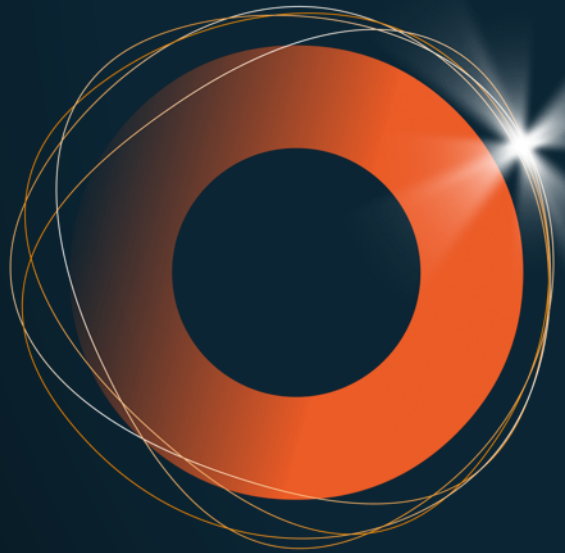

adjuvants for use in subunit based vaccines and global access
focus on licensed one

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CSO BIOASTER

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MICROBIOLOGY TECHNOLOGY INSTITUTE

ADJUVANTS FOR USE IN SUBUNIT BASED VACCINES

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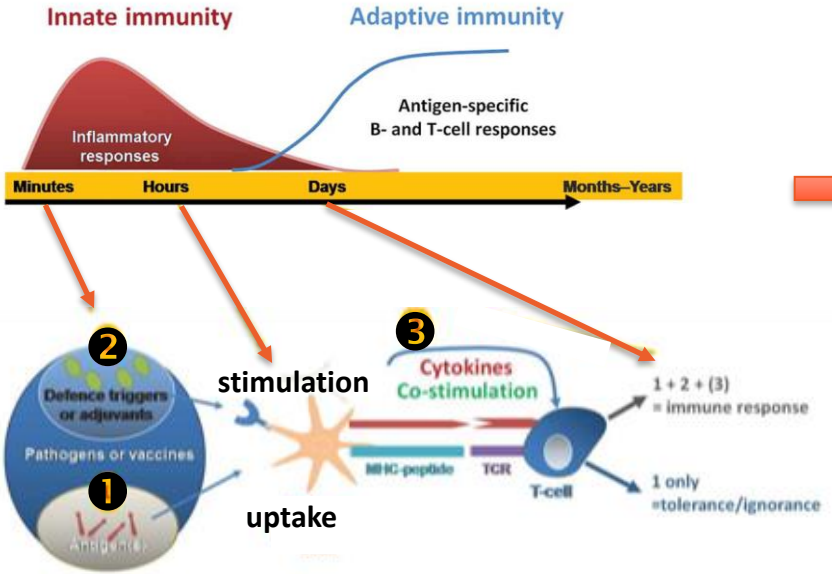
Adaptive immune response required 3 signals to be elicited



All vaccines contain adjuvants

From the pathogen (live attenuated, killed, live vectors

Or added to the antigens (Al salt, PAMPS, saponins,…)

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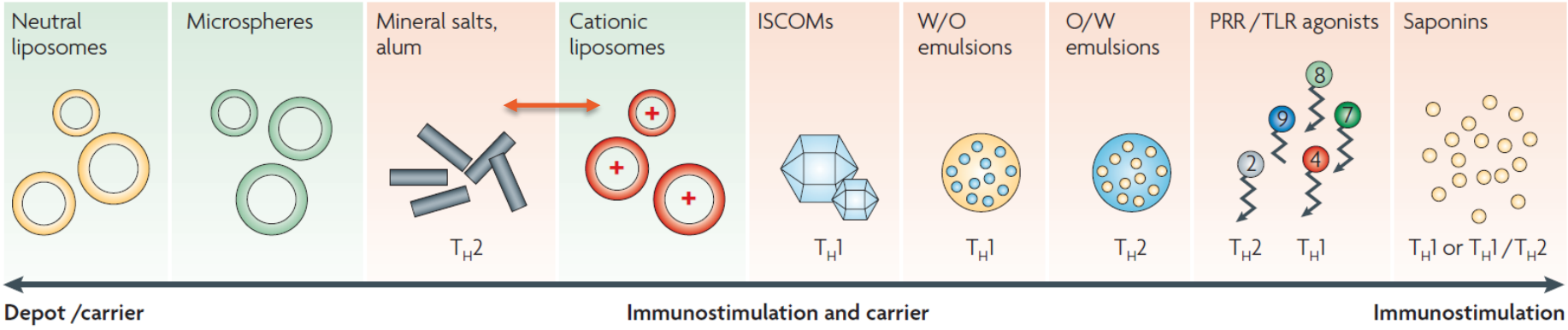
Increase antigen uptake **Activation factors**



The status

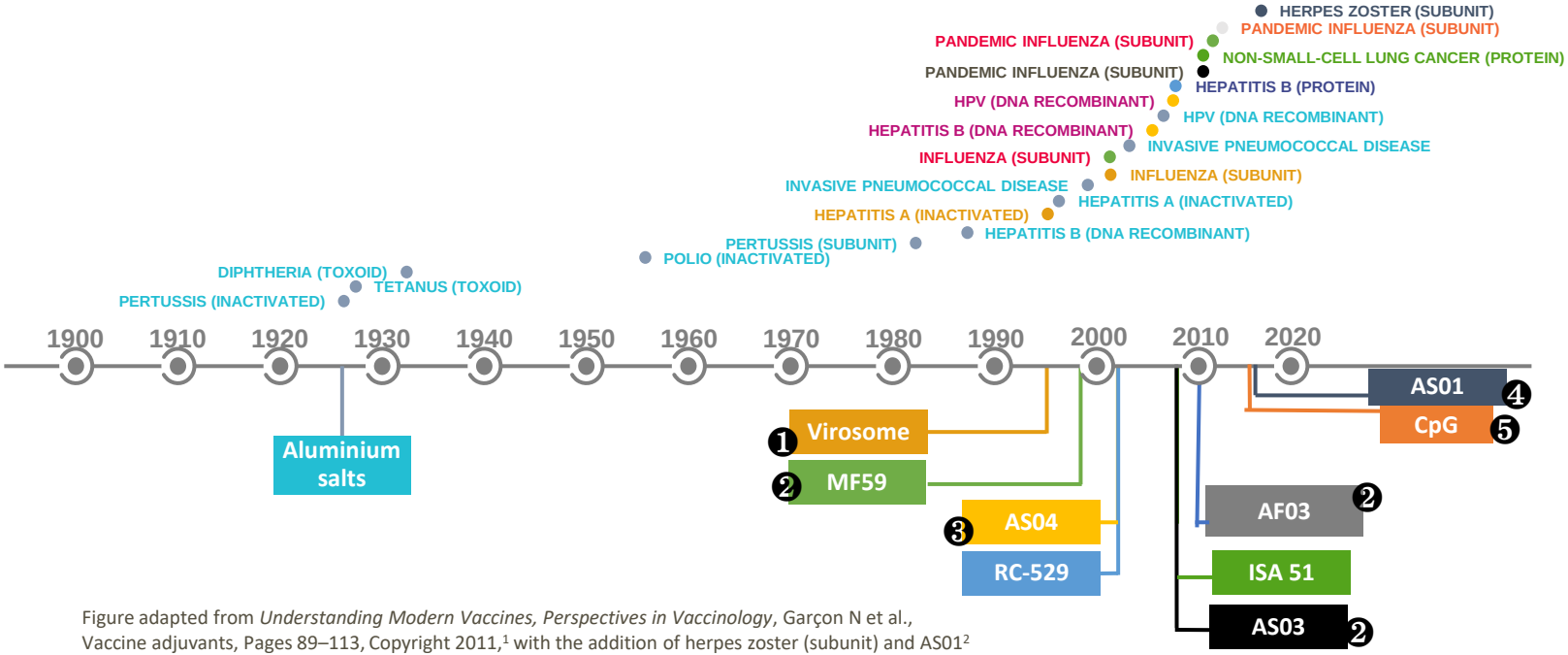


Figure adapted from *Understanding Modern Vaccines, Perspectives in Vaccinology*, Garçon N et al., Vaccine adjuvants, Pages 89–113, Copyright 2011,[1] with the addition of herpes zoster (subunit) and AS01[2]

HPV, human papilloma virus

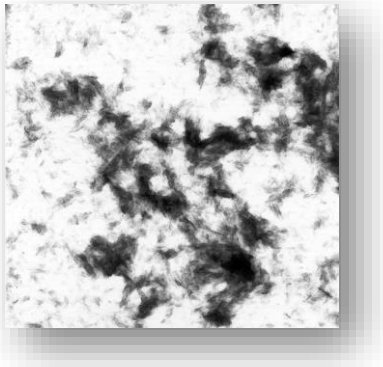
1. Garçon N *et al*. Chapter 4. In: *Understanding Modern Vaccines, Perspectives in Vaccinology*. Garçon N *et al* (Eds). Amsterdam: Elsevier, 2011. Vol 1, pp. 89–113; 2. GSK press release, 2017. (accessed May 2018)

Current constituants of adjuvants in licensed vaccines (1)

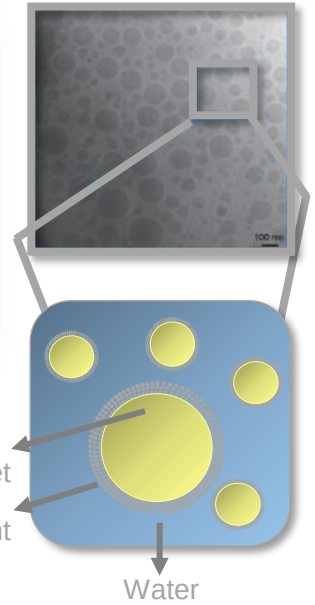
Emulsions

Aluminium salts

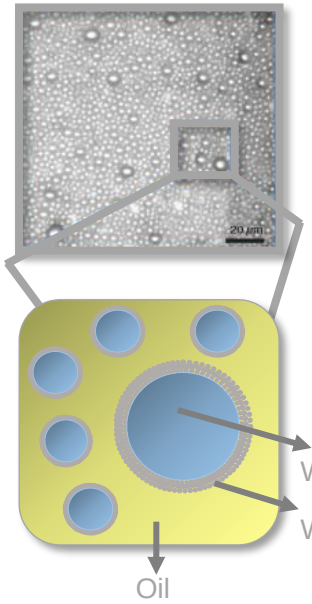
Courtesy of GSK Vaccines



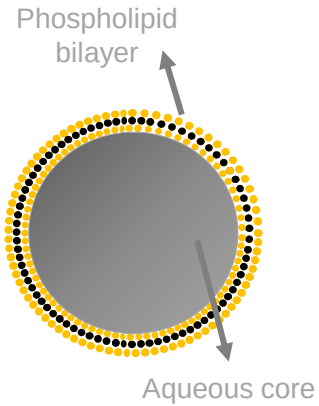
Courtesy of GSK Vaccines



*Courtesy of Professor Resasco**



Liposomes

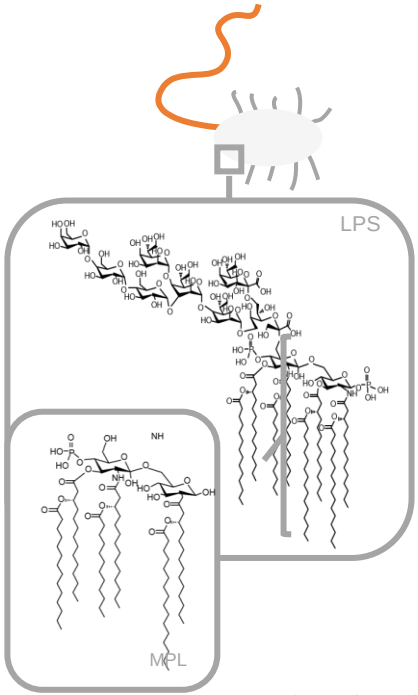


o/w, oil-in-water; w/o, water in oil *University of Oklahoma, USA

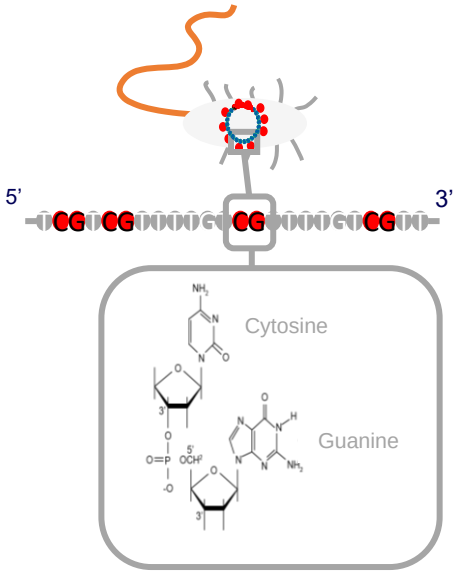
Garçon *et al.* Chapter 4 in: Garçon *et al.* Understanding Modern Vaccines, Perspectives in vaccinology, Vol 1, Amsterdam. Elsevier 2011;p89–113

Current constituants in licensed vaccines (2)

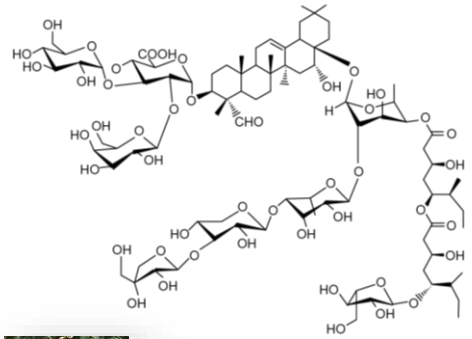
MPL from microbial membrane



CpG from microbial DNA



Saponin QS21 from plants

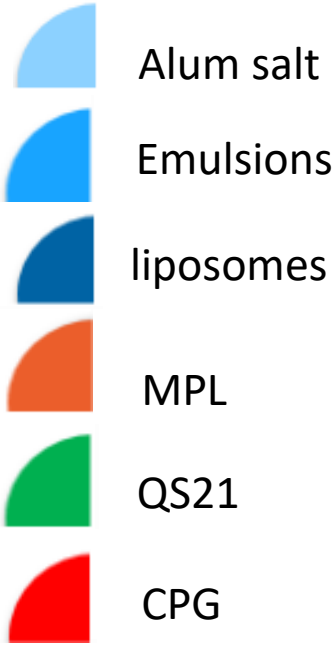


Courtesy of Franz Xaver (GNU Free Documentation Licence

LPS, lipopolysaccharide; MPL, monophosphoryl lipid A;
CpG, adjacent cytosine and guanine connected by phosphodiester bond; QS, *Quillaja saponaria*

Garçon *et al.* Chapter 4 in: Garçon *et al.* Understanding Modern Vaccines, Perspectives in vaccinology, Vol 1, Amsterdam. Elsevier 2011;p89–113

Current adjuvants in licensed vaccines



Alum salt

Emulsions

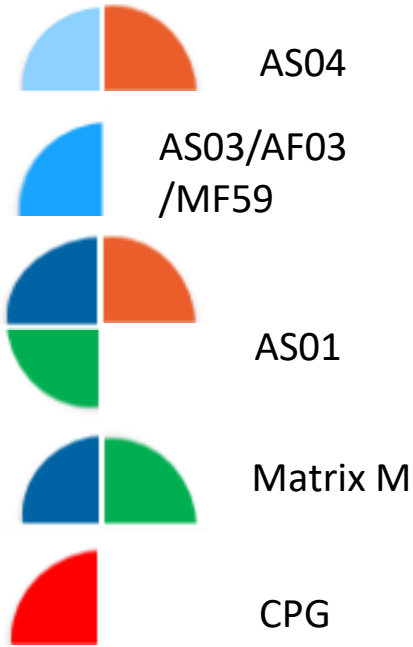
liposomes

MPL

QS21

CPG

In licenses vaccines



AS04

AS03/AF03 /MF59

AS01

Matrix M

CPG

The case of COVID-19 : recombinant antigen vaccine candidates

CONCURRENT PHASE 1/2; 2; 3

NVX-CoV2373

Novavax

United States

Protein subunit

LATEST RESULTS

Sep 2; Phase 1/2

Age range:	**18-59**
Doses trialed:	**2 (0 and 21 days)**
Immune response:	**High**
Side effects:	**Mild**

OTHER DETAILS

Prior licensed vaccines:	**No**
Prior trials:	**RSV, Flu, Ebola, HPV, VZV**
Technology:	**Antigen + adjuvant**

Advance orders: **Australia, Canada, COVAX, Japan, New Zealand, UK, U.S.**

Matrix M

PHASE 1/2

S protein (baculovirus production)

Sanofi-GSK

Multinational

Protein subunit

LATEST RESULTS

Dec. 11; Phase 1/2 trial

Age range:	**18-49; 50+**
Doses trialed:	**1 or 2 (0 and 21 days)**
Immune response:	**Moderate; Low in older adults**
Side effects:	**Mild to moderate**

OTHER DETAILS

Prior licensed vaccines:	**Flu**
Prior trials:	**Multiple**
Technology:	**Antigen + adjuvant**

Advance orders: **Canada, EU, UK, U.S.**

AS03

PHASE 2/3

CoVLP

Medicago-GSK-Dynavax

Canada

Virus-like particle

LATEST RESULTS

Nov. 6; Phase 1

Age range:	**18-55**
Doses trialed:	**2 (0 and 21 days)**
Immune response:	**Moderate-High**
Side effects:	**Mild to moderate**

OTHER DETAILS

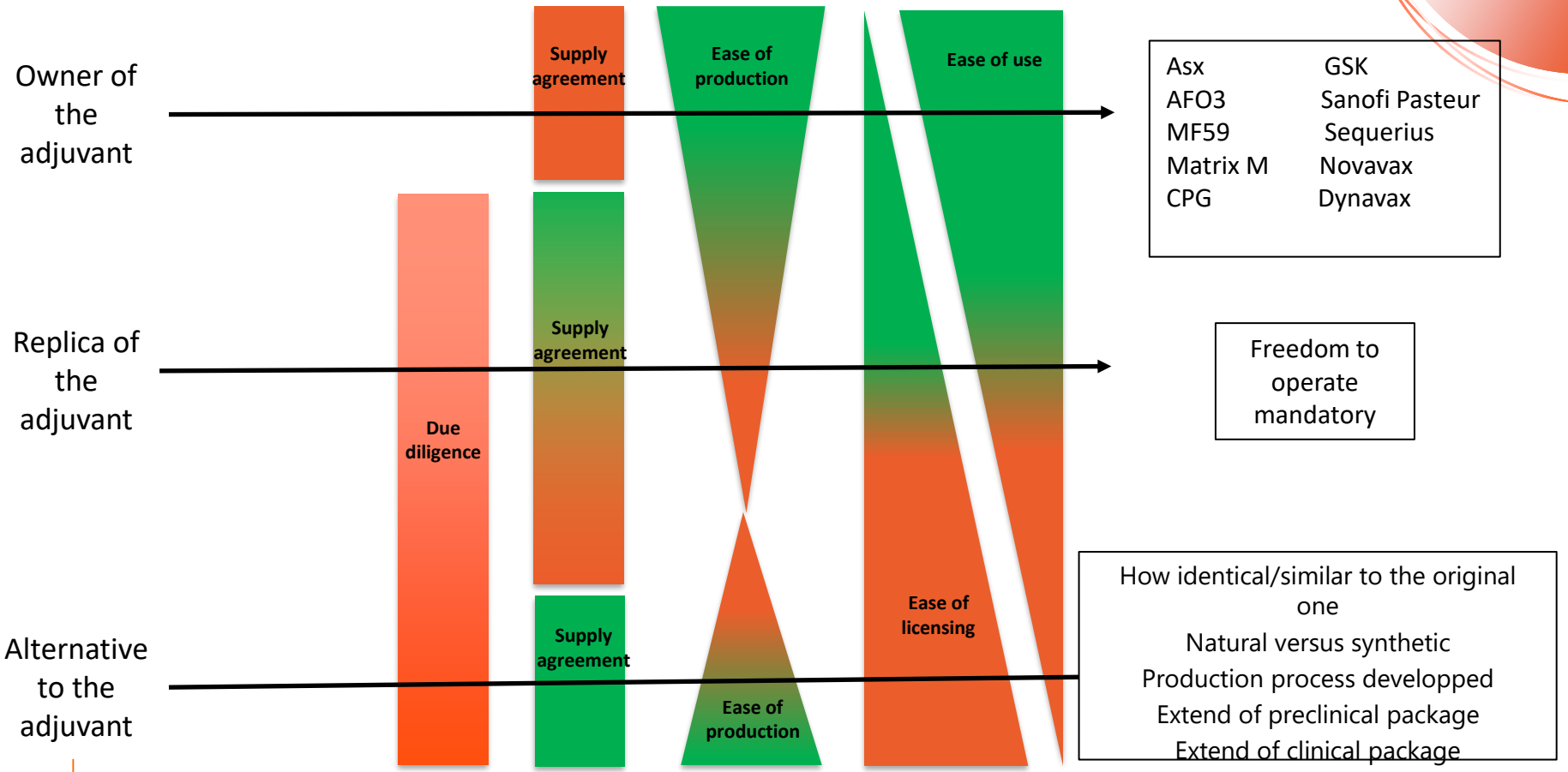
Prior licensed vaccines:	**No**
Prior trials:	**Flu**
Technology:	**VLP + adjuvant**

Advance orders: **Canada**

AS03 or CpG

GLOBAL ACCESS

From producer to alternative



The possibilities in the context of COVID-19 vaccines

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owner	original	replica	alternatives
Sanofi Pasteur	AF03		SE (idri), ISA Montanide (seppic), SWE (VFI)
GSK vaccines	AS03	Numerous CMO	
Seqirus	MF59	Addavax (invivogen)	
	squalene	various sources	Kishimoto Special Liver Oil Co. Ltd. (Japan), Sophim (France), Amyris (US), Arbee Biomarine Extracts Pvt. Ltd. (India) Ekiz Olive Oil & Soap Inc. (Turkey)
	CAF01		
Novavax	Matrix M		QS21 agentus, desert King, Crona, botanica, sponex, AS01
Dynavax	CpG		

Global access, global remarks

- Preclinical evaluation needs to be done with the final formulation
- Sustainability/quality control of the raw material is key
- From production to fill/finish by experience CRO is key,
- It may look the same, taste the same, if not the same, all will have to be done as for a new adjuvant

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INVESTIR L'AVENIR