IS mRNA THE FUTURE OF VACCINE TECHNOLOGY?

The mRNA COVID-19 vaccine took only a year to develop – beating the previous fastest traditional vaccine development, held by the 1967 mumps vaccine, of four years. How does mRNA vaccine technology differ from traditional vaccine technology?

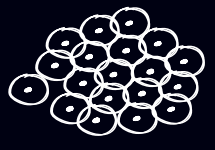
VACCINE PRODUCTION PROCESSES COMPARED

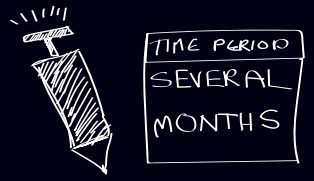
TRADITIONAL VACCINES

PRODUCTION TIME

Vaccines are produced from viruses grown in chicken eggs or mammal cells. The process can take months, slowing down development.


Chicken eggs

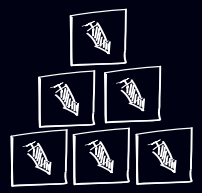

Mammal cells



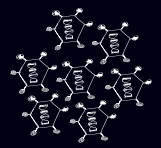
Vaccine development duration

BIOSAFETY

Large quantity of virus is needed to make each batch of vaccine, which can create potential hazards.

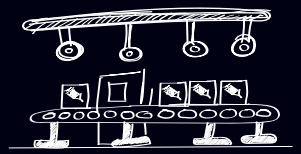

Vaccine batches


Potential hazards


Large virus quanitities

FLEXIBILITY

A bespoke production process is needed for each new vaccine, including its purification and testing.


Bespoke production processes

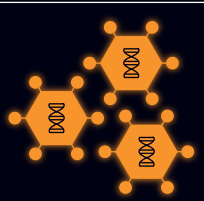

Purification


Testing

Source: BreakThroughs, 2021

mRNA VACCINES

PRODUCTION TIME

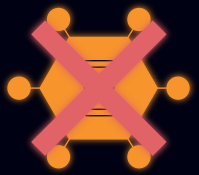

Virus DNA


Sequencing

Vaccine development duration

The RNA in mRNA is made from a DNA template of a virus. The DNA is synthesized from an electronic sequence, and can be distributed electronically. The process takes around a week.

BIOSAFETY


No virus required


Only small quanity for testing

No virus is needed to make batches of mRNA vaccines, only a small quantity for vaccine testing.

It takes
2.6 months
to produce
8 billion
double-strength 1µg/dose
mRNA vaccines
Source: nih.gov, 2021

FLEXIBILITY


Scaling


Target virus easily changed

In future, the process may be scaled, enabling the replacement of target proteins with minimal changes to production, so the target virus can be easily changed.

FUTURE OF mRNA VACCINES

PROPHYLACTIC VACCINES

Used as a precautionary measure to avoid infection or disease

mRNA to become **dominant**

Total market value
$7-10bn
by 2035

$12-15bn
including COVID-19 vaccines

THERAPEUTIC VACCINES

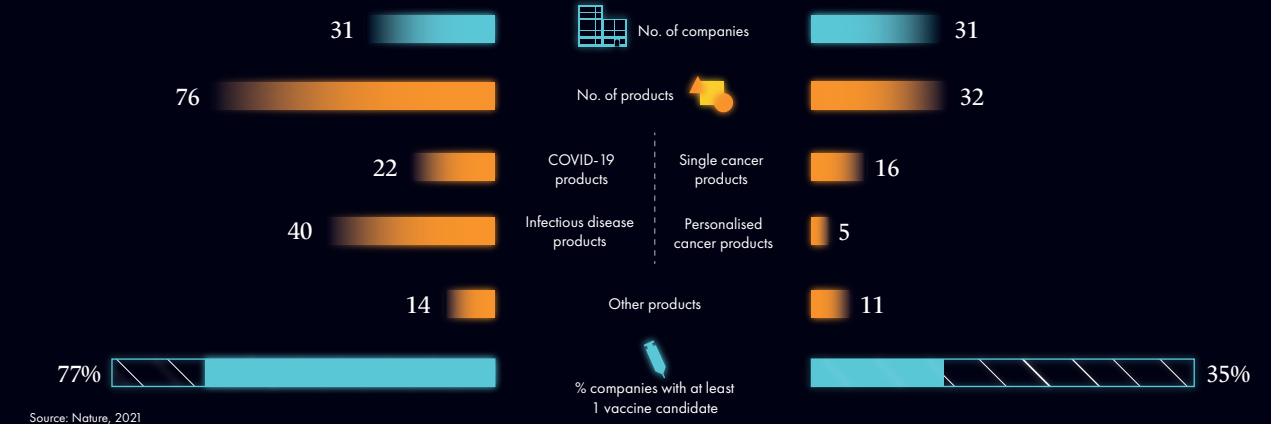
Administered to treat disease or infection

mRNA to become influential in **immuno-oncology**

Total market value
$7-10bn
by 2035

Source: Nature, 2021

mRNA VACCINES IN DEVELOPMENT



Source: Nature, 2021