

## 社会的な背景

免疫系は、感染症、自己免疫疾患、アレルギーにとどまらず、がん免疫を含む幅広い疾患群の病態に深く関与している。これまで、ワクチン接種の反応性は、接種後の抗体価の測定により評価されてきた。

## 従来の技術・課題

従来は、ELISA法や中和試験のように蛋白レベルで測定していたが、抗体価かなり高いレベルで保持されているため評価ができず、mRNAレベルで評価できる新たな解析方法が必要とされている。

## 技術のポイント

### 1. 技術の概要

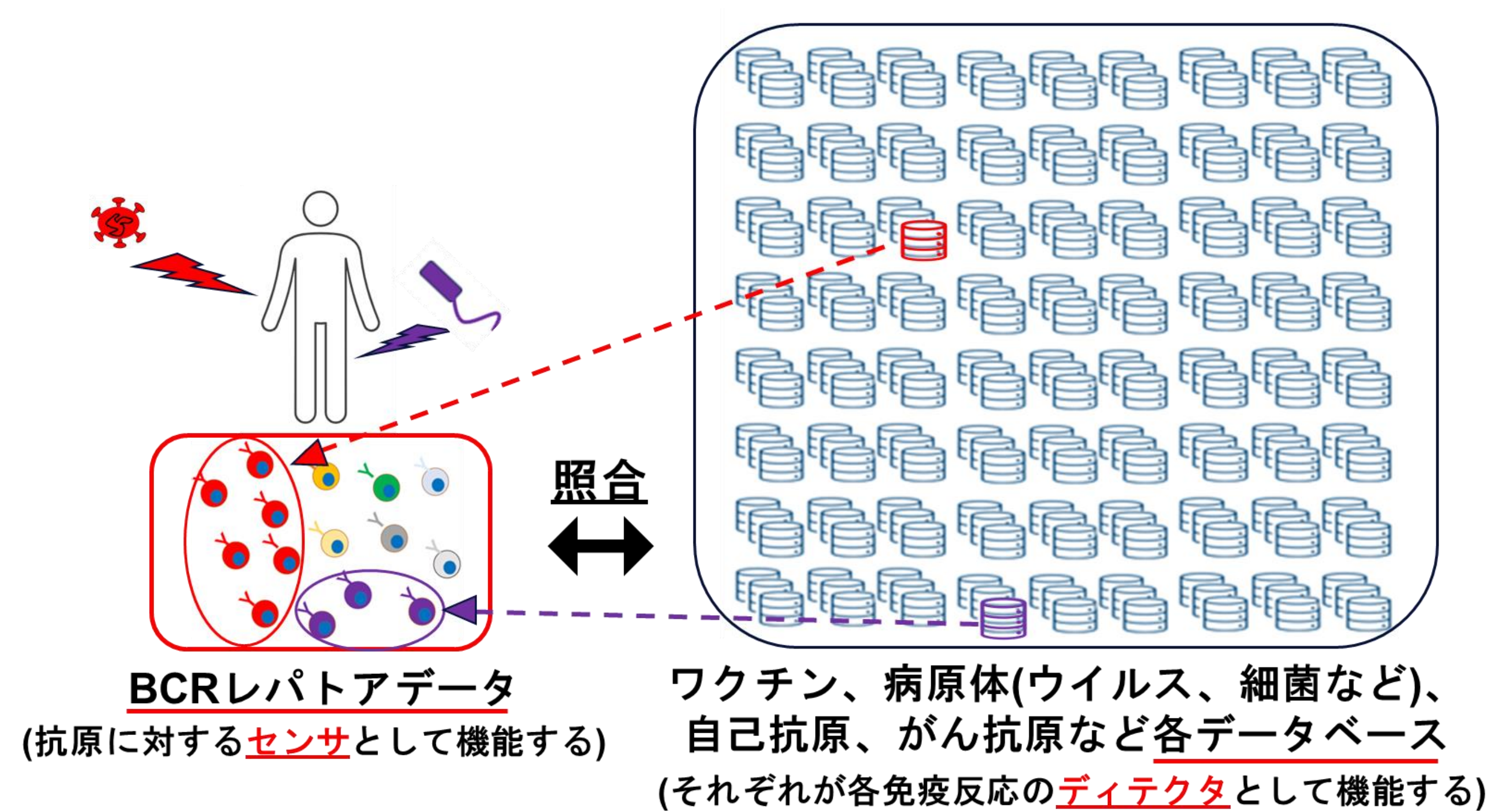


図1.QASAS法による網羅的評価の概念図

### ここがポイント！

#### 免疫細胞レパトアの多様性を用いた免疫反応評価

- ① ワクチン後反応の詳細な評価に豊富な実績がある！
- ② あらゆる免疫反応の網羅的評価へ応用可能！

**利点：**“データベースによる情報解析での反応評価”であり膨大な解析でも低コストで解析可能

### 2. 技術の利点(ワクチン評価の実例)

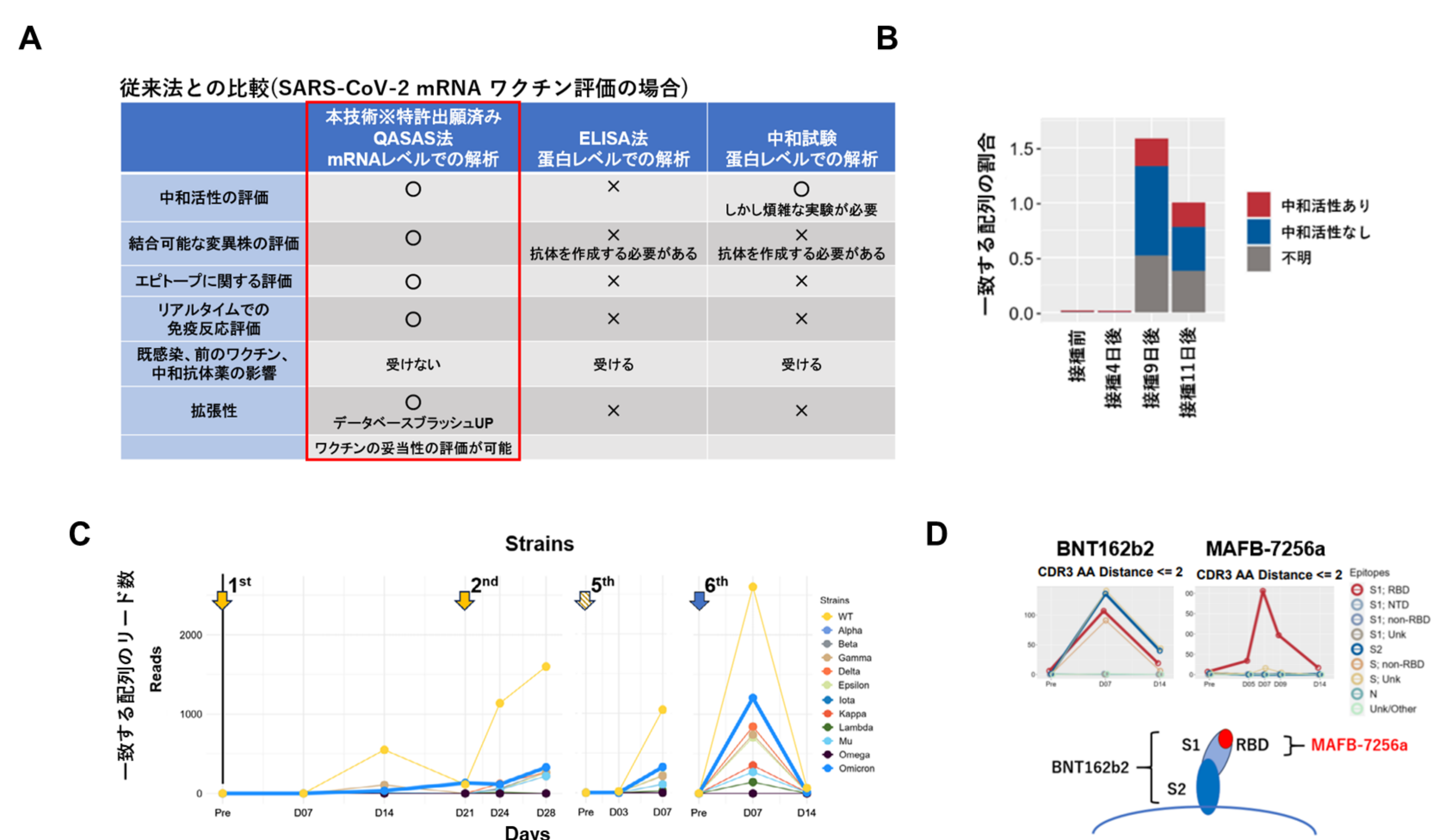


図2.QASAS法によるSARS-Cov-2mRNAワクチンの評価

- データベースを、特定の抗原ごとに用意することで反応の詳細を明らかにできる。
- ワクチン後反応であれば、「中和活性(B)」「変異株(C)」「エピトープ(D)」に対する反応を解析。ワクチンの妥当性を評価できる。

## 実用化に向けた今後の展開

### 想定される活用例

- ・ AI技術でデータベース群を爆発的に増やし、あらゆる免疫反応評価を実現する
- ・ 感染症、がん免疫、自己免疫疾患、アレルギーの評価、ワクチンなど創薬候補の評価・開発など

### 連携について

実施許諾契約、共同研究契約、技術検討のための契約 など

### 論文と知財

- ・ 関連出願 3 件
- ・ 論文あり



# Unlocking the Immune System's Story: A New Method for Vaccine Assessment and Comprehensive Immune Sensing.

Kobe University Yohei Funakoshi

## Background

The immune system is deeply involved in a wide range of diseases, including infectious diseases, autoimmune disorders, allergies, and cancer immunity. Previously, vaccine response was evaluated by measuring antibody titers after inoculation.

## Previously Technology

Traditionally, measurements were performed at the protein level using methods such as ELISA or neutralization assays. However, because antibody titers are maintained at quite high levels, evaluation has been impossible, necessitating new analytical methods capable of assessing mRNA levels.

## Technical Significance

## 1. Overview of the Technology

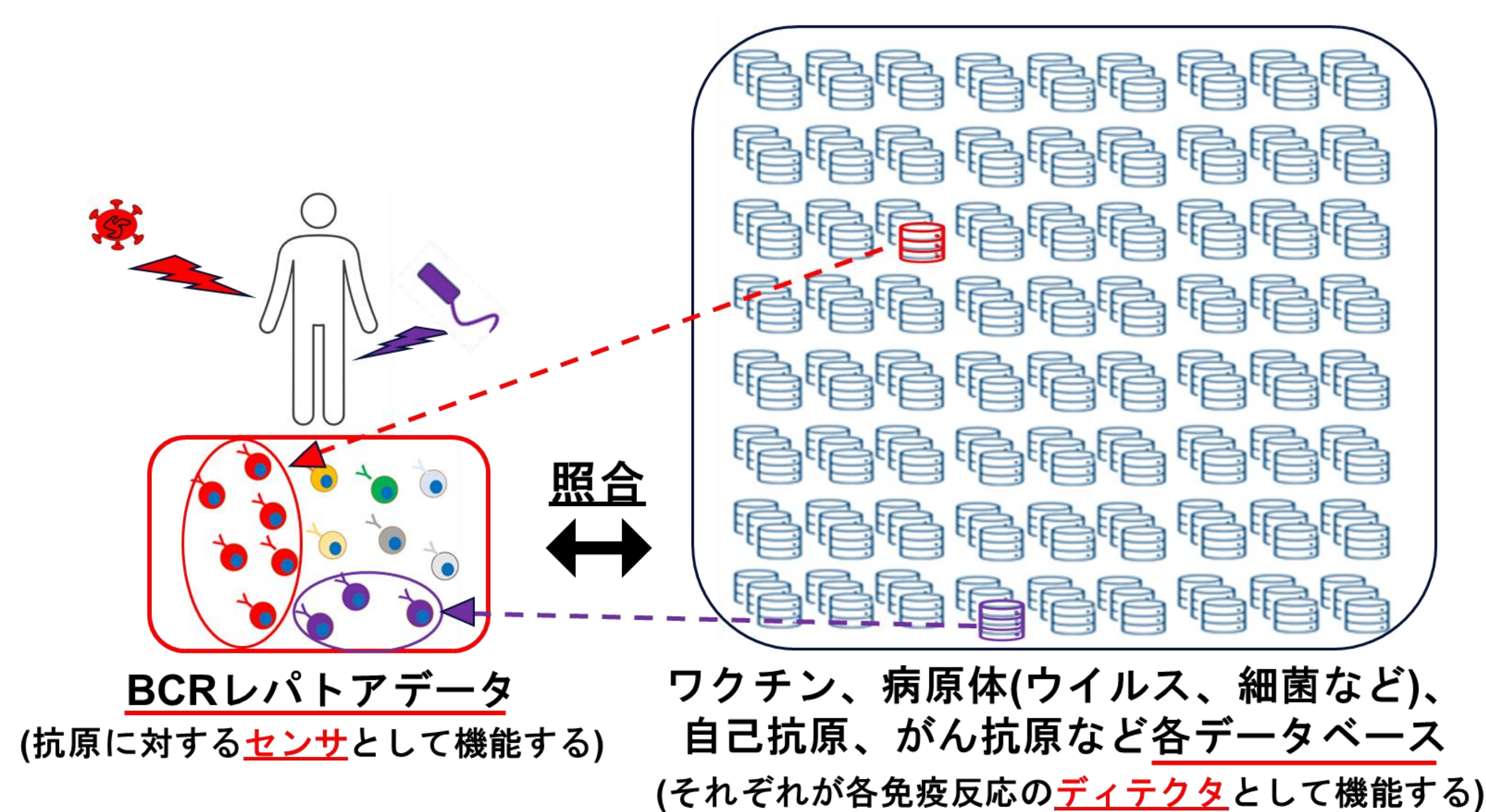


Figure 1. Conceptual Diagram of Comprehensive Evaluation Using the QASAS Method

### Significance

- Evaluating immune responses using the diversity of the immune cell repertoire.
- Applicable to the comprehensive evaluation of all immune responses.
- It is a "reaction evaluation by information analysis using a database," which allows for low-cost analysis even for large-scale assessments.

## 2. Advantages of the Technology

A Comparison with Conventional Methods (For SARS-CoV-2 mRNA Vaccine Evaluation)

	QASAS method mRNA-level analysis	ELISA method Protein-level analysis	Neutralization Test Protein-level analysis
Evaluation of neutralizing activity	○	×	○ Complex experiments are required
Evaluation of bindable variants	○	×	×
Evaluation of epitopes	○	×	×
Real-time immune response evaluation	○	×	×
Impact of prior infection, previous vaccination, and neutralizing antibody drugs	Not affected	Affected	Affected
Scalability	○ Improving and expanding database quality	×	×
Other	Enables evaluation of vaccine validity		

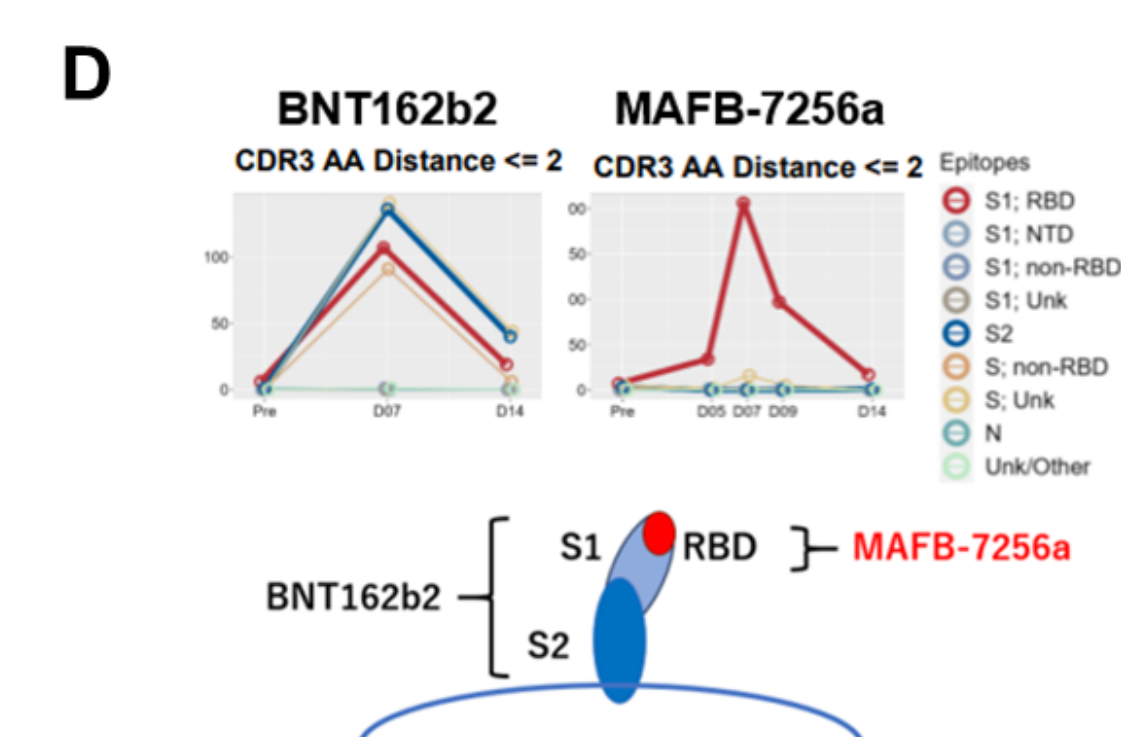
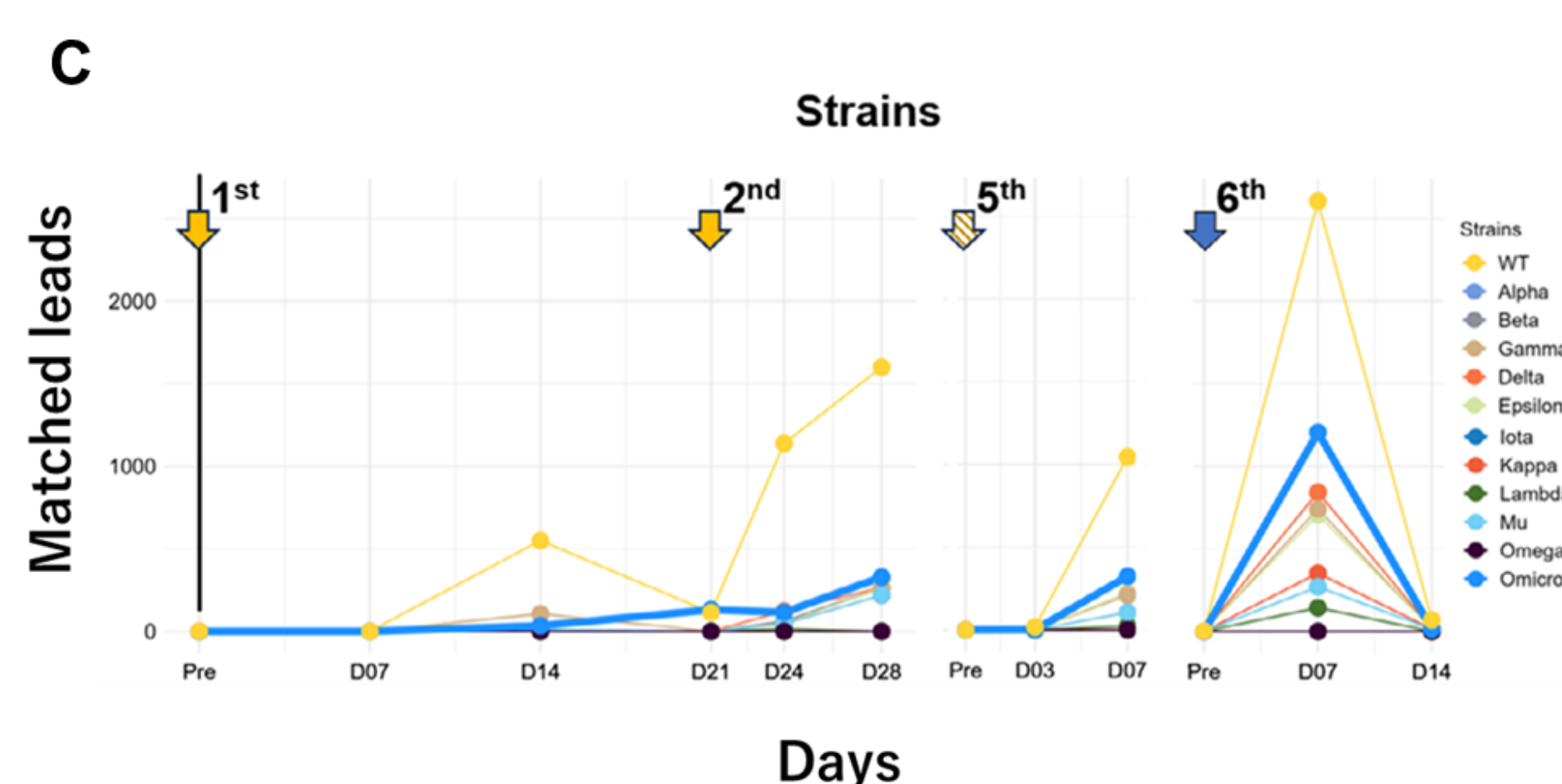
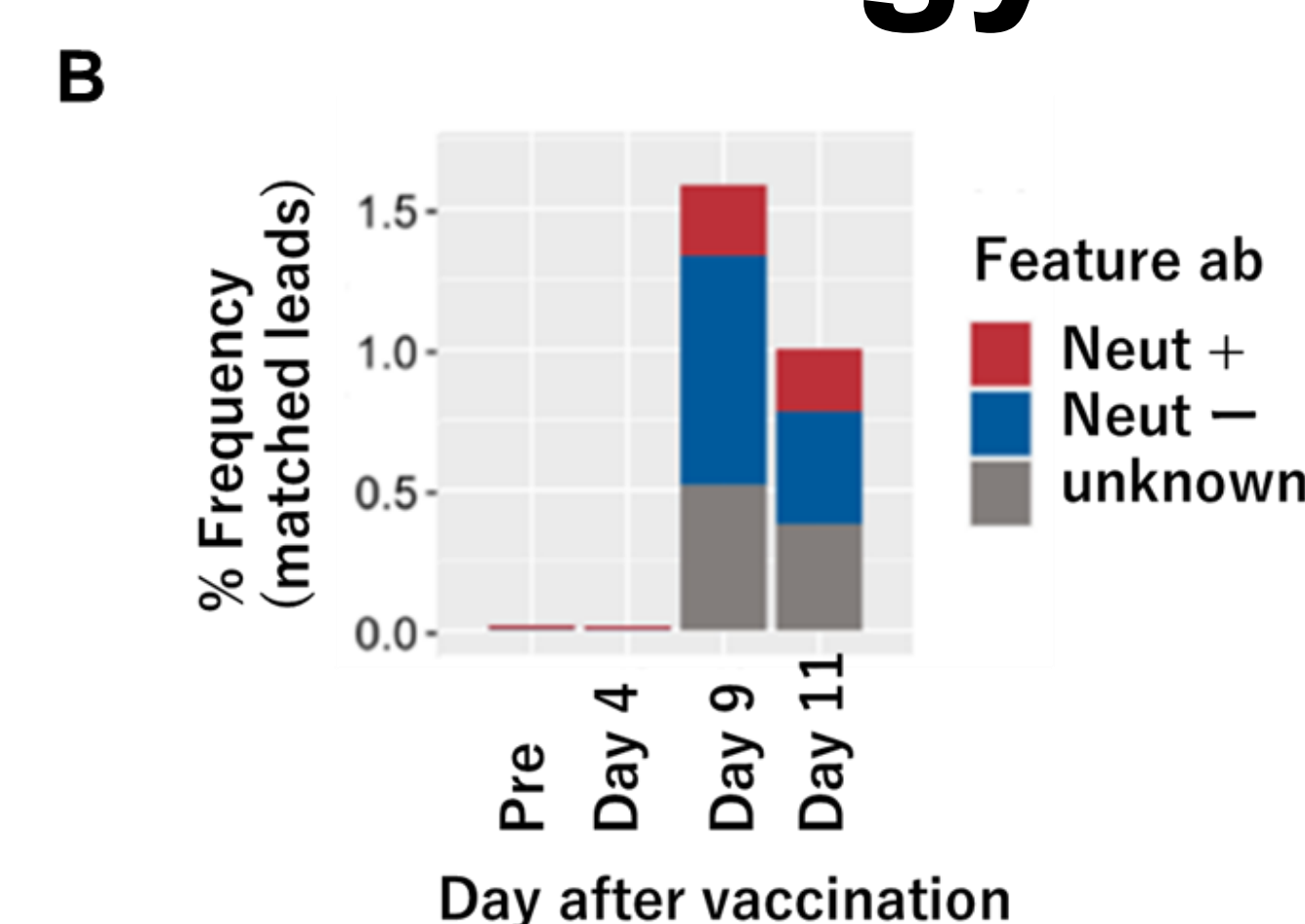


Figure 2. Evaluation of SARS-CoV-2 mRNA Vaccines Using the QASAS Method

- By preparing databases for specific antigens, we can clarify the details of the immune response.
- For post-vaccination responses, we analyze reactions to "neutralizing activity (B)", "variant strains (C)", and "epitopes (D)". This allows us to evaluate the vaccine's efficacy.

## Future Prospective

### Possible Applications

- Using AI technology to exponentially expand databases and enable evaluation of all immune responses
- Evaluation of infectious diseases, cancer immunity, autoimmune diseases, allergies, and evaluation/development of drug candidates such as vaccines

### Possible Collaboration

License Agreement, Joint Research Agreement, Agreement for Technical Review, etc.

### Publications & IP

- 3 related applications
- Publications available