DRAFT landscape of COVID-19 candidate vaccines – 30 May 2020

10 candidate vaccines in clinical evaluation

Platform	Type of candidate vaccine	Developer	cr Coronavirus Current stage of clinical evaluation/regulatory status Coronavirus candidate		Same platform for non-Coronavirus candidates	
Non- Replicating Viral Vector	ChAdOx1-S	University of Oxford/AstraZeneca	SARS-CoV2	Phase2b/3 2020-001228-32 Phase 1/2 2020-001072-15	MERS, influenza, TB, Chikungunya, Zika, MenB, plague	
Non- Replicating Viral Vector	Adenovirus Type 5 Vector	CanSino Biological Inc./Beijing Institute of Biotechnology	SARS-CoV2	Phase 2 <u>ChiCTR2000031781</u> Phase 1 <u>ChiCTR2000030906</u>	Ebola	
RNA	LNP- encapsulated mRNA	Moderna/NIAID	SARS-CoV2	Phase 2 NCT04405076 Phase 1 NCT04283461	multiple candidates	
Inactivated	Inactivated	Wuhan Institute of Biological Products/Sinopharm	SARS-CoV2	Phase 1/2 ChiCTR2000031809		
Inactivated	Inactivated	Beijing Institute of Biological Products/Sinopharm	SARS-CoV2	Phase 1/2 ChiCTR2000032459		
Inactivated	Inactivated + alum	Sinovac	SARS-CoV2	Phase 1/2 NCT04383574 NCT04352608	SARS	
Protein Subunit	Full length recombinant SARS CoV-2 glycoprotein nanoparticle vaccine adjuvanted with Matrix M	Novavax	SARS-CoV2	Phase 1/2 NCT04368988	RSV; CCHF, HPV, VZV, EBOV	
RNA	3 LNP-mRNAs	BioNTech/Fosun Pharma/Pfizer	SARS-CoV2	Phase 1/2 2020-001038-36 NCT04368728		
Inactivated	Inactivated	Institute of Medical Biology , Chinese Academy of Medical Sciences	SARS-CoV2	Phase 1		
DNA	DNA plasmid vaccine with electroporation	Inovio Pharmaceuticals	SARS-CoV2	Phase 1 NCT04336410	multiple candidates	

121 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 Vaccine (GX- 19)	Genexine Consortium	SARS-CoV2	Pre-Clinical	
DNA	DNA with electroporation	Karolinska Institute / Cobra Biologics (OPENCORONA Project)	SARS-CoV2	Pre-Clinical	

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DNA	DNA plasmid vaccine	Osaka University/ AnGes/ Takara Bio	SARS-CoV2	Pre-Clinical	
DNA	DNA	Takis/Applied DNA Sciences/Evvivax	SARS-CoV2	Pre-Clinical	
DNA	Plasmid DNA,	Immunomic Therapeutics,	SARS-CoV2	Pre-Clinical	SARS
	Needle-Free Delivery	Inc./EpiVax, Inc./PharmaJet	37113 6012	Tre climed	3,1113
DNA	DNA plasmid vaccine	Zydus Cadila	SARS-CoV2	Pre-Clinical	
DNA	DNA vaccine	BioNet Asia	SARS-CoV2	Pre-Clinical	
DNA	DNA vaccine	University of Waterloo	SARS-CoV2	Pre-Clinical	
DNA	DNA vaccine	Entos Pharmaceuticals	SARS-CoV2	Pre-Clinical	
DNA	bacTRL-Spike	Symvivo	SARS-CoV2	Pre-Clinical	
Inactivated	Inactivated	Beijing Minhai Biotechnology Co., Ltd.	SARS-CoV2	Pre-Clinical	
Inactivated	TBD	Osaka University/ BIKEN/ NIBIOHN	SARS-CoV2	Pre-Clinical	
Inactivated	Inactivated + CpG 1018	Sinovac/Dynavax	SARS-CoV2	Pre-Clinical	
Inactivated	Inactivated + CpG 1018	Valneva/Dynavax	SARS-CoV2	Pre-Clinical	
Inactivated	Inactivated	Research Institute for Biological Safety Problems, Rep of Kazakhstan	SARS-CoV2	Pre-Clinical	
Live Attenuated Virus	Codon deoptimized live attenuated vaccines	Codagenix/Serum Institute of India	SARS-CoV2	Pre-Clinical	HAV, InfA, ZIKV, FMD, SIV, RSV, DENV
Live Attenuated Virus	Codon deoptimized live attenuated vaccines	Indian Immunologicals Ltd/Griffith University	SARS-CoV2	Pre-Clinical	
Non- Replicating Viral Vector	MVA encoded VLP	GeoVax/BravoVax	SARS-CoV2	Pre-Clinical	LASV, EBOV, MARV, HIV
Non- Replicating Viral Vector	Ad26	Janssen Pharmaceutical Companies	SARS-CoV2	Pre-Clinical	Ebola, HIV, RSV
Non- Replicating Viral Vector	Replication defective Simian Adenovirus (GRAd) encoding SARS-CoV- 2 S	ReiThera/LEUKOCARE/Univercells	SARS-CoV2	Pre-Clinical	
Non- replicating viral vector	MVA-S encoded	DZIF – German Center for Infection Research	SARS-CoV2	Pre-clinical	Many
Non- replicating viral vector	MVA-S	IDIBAPS-Hospital Clinic, Spain	SARS-CoV2	Pre-clinical	
Non- Replicating Viral Vector	adenovirus-based NasoVAX expressing SARS2-CoV spike protein	Altimmune	SARS-CoV2	Pre-Clinical	influenza
Non- Replicating Viral Vector	Ad5 S (GREVAX™ platform)	Greffex	SARS-CoV2	Pre-Clinical	MERS
Non- Replicating Viral Vector	Oral Ad5 S	Stabilitech Biopharma Ltd	SARS-CoV2	Pre-Clinical	Zika, VZV, HSV- 2 and Norovirus
Non- Replicating Viral Vector	adenovirus-based + HLA-matched peptides	Valo Therapeutics Ltd	Pan-Corona	Pre-Clinical	
Non- Replicating Viral Vector	Oral Vaccine platform	Vaxart	SARS-CoV2	Pre-Clinical	InfA, CHIKV, LASV, NORV; EBOV, RVF, HBV, VEE
Non- Replicating Viral Vector	MVA expressing structural proteins	Centro Nacional Biotecnología (CNB-CSIC), Spain	SARS-CoV2	Pre-Clinical	Multiple candidates
Non- Replicating Viral Vector	Dendritic cell-based vaccine	University of Manitoba	SARS-CoV2	Pre-Clinical	

Non- Replicating Viral Vector	parainfluenza virus 5 (PIV5)-based vaccine expressing the spike protein	University of Georgia/University of Iowa	SARS-CoV2	Pre-Clinical	MERS
Non- Replicating Viral Vector	Recombinant deactivated rabies virus containing S1	Bharat Biotech/Thomas Jefferson University	SARS-CoV2	Pre-Clinical	HeV, NiV, EBOV, LASSA, CCHFV, MERS
Non- Replicating Viral Vector	Inactivated Flu- based SARS-CoV2 vaccine + Adjuvant	National Center for Genetic Engineering and Biotechnology (BIOTEC) /GPO, Thailand	SARS-CoV2	Pre-Clinical	,
Protein Subunit	RBD protein fused with Fc of IgG + Adj.	Chulalongkorn University/GPO, Thailand	SARS-CoV2	Pre-Clinical	
Protein Subunit	Capsid-like Particle	AdaptVac (PREVENT-nCoV consortium)	SARS-CoV2	Pre-Clinical	
Protein Subunit	Drosophila S2 insect cell expression system VLPs	ExpreS2ion	SARS-CoV2	Pre-Clinical	
Protein Subunit	Peptide antigens formulated in LNP	IMV Inc	SARS-CoV2	Pre-Clinical	
Protein Subunit	S protein	WRAIR/USAMRIID	SARS-CoV2	Pre-Clinical	
Protein Subunit	S protein +Adjuvant	National Institute of Infectious Disease, Japan	SARS-CoV2	Pre-Clinical	Influenza
Protein Subunit	VLP-recombinant protein + Adjuvant	Osaka University/ BIKEN/ National Institutes of Biomedical Innovation, Japan	SARS-CoV2	Pre-Clinical	
Protein Subunit	Native like Trimeric subunit Spike Protein vaccine	Clover Biopharmaceuticals Inc./GSK/Dynavax	SARS-CoV2	Pre-Clinical	HIV, REV Influenza
Protein Subunit	microneedle arrays S1 subunit	Univ. of Pittsburgh	SARS-CoV2	Pre-Clinical	MERS
Protein Subunit	Peptide	Vaxil Bio	SARS-CoV2	Pre-Clinical	
Protein Subunit	Adjuvanted protein subunit (RBD)	Biological E Ltd	SARS-CoV2	Pre-Clinical	
Protein Subunit	Peptide	Flow Pharma Inc	SARS-CoV2	Pre-Clinical	Ebola, Marburg, HIV, Zika, Influenza, HPV therapeutic vaccine, BreastCA vaccine
Protein Subunit	S protein	AJ Vaccines	SARS-CoV2	Pre-Clinical	
Protein Subunit	Ii-Key peptide	Generex/EpiVax	SARS-CoV2	Pre-Clinical	Influenza, HIV, SARS-CoV
Protein Subunit	S protein	EpiVax/Univ. of Georgia	SARS-CoV2	Pre-Clinical	H7N9
Protein Subunit	Protein Subunit EPV- CoV-19	EpiVax	SARS-CoV2	Pre-Clinical	
Protein Subunit	S protein (baculovirus production)	Sanofi Pasteur/GSK	SARS-CoV2	Pre-Clinical	Influenza, SARS-CoV
Protein Subunit	gp-96 backbone	Heat Biologics/Univ. Of Miami	SARS-CoV2	Pre-Clinical	NSCLC, HIV, malaria, Zika
Protein Subunit	Molecular clamp stabilized Spike protein	University of Queensland/GSK/Dynavax	SARS-CoV2	Pre-Clinical	Nipah, influenza, Ebola, Lassa
Protein Subunit	Peptide vaccine	FBRI SRC VB VECTOR, Rospotrebnadzor, Koltsovo	SARS-CoV2	Pre-Clinical	Ebola
Protein Subunit	Subunit vaccine	FBRI SRC VB VECTOR, Rospotrebnadzor, Koltsovo	SARS-CoV2	Pre-Clinical	
Protein Subunit	S1 or RBD protein	Baylor College of Medicine	SARS-CoV2	Pre-Clinical	SARS
Protein Subunit	Subunit protein, plant produced	iBio/CC-Pharming	SARS-CoV2	Pre-Clinical	

Protein Subunit	Recombinant protein, nanoparticles (based on S-protein and	Saint-Petersburg scientific research institute of vaccines and serums	SARS-CoV2	Pre-Clinical	
Protein Subunit	other epitopes) COVID-19 XWG-03 truncated S (spike) proteins	Innovax/Xiamen Univ./GSK	SARS-CoV2	Pre-Clinical	HPV
Protein Subunit	Adjuvanted microsphere peptide	VIDO-InterVac, University of Saskatchewan	SARS-CoV2	Pre-Clinical	
Protein	Synthetic Long	OncoGen	SARS-CoV2	Pre-Clinical	
Subunit	Peptide Vaccine candidate for S and M proteins				
Protein Subunit	Oral E. coli-based protein expression system of S and N proteins	MIGAL Galilee Research Institute	SARS-CoV2	Pre-Clinical	
Protein Subunit	Nanoparticle vaccine	LakePharma, Inc.	SARS-CoV2	Pre-Clinical	
Protein Subunit	Recombinant spike protein with Advax™ adjuvant	Vaxine Pty Ltd/Medytox	SARS-CoV2	Pre-Clinical	
Protein Subunit	OMV-based vaccine	Quadram Institute Biosciences	SARS-CoV2		Flu A, plague
Protein	OMV-based vaccine	BiOMViS Srl/Univ. of Trento	SARS-CoV2		
Subunit		,			
Protein subunit	structurally modified spherical particles of the tobacco mosaic virus (TMV)		SARS-CoV2	preclinical	rubella, rotavirus
Protein Subunit	Spike-based	University of Alberta	SARS-CoV2	Pre-Clinical	Hepatitis C
Protein Subunit	Recombinant S1-Fc fusion protein	AnyGo Technology	SARS-CoV2	Pre-Clinical	
Protein	Recombinant	Yisheng Biopharma	SARS-CoV2	Pre-Clinical	
Subunit Protein	Recombinant S	Vabiotech	SARS-CoV2	Pre-Clinical	
Subunit Protein	protein in IC-BEVS Orally delivered,	Applied Biotechnology Institute, Inc.	SARS-CoV2	Pre-Clinical	
Subunit Protein	heat stable subunit	Medigen Vaccine Biologics	SARS-CoV2	Pre-Clinical	
Subunit	S-2P protein + CpG 1018	Corporation/NIAID/Dynavax	SARS-COVZ	Pre-Cillical	
Protein	Peptides derived	Axon Neuroscience SE	SARS-CoV2	Pre-Clinical	
Subunit Protein	from Spike protein Adjuvanted	Anhui Zhifei Longcom	SARS-CoV2	Pre-Clinical	
Subunit	recombinant protein (RBD-Dimer)	Biopharmaceutical/ Institute of Microbiology, Chinese Academy of Sciences	371113 60 12	Tre emiliar	
Protein	RBD-based	Neovii/Tel Aviv University	SARS-CoV2	Pre-Clinical	
Subunit Protein	RBD-based	Kentucky Bioprocessing, Inc	SARS-CoV2	Pre-Clinical	
Subunit Protein	Outer Membrane	Intravacc/Epivax	SARS-CoV2	Pre-Clinical	
Subunit	Vesicle (OMV)- peptide	maras, zprian			
Replicating	YF17D Vector	KU Leuven	SARS-CoV2	Pre-Clinical	
Viral Vector	Name I ve Name	7.4	CARCCAST	Bara Citi in I	
Replicating Viral Vector	Measles Vector	Zydus Cadila	SARS-CoV2	Pre-Clinical	
Replicating Viral Vector	Measles Vector	Institute Pasteur/Themis/Univ. of Pittsburg Center for Vaccine Research/Merck	SARS-CoV2	Pre-Clinical	West nile, chik, Ebola, Lassa, Zika
Replicating Viral Vector	Measles Vector	FBRI SRC VB VECTOR, Rospotrebnadzor, Koltsovo	SARS-CoV2	Pre-Clinical	
Live	Measles Virus (S, N	DZIF – German Center for Infection	SARS-CoV2	Pre-clinical	Zika, H7N9,
attenuated virus	targets)	Research			CHIKV

Danlinatina	Hamaanayyyaatan	Tanix Dhamas /Sauthama Dasaanah	CARC CaV2	Dra Clinical	Concilion
Replicating Viral Vector	Horsepox vector expressing S protein	Tonix Pharma/Southern Research	SARS-CoV2	Pre-Clinical	Smallpox, monkeypox
Replicating	Live viral vectored	BiOCAD and IEM	SARS-CoV2	Pre-Clinical	Influenza
Viral Vector	vaccine based on	BIOCAD UNA ILIVI	SANS COVE	Tre chinear	IIIIIaciiza
vii ai veetoi	attenuated influenza				
	virus backbone				
	(intranasal)				
Replicating	Recombinant	FBRI SRC VB VECTOR,	SARS-CoV2	Pre-Clinical	Influenza
Viral Vector	vaccine based on	Rospotrebnadzor, Koltsovo			
	Influenza A virus, for				
	the prevention of				
	COVID-19				
	(intranasal)				
Replicating	Attenuated	Fundação Oswaldo Cruz and	SARS-CoV2	Pre-Clinical	Influenza
Viral Vector	Influenza expressing	Instituto Buntantan			
	an antigenic portion				
	of the Spike protein	•			
Replicating	Influenza vector	University of Hong Kong	SARS-CoV2	Pre-Clinical	
Viral Vector	expressing RBD	100000	6456 6 1/2	D 011 1 1	
Replicating	Replication-	IAVI/Merck	SARS-CoV2	Pre-Clinical	Ebola,
Viral Vector	competent VSV				Marburg, Lassa
	chimeric virus technology (VSVΔG)				
	delivering the SARS-				
	CoV-2 Spike (S)				
	glycoprotein.				
Replicating	VSV-S	University of Western Ontario	SARS-CoV2	Pre-Clinical	HIV, MERS
Viral Vector	V3V-3	Oniversity of Western Ontano	JANS-COV2	Tre-Cillical	THV, WILKS
Replicating	VSV vector	FBRI SRC VB VECTOR,	SARS-CoV2	Pre-Clinical	
Viral Vector	VSV VCCtOI	Rospotrebnadzor, Koltsovo	SANS COVE	Tre chinear	
Replicating	M2-deficient single	UW–Madison/FluGen/Bharat	SARS-CoV2	Pre-Clinical	influenza
Viral Vector	replication (M2SR)	Biotech	5, 11.5 55 72	Tre cilinear	denza
	influenza vector				
Replicating	Newcastle disease	Intravacc/ Wageningen	SARS-CoV2	Pre-Clinical	
Viral Vector	virus vector (NDV-	Bioveterinary Research/Utrecht			
	SARS-CoV-2/Spike)	Univ.			
Replicating	Avian paramyxovirus	The Lancaster University, UK	SARS-CoV2	Pre-Clinical	
Viral Vector	vector (APMV)				
RNA	LNP-mRNA	Translate Bio/Sanofi Pasteur	SARS-CoV2	Pre-Clinical	
RNA	LNP-mRNA	CanSino Biologics/Precision	SARS-CoV2	Pre-Clinical	
		NanoSystems			
RNA	LNP-encapsulated	Fudan University/ Shanghai	SARS-CoV2	Pre-Clinical	
	mRNA cocktail	JiaoTong University/RNACure			
	encoding VLP	Biopharma			
RNA	LNP-encapsulated	Fudan University/ Shanghai	SARS-CoV2	Pre-Clinical	
	mRNA encoding RBD	JiaoTong University/RNACure			
DNIA	Donling	Biopharma Contro Nacional Biotagnalagía	CARC CoV2	Dro Clinical	
RNA	Replicating	Centro Nacional Biotecnología	SARS-CoV2	Pre-Clinical	
	Defective SARS-CoV- 2 derived RNAs	(CNB-CSIC), Spain			
RNA		University of Tokyo / Dolichi Contro	SARS-CoV2	Pre-Clinical	MERS
NINA	LNP-encapsulated mRNA	University of Tokyo/ Daiichi-Sankyo	SAKS-CUVZ	rie-Cillical	IVIERS
RNA	Liposome-	BIOCAD	SARS-CoV2	Pre-Clinical	
1/11/7/	encapsulated mRNA	BIOCAD	JANJ-CUVZ	rie-Cillical	
RNA	Several mRNA	RNAimmune, Inc.	SARS-CoV2	Pre-Clinical	
1/11/7/	candidates	MVAIIIIIIIIIE, IIIC.	JANS-CUVZ	r i e-ciiilical	
RNA	mRNA	FBRI SRC VB VECTOR,	SARS-CoV2	Pre-Clinical	
131 W 3		Rospotrebnadzor, Koltsovo	5/11/5 COV2	The chinedi	
RNA	mRNA	China CDC/Tongji	SARS-CoV2	Pre-Clinical	
•		University/Stermina	3372		
RNA	mRNA	Arcturus/Duke-NUS	SARS-CoV2	Pre-Clinical	multiple
					candidates
RNA	saRNA	Imperial College London	SARS-CoV2	Pre-Clinical	EBOV; LASV,
					MARV, Inf
					(H7N9), RABV
RNA	mRNA	Curevac	SARS-CoV2	Pre-Clinical	RABV, LASV,
ININA			0		

					InfA, ZIKV, DengV, NIPV
RNA	mRNA in an intranasal delivery system	eTheRNA	SARS-CoV2	Pre-Clinical	<u> </u>
RNA	mRNA	Greenlight Biosciences	SARS-CoV2	Pre-Clinical	
RNA	mRNA	IDIBAPS-Hospital Clinic, Spain	SARS-CoV2	Pre-Clinical	
VLP	VLP + Adjuvant	Mahidol University/ The Government Pharmaceutical Organization (GPO)	SARS-CoV2	Pre-Clinical	
VLP	Virus-like particles, lentivirus and baculovirus vehicles	Navarrabiomed, Oncoimmunology group	SARS-CoV2	Pre-Clinical	
VLP	Virus-like particle, based on RBD displayed on virus- like particles	Saiba GmbH	SARS-CoV2	Pre-Clinical	
VLP	Plant-derived VLP	Medicago Inc.	SARS-CoV2	Pre-Clinical	Flu, Rotavirus, Norovirus, West Nile virus, Cancer
VLP	ADDomerTM multiepitope display	Imophoron Ltd and Bristol University's Max Planck Centre	SARS-CoV2	Pre-Clinical	
VLP	Unknown	Doherty Institute	SARS-CoV2	Pre-Clinical	
VLP	VLP	OSIVAX	SARS-CoV1 SARS-CoV2	Pre-Clinical	
VLP	eVLP	ARTES Biotechnology	SARS-CoV2	Pre-Clinical	malaria
VLP	VLPs peptides/whole virus	Univ. of Sao Paulo	SARS-CoV2	Pre-Clinical	
Unknown	Unknown	ImmunoPrecise	SARS-CoV2	Pre-Clinical	
Unknown	Unknown	Tulane University	SARS-CoV2	Pre-Clinical	
Unknown	Unknown	Université Laval	SARS-CoV2	Pre-Clinical	