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Rapid Preclinical Validation of Vaccine Candidates.

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Case Study: Rapid Preclinical Validation of Vaccine Candidates

Type of Organization: Public Health Research Lab

Industry: Vaccinology / Infectious Diseases

The Challenge: During an emerging infectious disease outbreak, quickly evaluating numerous potential vaccine candidates is critical. Traditional preclinical testing relies heavily on *in vivo* animal models, which are slow, expensive, and may not perfectly mimic human physiology.

The ScieFI Solution: The lab integrated **ScieFI 's Adaptive Knowledge Graph (AKG)** with its existing immunological and viral genomic databases. The AKG ingested global pathogen surveillance data and known immune responses, allowing the **AI Co-Scientist Module (ACS)** to identify optimal antigen targets and design novel vaccine constructs. Crucially, the lab utilized **ScieFI's "Digital Twin" Microphysiological Systems (MPS) Modeler**. This created virtual human immune-organ-on-chip models where various vaccine candidates could be rapidly tested *in silico* for their ability to elicit desired immune responses, predict off-target effects, and simulate antigen presentation, all before physical synthesis. The ACS then designed optimized *in vitro* experiments to validate the most promising digital twin results.

Impact & Benefits: The time from candidate identification to preclinical validation was reduced by 75%. The lab efficiently down-selected to the most efficacious and safest vaccine candidates, significantly accelerating the pipeline and enabling a faster response to the pandemic. The reliance on costly and ethically sensitive animal models was significantly reduced.

Key Features Highlighted:

- Adaptive Knowledge Graph (AKG)
- AI Co-Scientist Module (ACS)
- Automated Experimental Design & Optimization
- "Digital Twin" Microphysiological Systems (MPS) Modeler
- Predictive Readouts
