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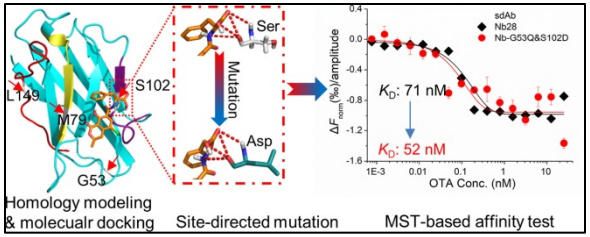
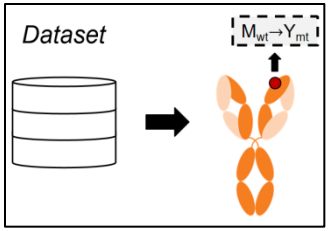
Recent advances in antibody optimization based on deep learning methods

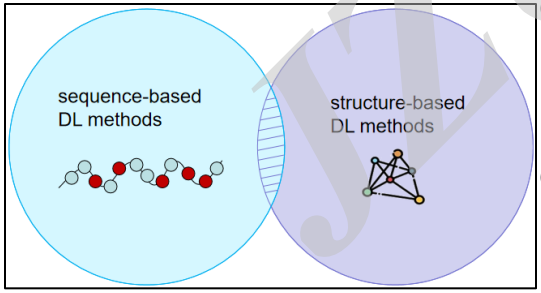
Key words: Deep learning; Antibody optimization; Available dataset; Input data type

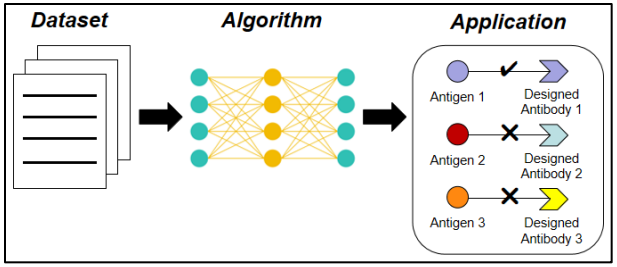
Research Summary

This review mainly focused on recent progress in deep learning-based antibody optimization, and discuss the current challenges and potential solutions for the future development of general-purpose deep learning algorithms in antibody optimization:









- **Introduction of deep learning for antibody optimization**
- **Public datasets for deep learning-based antibody optimization**
- **Classification of algorithms by input data types**
- **Challenges in dataset quality and algorithm limitations**

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Innovation points

- **Introduction** to the importance of monoclonal antibodies, their structural characteristics, and their dominance in disease treatment.

- **Summary** of recent advancements in deep learning-based antibody optimization, including datasets, algorithm input types, and their applications in improving efficiency and reducing costs.

- **Emphasis** on current challenges in data quality and algorithm limitations, along with potential solutions and future directions for general-purpose deep learning models in antibody engineering.

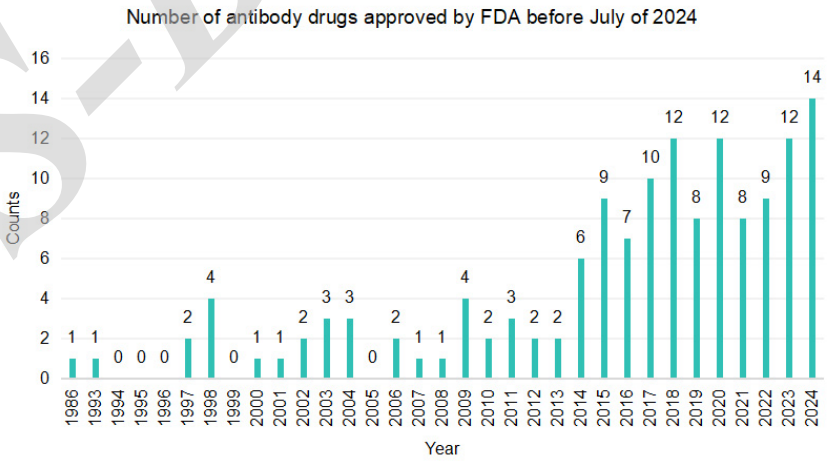

Figure 1

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Innovation points

A series of comprehensive tables were generated to summarize the latest knowledge about datasets and DL-methods for antibody optimization.

Table 1 | Summary of available datasets for deep learning-based antibody optimization.

Table 2 | Summary of deep learning-based antibody optimization methods using only sequence data.

Table 3 | Overview of DL-based antibody optimization methods using both sequence and structural data.

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