

# The COVID-19 Vaccine Development Landscape

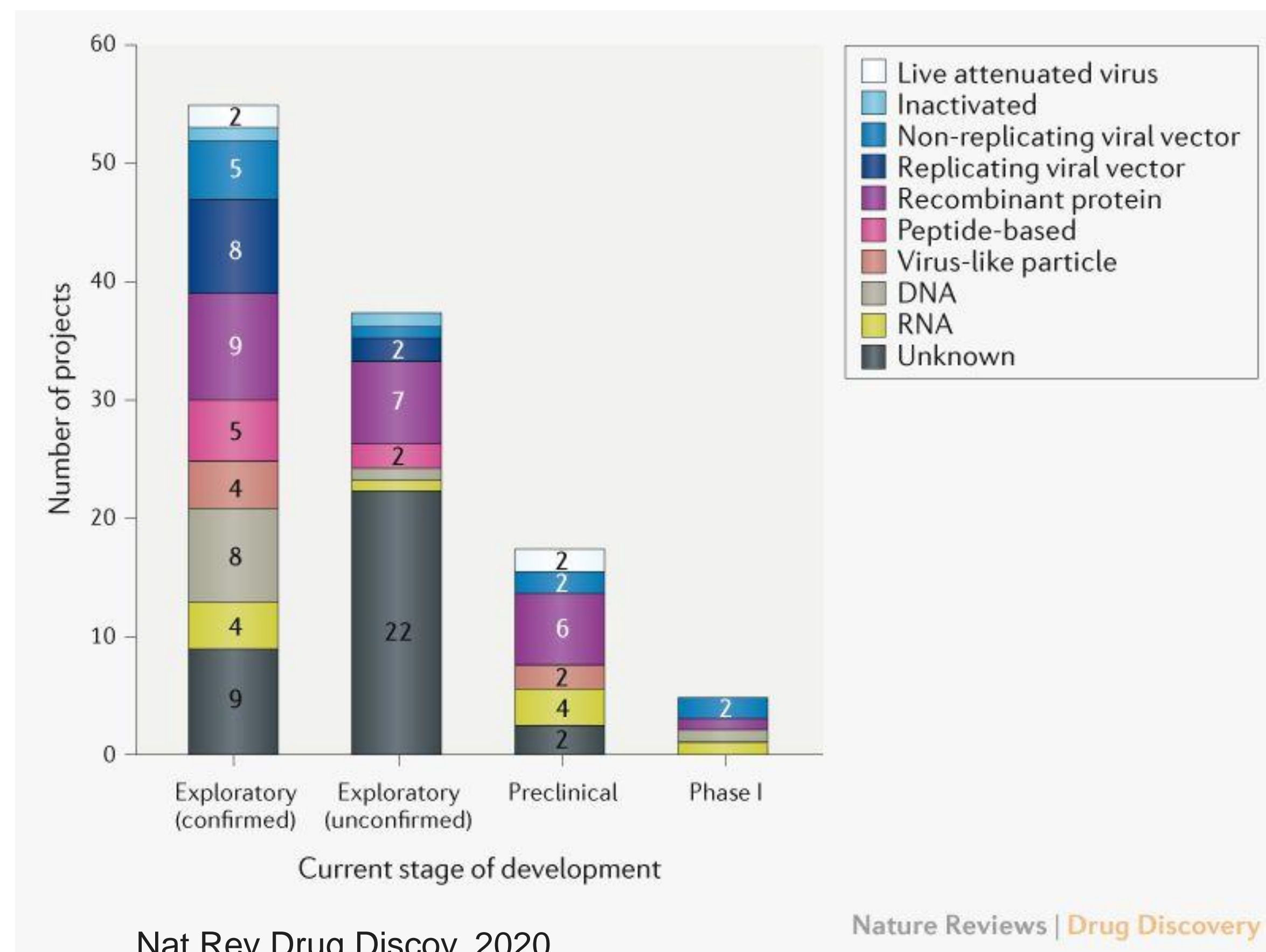
Thanh Le T, Andreadakis Z, Kumar A, Gómez Román R, Tollefsen S, Saville M,  
Mayhew S.

Nat Rev Drug Discov. 2020 Apr 9. doi: 10.1038/d41573-020-00073-5.

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# 全世界現有115種疫苗開發中

- As of 8 April 2020, the global COVID-19 vaccine R&D landscape includes 115 vaccine candidates.
- Among them, 78 are confirmed as active and 37 are unconfirmed.
- Of the 78 confirmed active projects, 73 are currently at exploratory or preclinical stages.



115種COVID-19候選疫苗研發階段與使用平台

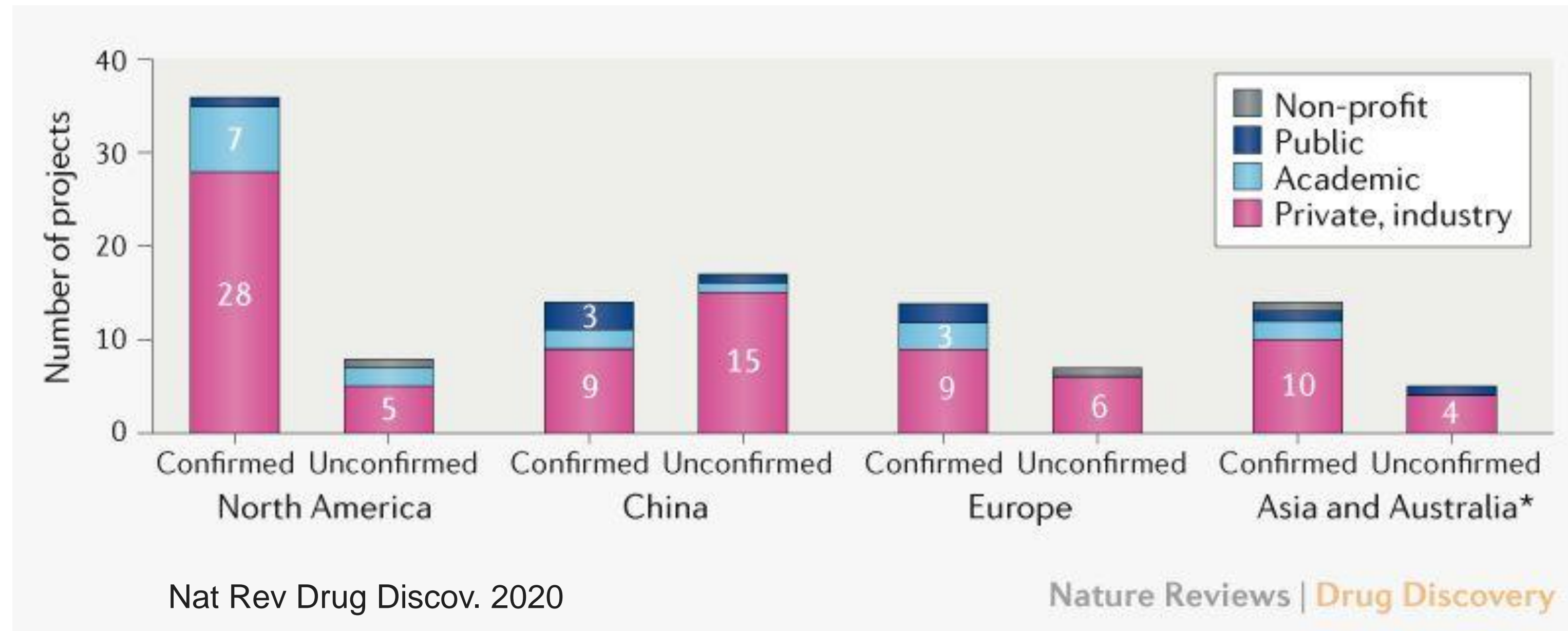
# 5種疫苗已進入Phase I

Candidate	Vaccine characteristics	Lead developer	Status
mRNA-1273	LNP-encapsulated mRNA vaccine encoding S protein	Moderna	Phase I ( <a href="#">NCT04283461</a> )
Ad5-nCoV	Adenovirus type 5 vector that expresses S protein	CanSino Biologicals	Phase I ( <a href="#">NCT04313127</a> )
INO-4800	DNA plasmid encoding S protein delivered by electroporation	Inovio Pharmaceuticals	Phase I ( <a href="#">NCT04336410</a> )
LV-SMENP-DC	DCs modified with lentiviral vector expressing synthetic minigene based on domains of selected viral proteins; administered with antigen-specific CTLs	Shenzhen Geno-Immune Medical Institute	Phase I ( <a href="#">NCT04276896</a> )
Pathogen-specific aAPC <small>Nat Rev Drug Discov. 2020</small>	aAPCs modified with lentiviral vector expressing synthetic minigene based on domains of selected	Shenzhen Geno-Immune Medical Institute	Phase I ( <a href="#">NCT04299724</a> )

# 目前多元的疫苗開發平台：各有優劣

- Vaccine development landscape for COVID-19 is the range of technology platforms include nucleic acid (DNA and RNA), virus-like particle, peptide, viral vector (replicating and non-replicating), recombinant protein, live attenuated virus and inactivated virus approaches.
- RNA and DNA platforms may involve a simpler process — which is likely to make them easier to scale up. But no vaccine with this approach has yet been approved for any disease in humans.

# 誰在開發COVID-19疫苗？



- 北美最多有**36項(46%)**，中國，歐洲，亞/澳洲則各有**14項(18%)**
- 七成是私人企業，其餘才是學術，政府和其他非營利組織。雖有少數有經驗的跨國大型疫苗公司，但許多是規模較小或缺乏生產經驗的公司。值得注意的是：如何確保日後疫苗生產與供應能力？

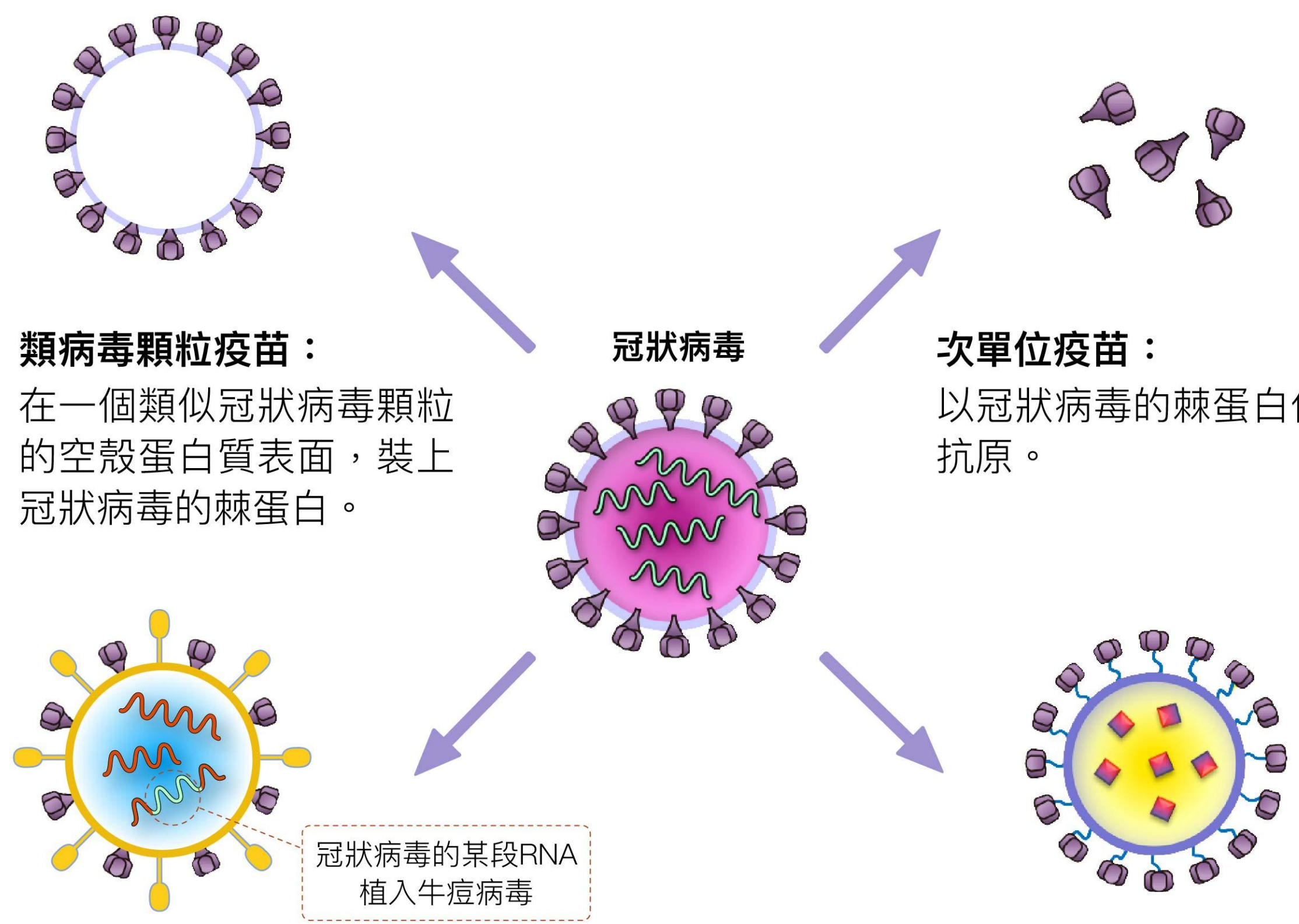
# 當然台灣也有研發中的疫苗

參考資料

<https://research.sinica.edu.tw/covid-19-vaccine-academia-sinica/>

## 中研院四大疫苗研究

- 冠狀病毒的棘蛋白
- 病毒的核酸
- 奈米疫苗的佐劑



**類病毒顆粒疫苗：**  
 在一個類似冠狀病毒顆粒的空殼蛋白質表面，裝上冠狀病毒的棘蛋白。

**次單位疫苗：**  
 以冠狀病毒的棘蛋白作為抗原。

**減毒牛痘病毒疫苗：**  
 以基因重組減弱牛痘病毒毒性，並使其表現冠狀病毒的棘蛋白。

**奈米疫苗：**  
 在中空奈米粒子表面黏上棘蛋白，內部裝入可刺激免疫系統反應的佐劑。

資料來源 | 胡哲銘  
 圖說設計 | 黃曉君、林洵安

需要注意的是

**If a coronavirus vaccine arrives, can the world make enough?**

Vaccines could be available in 12–18 months.

It is possible that by the time a vaccine arrives, much of the world will already have been infected with the new coronavirus.

Khamsi R.  
Nature. 2020 Apr 9.  
doi: 10.1038/d41586-020-01063-8.

*Image by Labiotech*

# 認識 [流行病防範創新聯盟]

CEPI

## 加入COVID-19疫苗的世界隊

- Coalition for Epidemic Preparedness Innovations (CEPI), a foundation that takes donations from public, private, philanthropic, and civil society organisations, to finance independent research projects to develop vaccines against emerging infectious disease.
- CEPI is headquartered in Oslo, Norway.
- In 2020, CEPI was identified as a "key player in the race to develop a vaccine" for the Coronavirus disease 2019.
- CEPI says that global funding of at least **US\$2 billion** is needed to help develop candidate vaccines and manufacture them for trials.

8



# 高雄長庚醫院的努力



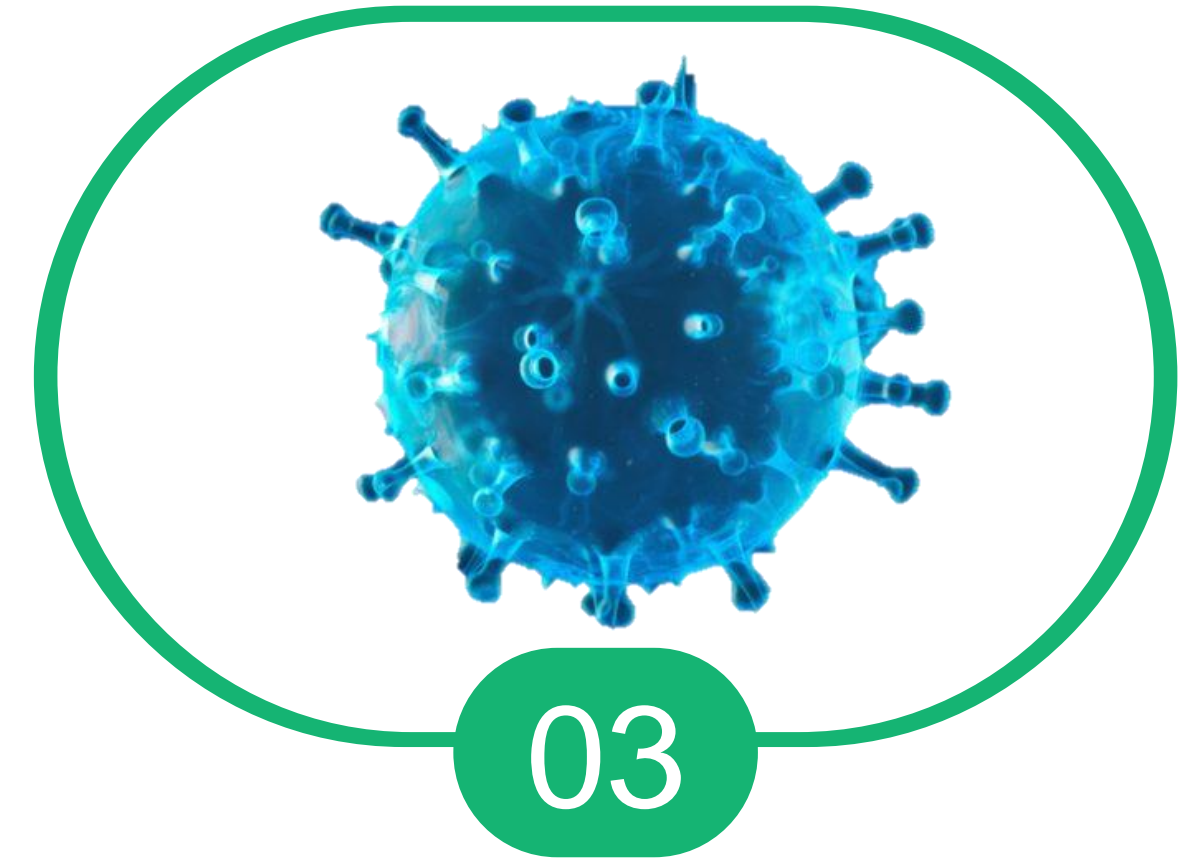
COVID-19 vaccines  
Clinical Trial

CEPI 向世界廣邀願意參與  
COVID-19 vaccine臨床試  
驗的sponsor與CRO



Expression of  
Interest (EOI)

我們醫院已經向CEPI提出  
願意參與COVID-19  
vaccine臨床試驗的意向  
書



How We Can Help

To find a way to end the  
coronavirus pandemic



HOW WE CAN HELP

請各位集思廣益 謝謝