Process Chromatography

Got Purification Troubles?

Capture Histidine-Tagged Proteins at High Yields and Purity for Vaccine Production

The Challenge

Achieving high yield and purity of viral proteins is critical to meeting the demanding efficacy and safety requirements of vaccine and diagnostic applications. Ensuring that the purification process is also efficient and cost-effective at a large scale is essential for widespread vaccine production.

For example, as new variants of SARS-CoV-2 emerge, the purification process may need to be adapted to efficiently handle different spike protein variants. This requires flexibility in the purification method and resin choice to accommodate changes in protein characteristics and production requirements.

Purification Tip

Poodts et al. (2022) investigated approaches for purifying the SARS-CoV-2 spike protein receptor binding domain (RBD). They found robust expression of a polyhistidine (His6)-tagged SARS-CoV-2 RBD using the insect cell–baculovirus system and efficient purification using Nuvia IMAC Resin, an immobilized metal affinity resin. The observed performance of Nuvia IMAC Resin demonstrates its applicability for purifying recombinant proteins, including histidine-tagged proteins (His-tagged), from insect cell–baculovirus systems, ensuring high purity and yield.

Authors' Approach

To enhance the synthesis of His6-tagged SARS-CoV-2 RBD (rRBD), Poodts et al. (2022) used a insect cell–baculovirus culture method. The cell culture supernatant was diafiltered and loaded onto Nuvia IMAC Resin. After washing with 80 mM imidazole, the protein was eluted using 500 mM imidazole. This method resulted in a high yield of 21.1 ± 3.7 mg rRBD/l cell culture supernatant with 82% recovery and is the highest yield reported to date for this system. This example demonstrates the potential utility of Nuvia IMAC Resin in virus and vaccine research, development, and therapeutic production.

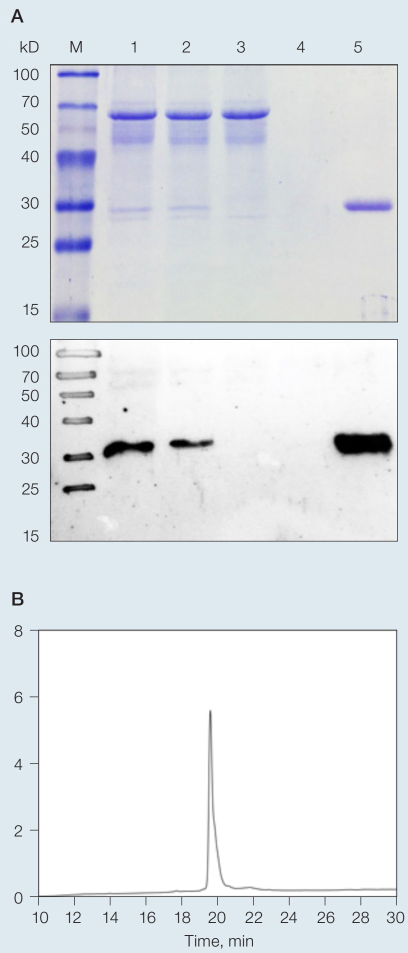

Fig. 1. Analysis of fractions collected during the Nuvia IMAC Resin purification process of His6-tagged receptor binding domain (rRBD). A, SDS-PAGE under reducing conditions (top) and western blot analysis using anti-S (anti-spike antibody; bottom). M, protein marker; 1, Sf9 cell expression supernatant; 2, diafiltered sample; 3, flowthrough; 4, washing step; 5, IMAC elution fraction. **B**, reverse phase-HPLC analysis of rRBD purified by Nuvia IMAC Resin.

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Nuvia IMAC Resin is a metal affinity resin designed for high-resolution separations and high-throughput applications. It exhibits excellent binding capacity for proteins, and, in this study, superior performance compared to other resins tested, allowing for efficient purification of the target protein with high yield and purity.

Nuvia IMAC Resin delivers:

- High dynamic binding capacity (over 40 mg/ml for histidine-tagged proteins)
- High purity (>95% in a single chromatographic step)
- Scalability

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Reference

Poodts J et al. (2022). Improved expression of SARS-CoV-2 spike RBD using the insect cell-baculovirus system. Viruses 14, 2794.

Note: This flier is based on the study conducted by Poodts et al. (2022) and is intended for informational purposes only. It is recommended to consult the original study and perform additional validation experiments according to specific requirements.

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