DRAFT landscape of COVID-19 candidate vaccines – 20 April 2020

5 candidate vaccines in clinical evaluation

Platform	Type of candidate vaccine	Developer	Coronavirus target	Current stage of clinical evaluation/regulatory status- Coronavirus candidate	Same platform for non-Coronavirus candidates
Non-Replicating Viral Vector	Adenovirus Type 5 Vector	CanSino Biological Inc./Beijing Institute of Biotechnology	COVID-19	Phase 2 ChiCTR2000031781 Phase 1 ChiCTR2000030906	Ebola
DNA	DNA plasmid vaccine Electroporation device	Inovio Pharmaceuticals	COVID-19	Phase 1 NCT04336410	Lassa, Nipah HIV Filovirus HPV Cancer indications Zika Hepatitis B
Inactivated	Inactivated	Beijing Institute of Biological Products/Wuhan Institute of Biological Products	COVID-19	Phase 1 ChiCTR2000031809	
Inactivated	Inactivated + alum	Sinovac	COVID-19	Phase 1 NCT04352608	SARS
RNA	LNP-encapsulated mRNA	Moderna/NIAID	COVID-19	Phase 1 NCT04283461	multiple candidates

72 candidate vaccines in preclinical evaluation

Platform	Type of candidate vaccine	Developer	Coronavirus target	Current stage of clinical evaluation/regulatory status- Coronavirus candidate	Same platform for non-Coronavirus candidates
DNA	DNA with electroporation	Karolinska Institute / Cobra Biologics (OPENCORONA Project)	COVID-19	Pre-Clinical	
DNA	DNA plasmid vaccine	Osaka University/ AnGes/ Takara Bio	COVID-19	Pre-Clinical	

DNA	DNA	Takis/Applied DNA Sciences/Evvivax	COVID-19	Pre-Clinical	
DNA	Plasmid DNA, Needle-Free Delivery	Immunomic Therapeutics, Inc./EpiVax, Inc./PharmaJet, Inc.	COVID-19	Pre-Clinical	SARS
DNA	DNA plasmid vaccine	Zydus Cadila	COVID-19	Pre-Clinical	
DNA	DNA vaccine	BioNet Asia	COVID-19	Pre-Clinical	
DNA	DNA vaccine	University of Waterloo	COVID-19	Pre-Clinical	
Inactivated	TBD	Osaka University/ BIKEN/ NIBIOHN	COVID-19	Pre-Clinical	
Inactivated	Inactivated + CpG 1018	Sinovac/Dynavax	COVID-19	Pre-Clinical	
Live Attenuated Virus	Deoptimized live attenuated vaccines	Codagenix/Serum Institute of India	COVID-19	Pre-Clinical	HAV, InfA, ZIKV, FMD, SIV, RSV, DENV
Non-Replicating Viral Vector	ChAdOx1	University of Oxford	COVID-19	Phase 1/2 (recruiting) NCT04324606	MERS, influenza, TB, Chikungunya, Zika, MenB, plague
Non-Replicating Viral Vector	MVA encoded VLP	GeoVax/BravoVax	COVID-19	Pre-Clinical	LASV, EBOV, MARV, HIV
Non-Replicating Viral Vector	Ad26 (alone or with MVA boost)	Janssen Pharmaceutical Companies	COVID-19	Pre-Clinical	Ebola, HIV, RSV

Non-Replicating Viral Vector	Replication defective Simian Adenovirus (GRAd) encoding SARS-CoV-2 S	ReiThera	COVID-19	Pre-Clinical	
Non-replicating viral vector	MVA-S encoded	DZIF – German Center for Infection Research	COVID-19	Pre-clinical	Many
Non-Replicating Viral Vector	adenovirus-based NasoVAX expressing SARS2-CoV spike protein	Altimmune	COVID-19	Pre-Clinical	influenza
Non-Replicating Viral Vector	Ad5 S (GREVAX™ platform)	Greffex	COVID-19	Pre-Clinical	MERS
Non-Replicating Viral Vector	Oral Vaccine platform	Vaxart	COVID-19	Pre-Clinical	InfA, CHIKV, LASV, NORV; EBOV, RVF, HBV, VEE
Non-Replicating Viral Vector	MVA expressing structural proteins	Centro Nacional Biotecnología (CNB-CSIC), Spain	COVID-19	Pre-Clinical	HIV, HCV, chikungunya, Ebola, zika, malaria, leishmania
Non-Replicating Viral Vector	Dendritic cell-based vaccine	University of Manitoba	COVID-19	Pre-Clinical	
Non-Replicating Viral Vector	parainfluenza virus 5 (PIV5)-based vaccine expressing the spike protein	University of Georgia/University of Iowa	COVID-19	Pre-Clinical	MERS
Protein Subunit	Capsid-like Particle	AdaptVac (PREVENT-nCoV consortium)	COVID-19	Pre-Clinical	
Protein Subunit	Drosophila S2 insect cell expression system VLPs	ExpreS2ion	COVID-19	Pre-Clinical	
Protein Subunit	Peptide antigens formulated in lipid nanoparticle formulation	IMV Inc	COVID-19	Pre-Clinical	

Protein Subunit	S protein	WRAIR/USAMRIID	COVID-19	Pre-Clinical	
Protein Subunit	S protein +Adjuvant	National Institute of Infectious Disease, Japan	COVID-19	Pre-Clinical	Influenza
Protein Subunit	VLP-recombinant protein + Adjuvant	Osaka University/ BIKEN/ National Institutes of Biomedical Innovation, Japan	COVID-19	Pre-Clinical	
Protein Subunit	Native like Trimeric subunit Spike Protein vaccine	Clover Biopharmaceuticals Inc./GSK/Dynavax	COVID-19	Pre-Clinical	HIV, REV Influenza
Protein Subunit	microneedle arrays S1 subunit	Univ. of Pittsburgh	COVID-19	Pre-Clinical	MERS
Protein Subunit	Peptide	Vaxil Bio	COVID-19	Pre-Clinical	
Protein Subunit	Adjuvanted protein subunit (RBD)	Biological E Ltd	COVID-19	Pre-Clinical	
Protein Subunit	Peptide	Flow Pharma Inc	COVID-19	Pre-Clinical	Ebola, Marburg, HIV, Zika, Influenza, HPV therapeutic vaccine, BreastCA vaccine
Protein Subunit	S protein	AJ Vaccines	COVID-19	Pre-Clinical	
Protein Subunit	Ii-Key peptide	Generex/EpiVax	COVID-19	Pre-Clinical	Influenza, HIV, SARS-CoV
Protein Subunit	S protein	EpiVax/Univ. of Georgia	COVID-19	Pre-Clinical	H7N9

Protein Subunit	S protein (baculovirus production)	Sanofi Pasteur/GSK	COVID-19	Pre-Clinical	Influenza, SARS-CoV
Protein Subunit	Full length recombinant SARs CoV-2 glycoprotein nanoparticle vaccine adjuvanted with Matrix M	Novavax	COVID-19	Pre-Clinical	RSV; CCHF, HPV, VZV, EBOV
Protein Subunit	gp-96 backbone	Heat Biologics/Univ. Of Miami	COVID-19	Pre-Clinical	NSCLC, HIV, malaria, Zika
Protein Subunit	Molecular clamp stabilized Spike protein	University of Queensland/GSK/Dynavax	COVID-19	Pre-Clinical	Nipah, influenza, Ebola, Lassa
Protein Subunit	S1 or RBD protein	Baylor College of Medicine	COVID-19	Pre-Clinical	SARS
Protein Subunit	Subunit protein, plant produced	iBio/CC-Pharming	COVID-19	Pre-Clinical	
Protein Subunit	Recombinant protein, nanoparticles (based on S-protein and other epitopes)	Saint-Petersburg scientific research institute of vaccines and serums	COVID-19	Pre-Clinical	
Protein Subunit	COVID-19 XWG-03 truncated S (spike) proteins	Innovax/Xiamen Univ./GSK	COVID-19	Pre-Clinical	HPV
Protein Subunit	Adjuvanted microsphere peptide	VIDO-InterVac, University of Saskatchewan	COVID-19	Pre-Clinical	
Protein Subunit	Synthetic Long Peptide Vaccine candidate for S and M proteins	OncoGen	COVID-19	Pre-Clinical	
Protein Subunit	Oral E. coli-based protein expression system of S and N proteins	MIGAL Galilee Research Institute	COVID-19	Pre-Clinical	

Protein Subunit	Spike-based	University of Alberta	COVID-19	Pre-Clinical	Hepatitis C
Replicating Viral Vector	Measles Vector	Zydus Cadila	COVID-19	Pre-Clinical	
Replicating Viral Vector	Measles Vector	Institute Pasteur/Themis/Univ. of Pittsburg Center for Vaccine Research	COVID-19	Pre-Clinical	West nile, chik, Ebola, Lassa, Zika
Live attenuated virus	Measles Virus (S, N targets)	DZIF – German Center for Infection Research	COVID-19	Pre-clinical	Zika, H7N9, CHIKV
Replicating Viral Vector	Horsepox vector expressing S protein	Tonix Pharma/Southern Research	COVID-19	Pre-Clinical	Smallpox, monkeypox
Replicating Viral Vector	Live viral vectored vaccine based on attenuated influenza virus backbone (intranasal)	BiOCAD and IEM	COVID-19	Pre-Clinical	
Replicating Viral Vector	Influenza vector expressing RBD	University of Hong Kong	COVID-19	Pre-Clinical	
Replicating Viral Vector	Replication-competent VSV chimeric virus technology (VSVΔG) delivering the SARS-CoV-2 Spike (S) glycoprotein.	IAVI/Batavia	COVID-19	Pre-Clinical	Ebola, Marburg, Lassa
Replicating Viral Vector	VSV-S	University of Western Ontario	COVID-19	Pre-Clinical	HIV, MERS
RNA	LNP-encapsulated mRNA cocktail encoding VLP	Fudan University/ Shanghai JiaoTong University/RNACure Biopharma	COVID-19	Pre-Clinical	

RNA	LNP-encapsulated mRNA encoding RBD	Fudan University/ Shanghai JiaoTong University/RNACure Biopharma	COVID-19	Pre-Clinical	
RNA	Replicating Defective SARS-CoV-2 derived RNAs	Centro Nacional Biotecnología (CNB-CSIC), Spain	COVID-19	Pre-Clinical	
RNA	LNP-encapsulated mRNA	University of Tokyo/ Daiichi-Sankyo	COVID-19	Pre-Clinical	MERS
RNA	Liposome-encapsulated mRNA	BIOCAD	COVID-19	Pre-Clinical	
RNA	mRNA	China CDC/Tongji University/Stermina	COVID-19	Pre-Clinical	
RNA	mRNA	Arcturus/Duke-NUS	COVID-19	Pre-Clinical	multiple candidates
RNA	mRNA	BioNTech/Fosun Pharma/Pfizer	COVID-19	Pre-Clinical	
RNA	saRNA	Imperial College London	COVID-19	Pre-Clinical	EBOV; LASV, MARV, Inf (H7N9), RABV
RNA	mRNA	Curevac	COVID-19	Pre-Clinical	RABV, LASV, YFV; MERS, InfA, ZIKV, DengV, NIPV
VLP	Virus-like particle, based on RBD displayed on virus-like particles	Saiba GmbH	COVID-19	Pre-Clinical	
VLP	Plant-derived VLP	Medicago Inc.	COVID-19	Pre-Clinical	Flu, Rotavirus, Norovirus, West Nile virus, Cancer
VLP	ADDomerTM multiepitope display	Imophoron Ltd and Bristol University's Max Planck Centre	COVID-19	Pre-Clinical	
VLP	Unknown	Doherty Institute	COVID-19	Pre-Clinical	
Unknown	Unknown	ImmunoPrecise	COVID-19	Pre-Clinical	
Unknown	Unknown	Tulane University	COVID-19	Pre-Clinical	
Unknown	Unknown	Université Laval	COVID-19	Pre-Clinical	