

Reductive strategies in protein engineering: Harnessing the full potential of the protein universe

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Protein engineering is a powerful tool that allows the manipulation of protein structure and function for various applications. However, the vast size of the protein sequences poses significant challenges in discovering or engineering proteins with desired properties using conventional approaches. To address the current limitations, we employ reductive strategies to harness the full potential of the proteins in nature. Reductive strategies simplify the complex relationship between protein structure and function by focusing on key elements. This enables effective exploration of the infinite protein sequence space, thereby accelerating the identification of critical residues in proteins with desired properties. Specifically, short motifs, minimal functional domains, and evolutionary constraints are utilized to reduce the design space. In this talk, domain-based engineering of a glutamine-binding protein and motif-based comprehensive screening of peptide therapeutics will be presented as successful case studies of reductive protein engineering. By applying reductive strategies, we aim to open new horizons in protein engineering and effectively exploit the untapped area of the protein universe.