



mRNA Products Development and Platform Implementation at Bio-Manguinhos/ FIOCRUZ



Ministério da Saúde

FIOCRUZ

Fundação Oswaldo Cruz



Instituto de Tecnologia
em Imunobiológicos

Bio-Manguinhos



FIOCRUZ

122 years promoting
public health.

BIO-MANGUINHOS

Latin American **excellence** Institute in development and production of **immunobiologicals**.

We are **2,300 professionals**.
Our being reason is to innovate and produce on behalf of SUS, investing and training skills for the future.



PORTFOLIO



Only in 2021, more than **233 million vaccine doses** were delivered to National Immunization Program (PNI).

VACCINES

TO PREVENT AND SAVE LIVES

12 products:

- Covid-19 (recombinant) – **WHO PQ requested**;
- *Haemophilus influenzae b* (Hib) conjugated;
- Yellow fever – **WHO PQ**;
- Diphtheria, tetanus and pertussis + Hib;
- Meningococcal ACW;
- Pneumococcal 10-valent conjugated;
- Poliomyelitis 1 & 3 oral;
- Inactivated poliomyelitis;
- Human rotavirus;
- Measles, mumps and rubella;
- Measles, mumps, rubella and varicella;
- Measles and rubella – **WHO PQ submitted in Sep/22**.

211 million doses of Covid-19 vaccine delivered up to Nov/2022

COMMITMENT WITH SOCIETY



**LATEST 5 YEARS
DELIVERIES (2017-2021):**

VACCINES:

701 million doses

BIOPHARMACEUTICALS

27 million vials / syringes

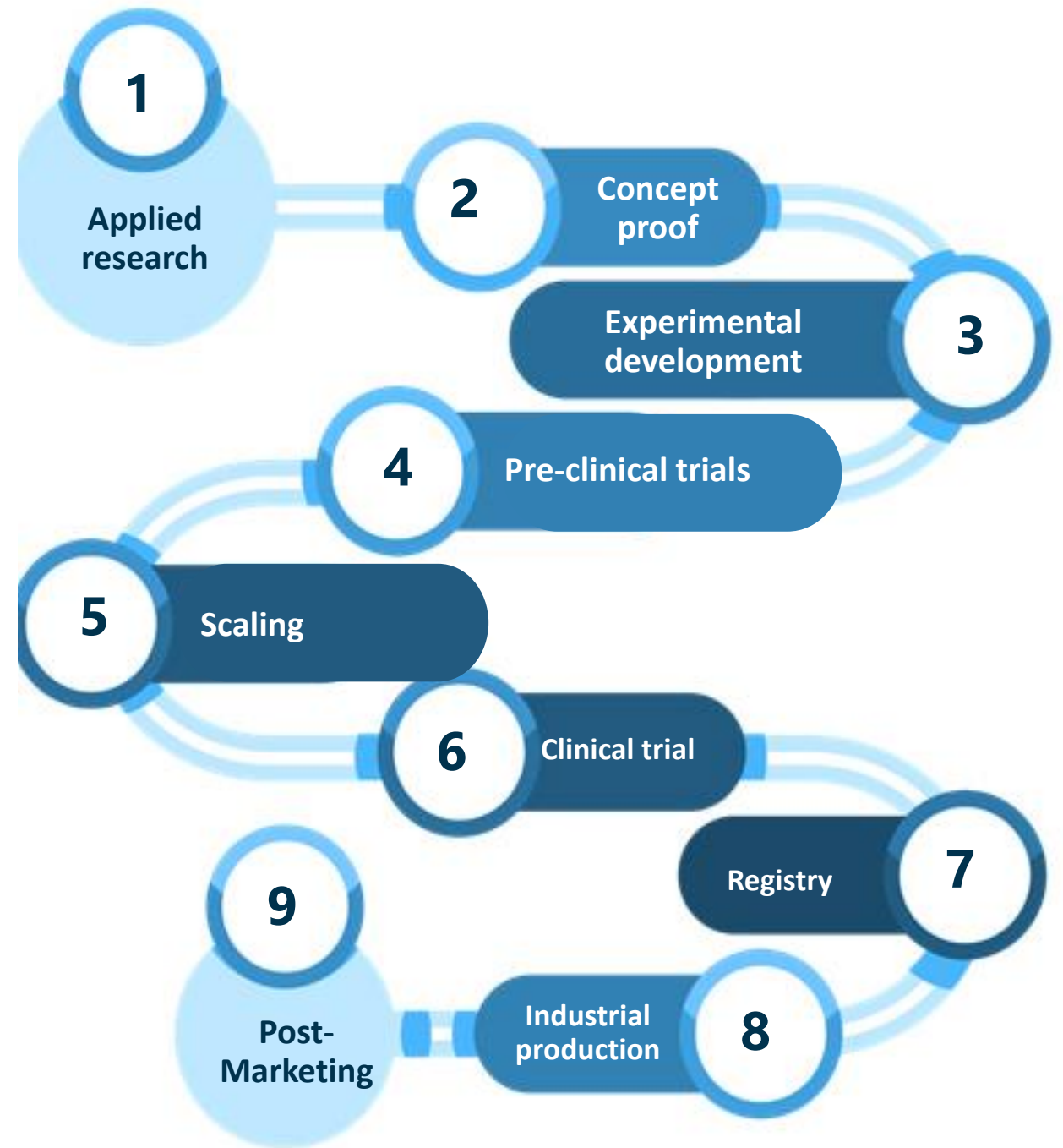
IN VITRO DIAGNOSTICS

56 million reactions

WITH EXPERTISE IN DEVELOPMENT OF PRODUCTS AND PROCESSES

Bio has 28 projects*
focused on products.

*13 are technological development projects, and the others are technology transfer projects.



PAHO selects centers in Argentina, Brazil to develop COVID-19 mRNA vaccines

21 Sep 2021



Washington DC, September 21, 2021 (PAHO) – The Pan American Health Organization (PAHO) has announced the selection of two centers in Argentina and Brazil as regional hubs for the development and production of mRNA-based vaccines in Latin America in a bid to tackle COVID-19 and future infectious-disease challenges.

The Bio-Manguinhos Institute of Technology on Immunobiologicals at the Oswaldo Cruz Foundation (FIOCRUZ) was selected as the center in Brazil. The institute has a long tradition in vaccine manufacturing and has made promising advances in the development of an innovative mRNA vaccine against COVID-19.

Bio-Manguinhos Manufacturing Capacities



≈ 200 m² area with
production capacity of
30 g of purified RNA/day



[illegible]

Pilot Plant Prokaryotic and RNA vaccines and biologics

- Somatropin production in E.coli
- Pneumo 12 valent conjugated vaccine
- Subunit viral vaccines
- RNA COVID-19 vaccine development
- mRNA therapeutic vaccines
- siRNA cancer therapies



GMP Small-scale
up to 48,500 doses /day
(50 µg drug product)

Upgrade

GMP Large-scale
up to 100M doses /year
(50 µg drug product)



1 g

Max 1 day

5 g

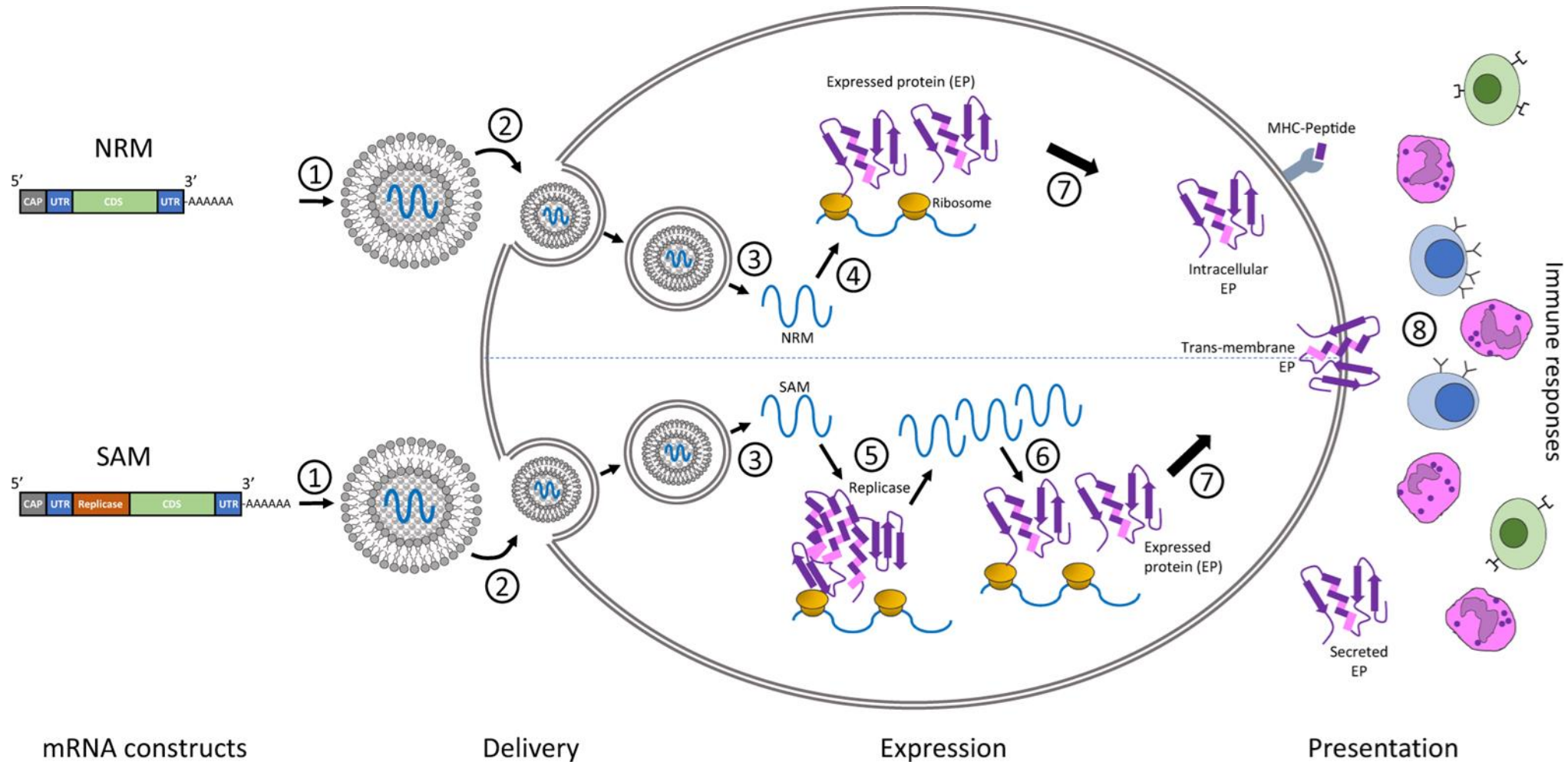
30 g

1 day

200 g

6 days

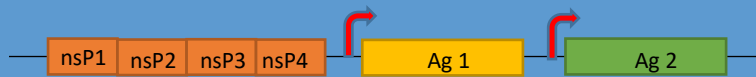
mRNA and saRNA Mechanism



Differences between mRNA and saRNA

Vaccine composition- RNA structure

saRNA construction



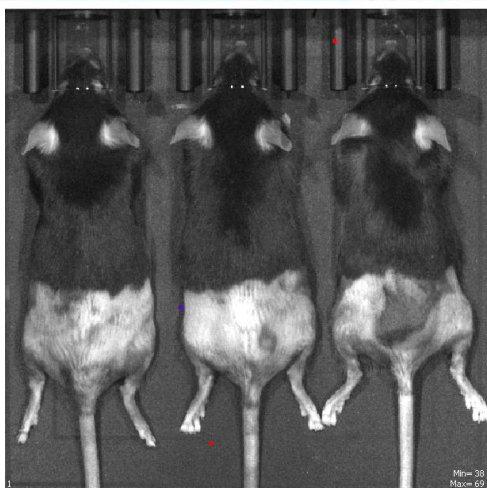
- ✓ Two different antigens allowing broadly protection

mRNA construction

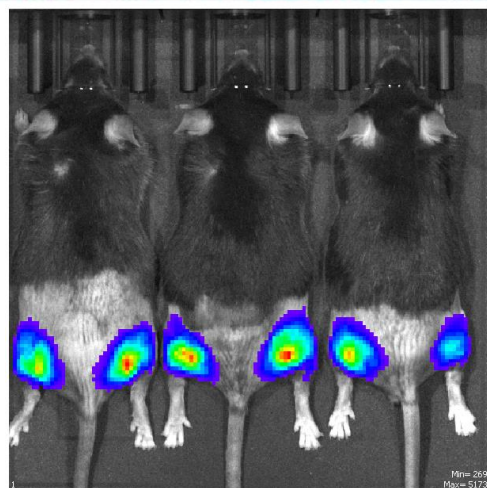


- ✓ Optimized Spike construction with diverse regulatory elements

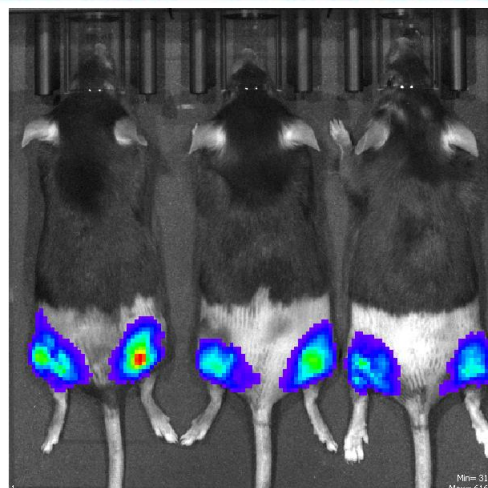
Bioluminescence Assay



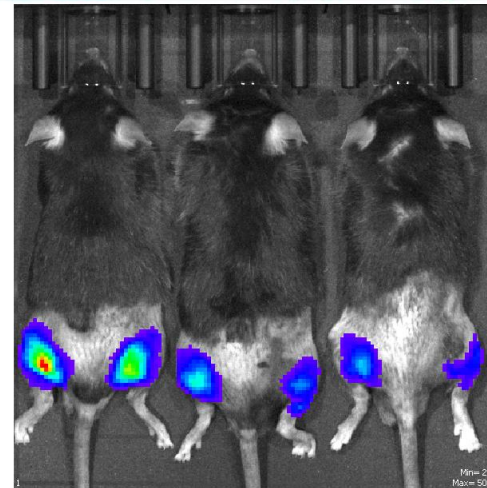
Buffer



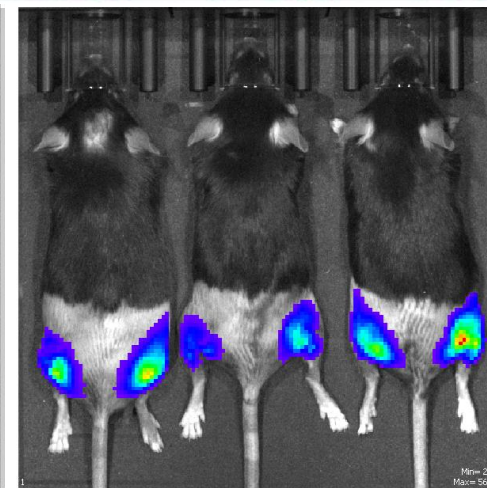
mRNA – Control Form.2



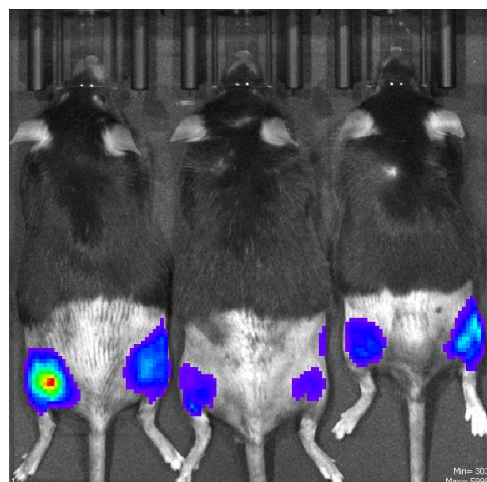
mRNA – Form. BI



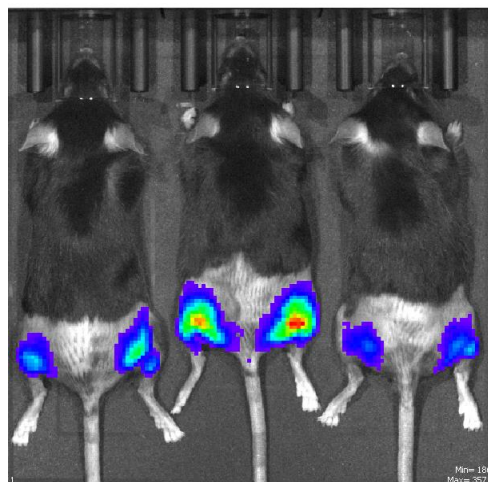
mRNA – Form. BK



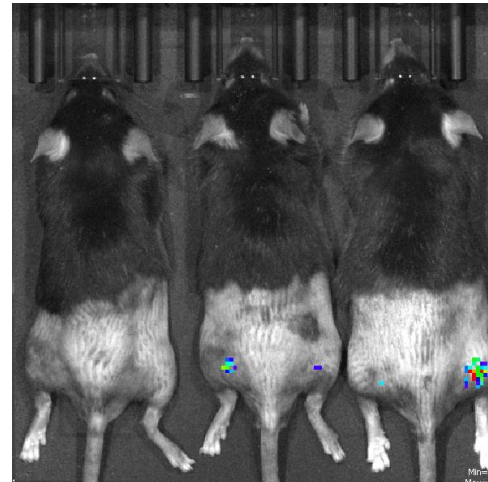
mRNA – Control Form. 1



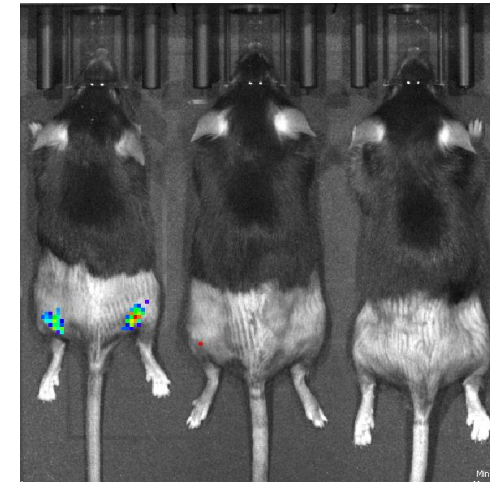
mRNA – Form. G



mRNA – Form. I

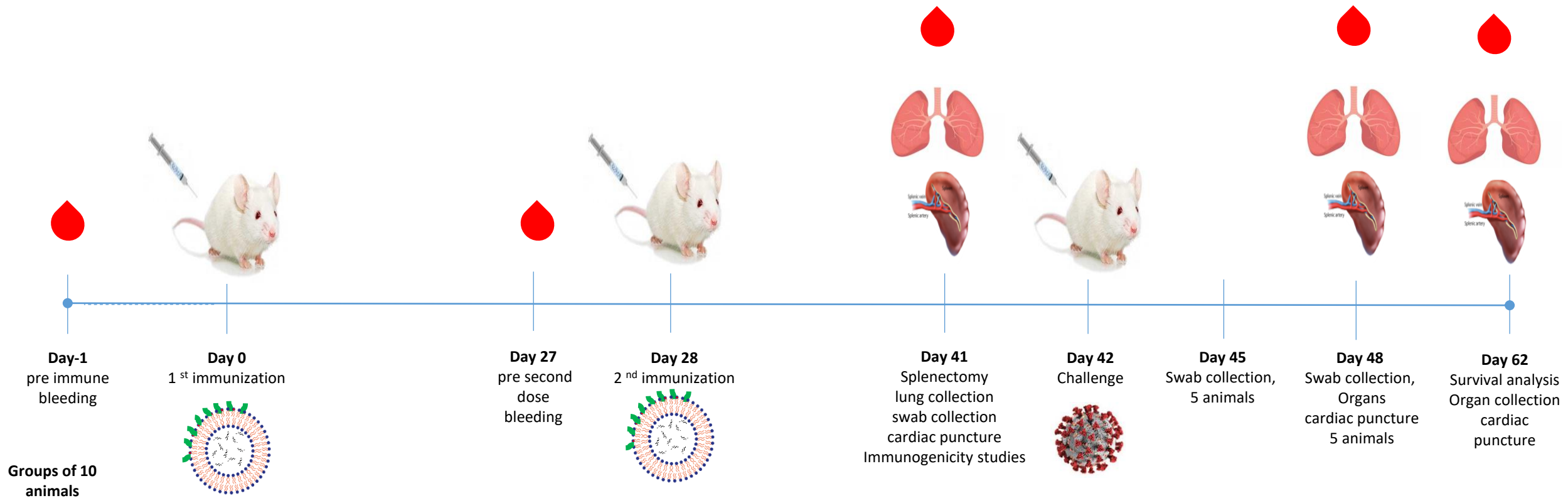


saRNA – Form. BI



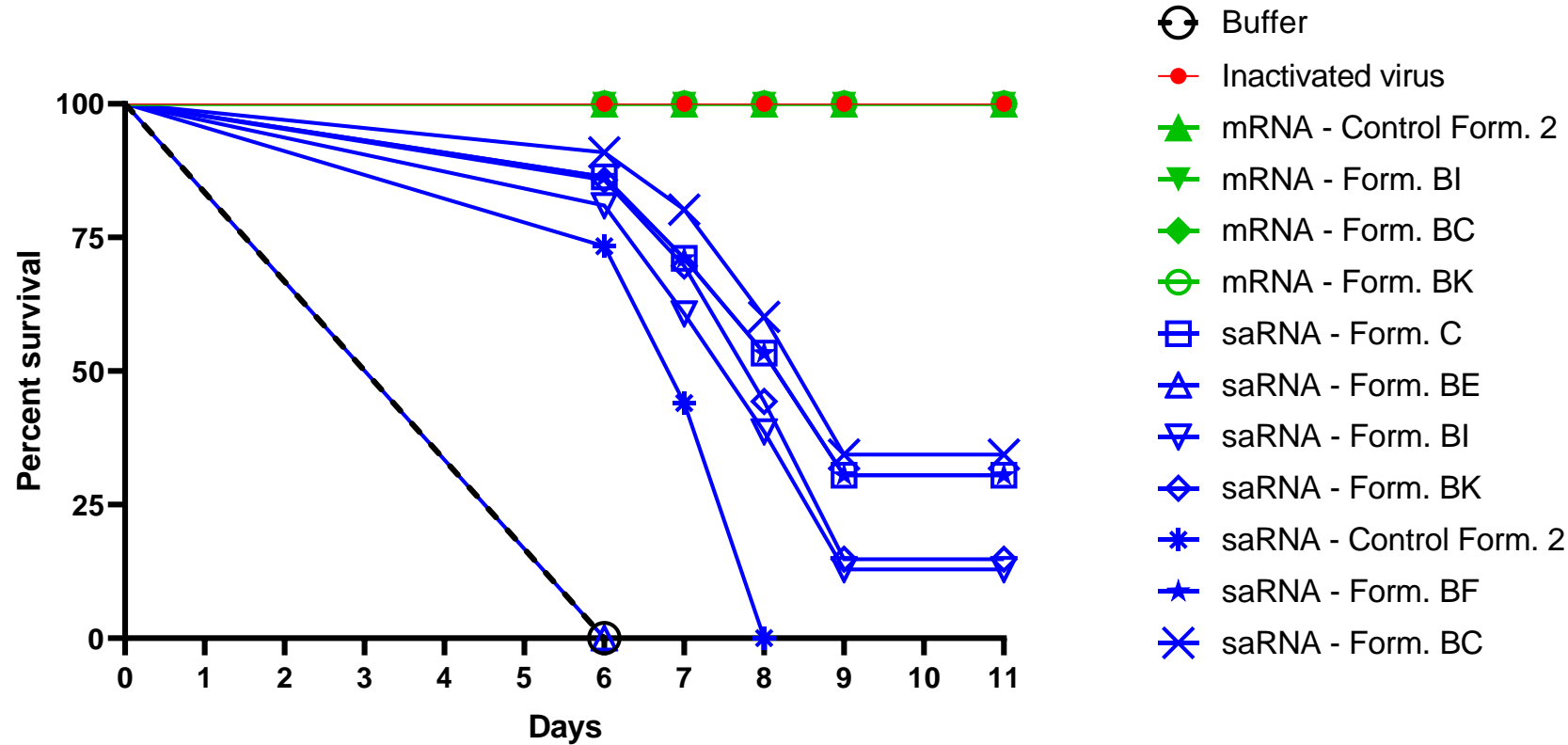
saRNA – Form. BK

Preclinical Studies

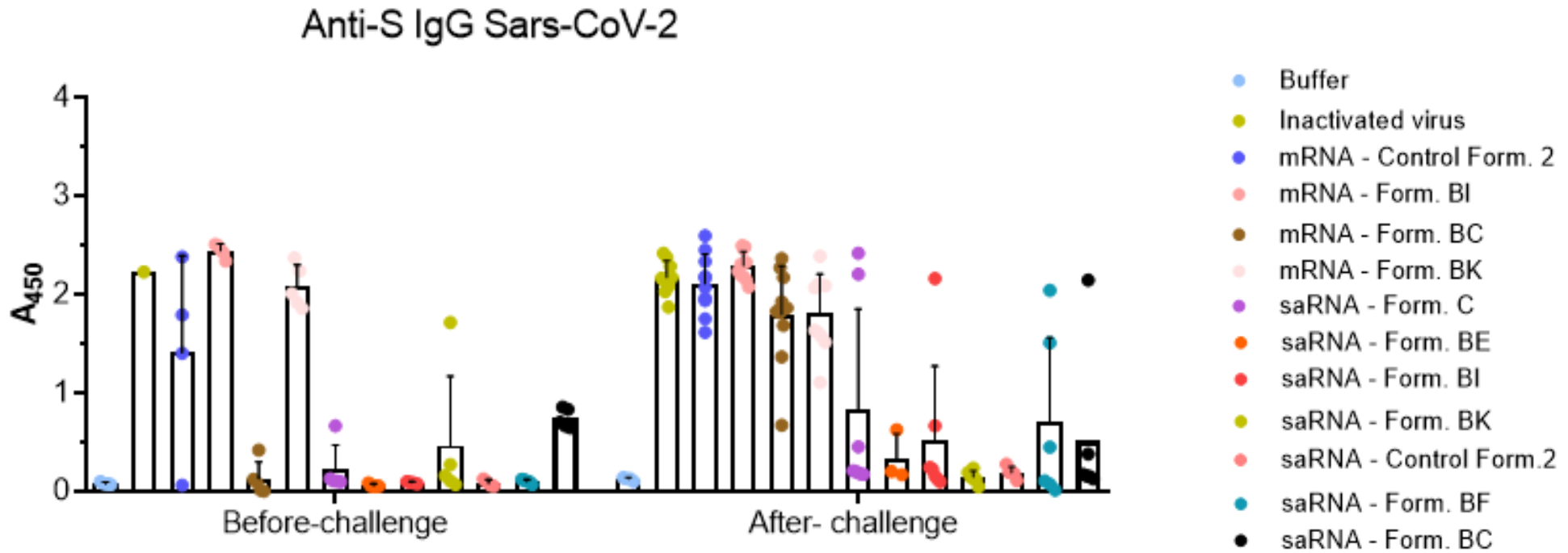


Survival assessment in mice

In vivo assay



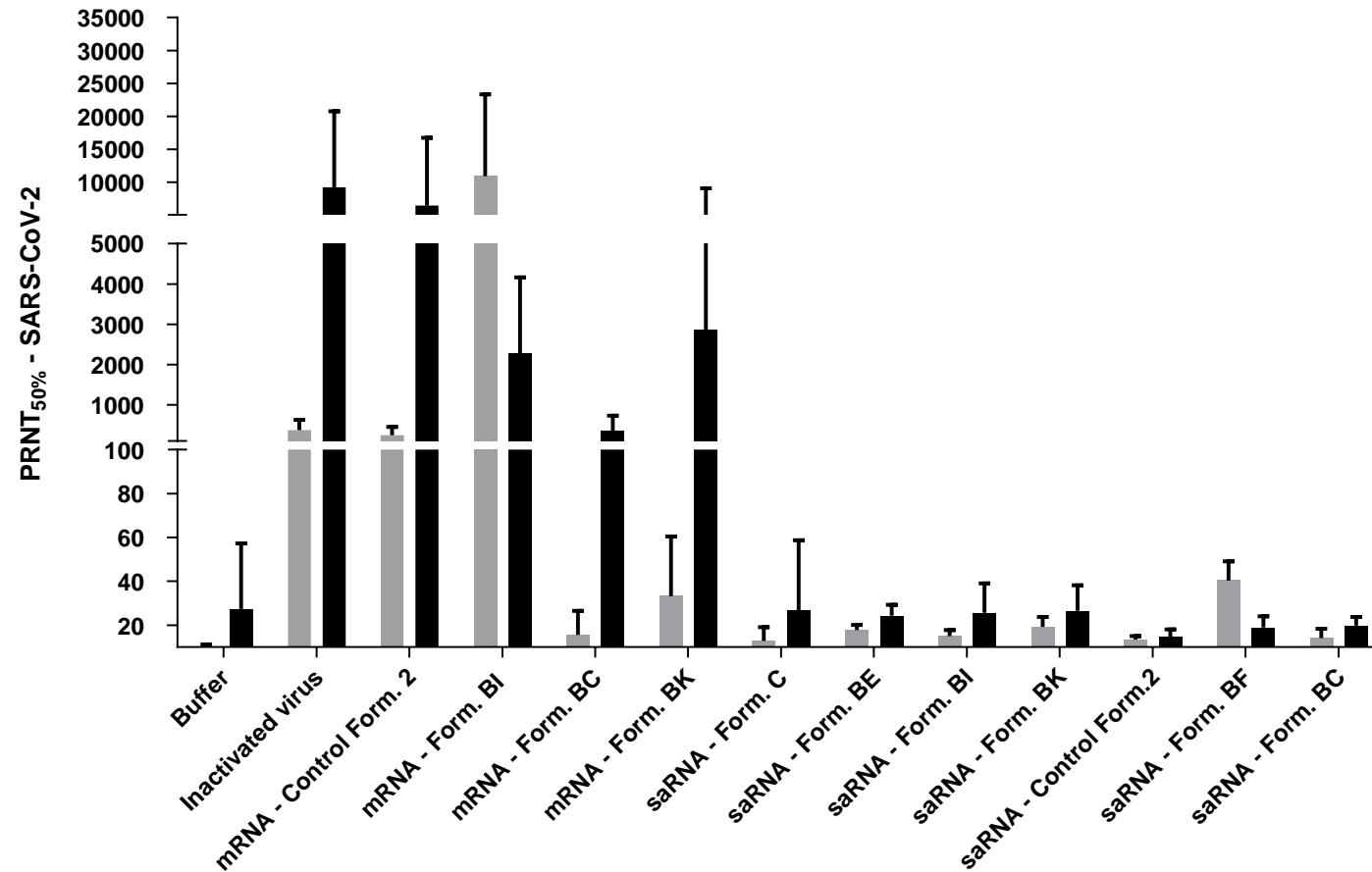
Evaluation of humoral immune responses in mice by ELISA



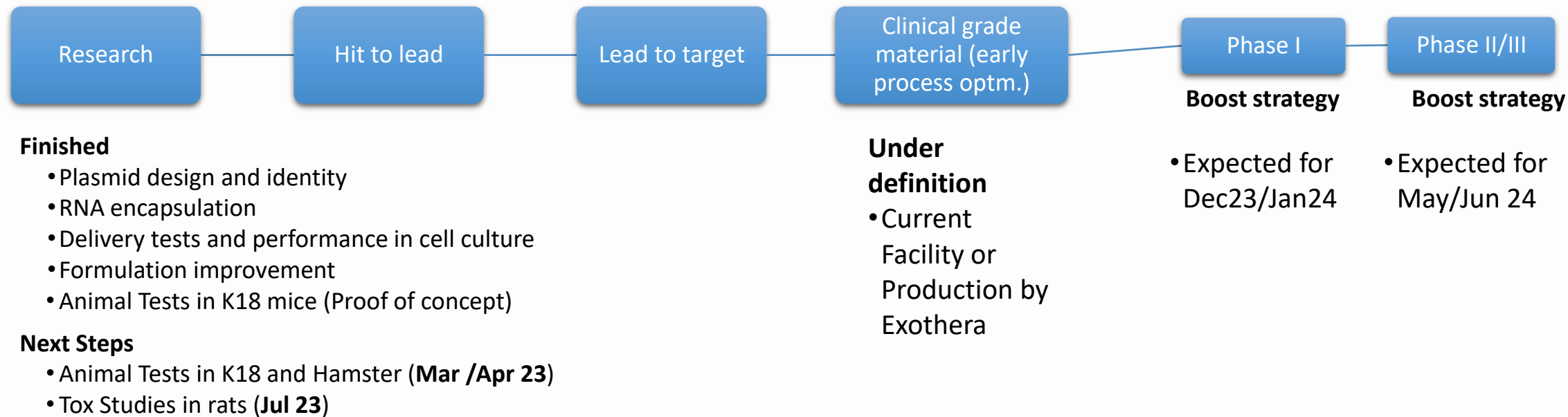
Evaluation of SARS-CoV-2 MAbs in mice

Before challenge SARS-CoV-2 "Wuhan"

After challenge SARS-CoV-2 "Wuhan"

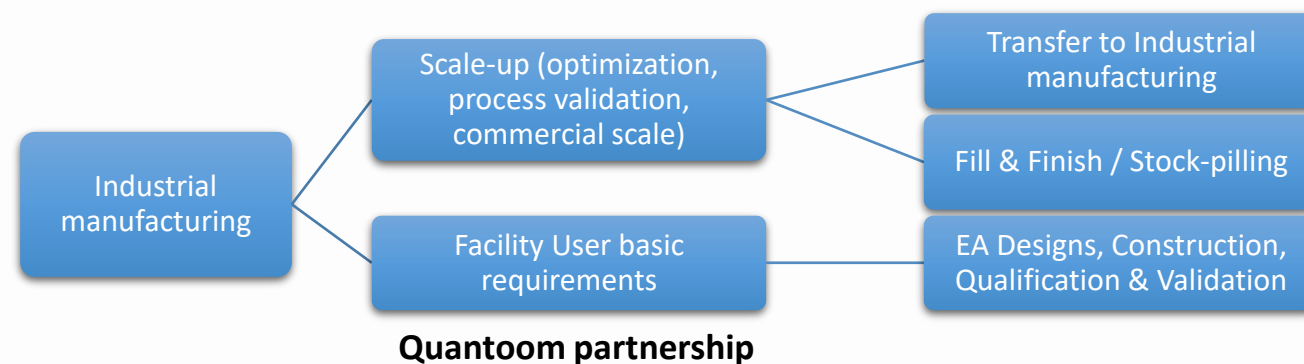


RNA Platform Timeline



Main challenges for establishing industrial scale manufacturing

- Equipments for productive area- **Pilot Plant** (Supply chain- Partnership with Quantoom)
- Encapsuladora (Precision Nanosystem)
- Qualified personnel- Training





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