In this study, we have used phage-display technology to identify antibodies specific for chelated uranyl ions. Using this technology, we have generated a recombinant phage-display antibody library that can be used to identify antibodies with specificity for chelated uranyl ions.

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Figure 1. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Conclusions

These results support the hypothesis that phage-display technology can be used to identify antibodies specific for chelated uranyl ions. Further studies are needed to determine the specificity and affinity of the recombinant antibody for chelated uranyl ions. These studies will also provide insights into the mechanism of action of the recombinant antibody.

References


Figure 2. Thirty-six hours after transfection the culture supernatants were removed and the yield of Fab protein was measured. The yield of Fab protein was measured using a sandwich ELISA. The values are reported as mean ± standard deviation.

Figure 3. Competition ELISA to assess the binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 4. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 5. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

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Figure 8. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 9. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

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Figure 11. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

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Figure 13. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 14. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 15. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 16. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 17. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 18. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 19. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 20. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 21. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 22. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 23. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 24. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 25. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

Figure 26. Binding of recombinant antibody to immobilized uranyl ions. The recombinant antibody was incubated with immobilized uranyl ions in the presence of various concentrations of soluble uranyl ions. The binding was measured using a competitive ELISA.

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