

# DRAFT landscape of COVID-19 candidate vaccines – 27 May 2020

## 10 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	ChAdOx1-S	University of Oxford/AstraZeneca	SARS-CoV2	Phase 2b/3 <a href="#">2020-001228-32</a> Phase 1/2 <a href="#">2020-001072-15</a>	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 <a href="#">ChiCTR2000031781</a> Phase 1 <a href="#">ChiCTR2000030906</a>	Ebola
RNA	LNP-encapsulated mRNA	Moderna/NIAID	SARS-CoV2	Phase 2 (IND submitted) Phase 1 <a href="#">NCT04283461</a>	multiple candidates
Inactivated	Inactivated	Wuhan Institute of Biological Products/Sinopharm	SARS-CoV2	Phase 1/2 <a href="#">ChiCTR2000031809</a>	
Inactivated	Inactivated	Beijing Institute of Biological Products/Sinopharm	SARS-CoV2	Phase 1/2 <a href="#">ChiCTR2000032459</a>	
Inactivated	Inactivated + alum	Sinovac	SARS-CoV2	Phase 1/2 <a href="#">NCT04383574</a> <a href="#">NCT04352608</a>	SARS
Protein Subunit	Full length recombinant SARS CoV-2 glycoprotein nanoparticle vaccine adjuvanted with Matrix M	Novavax	SARS-CoV2	Phase 1/2 <a href="#">NCT04368988</a>	RSV; CCHF, HPV, VZV, EBOV
RNA	3 LNP-mRNAs	BioNTech/Fosun Pharma/Pfizer	SARS-CoV2	Phase 1/2 <a href="#">2020-001038-36</a> <a href="#">NCT04368728</a>	
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 <a href="#">NCT04336410</a>	multiple candidates

## 115 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	

### DISCLAIMER:

These landscape documents have been prepared by the World Health Organization (WHO) for information purposes only concerning the 2019-2020 global of the novel coronavirus. Inclusion of any particular product or entity in any of these landscape documents does not constitute, and shall not be deemed or construed as, any approval or endorsement by WHO of such product or entity (or any of its businesses or activities). While WHO takes reasonable steps to verify the accuracy of the information presented in these landscape documents, WHO does not make any (and hereby disclaims all) representations and warranties regarding the accuracy, completeness, fitness for a particular purpose (including any of the aforementioned purposes), quality, safety, efficacy, merchantability and/or non-infringement of any information provided in these landscape documents and/or of any of the products referenced therein. WHO also disclaims any and all liability or responsibility whatsoever for any death, disability, injury, suffering, loss, damage or other prejudice of any kind that may arise from or in connection with the procurement, distribution or use of any product included in any of these landscape documents.

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, Needle-Free Delivery	Immunomic Therapeutics, Inc./EpiVax, Inc./PharmaJet	SARS-CoV2	Pre-Clinical	SARS
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	adenovirus-based NasoVAX expressing SARS2-CoV spike protein	Altimune	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

**DISCLAIMER:**

These landscape documents have been prepared by the World Health Organization (WHO) for information purposes only concerning the 2019-2020 global of the novel coronavirus. Inclusion of any particular product or entity in any of these landscape documents does not constitute, and shall not be deemed or construed as, any approval or endorsement by WHO of such product or entity (or any of its businesses or activities). While WHO takes reasonable steps to verify the accuracy of the information presented in these landscape documents, WHO does not make any (and hereby disclaims all) representations and warranties regarding the accuracy, completeness, fitness for a particular purpose (including any of the aforementioned purposes), quality, safety, efficacy, merchantability and/or non-infringement of any information provided in these landscape documents and/or of any of the products referenced therein. WHO also disclaims any and all liability or responsibility whatsoever for any death, disability, injury, suffering, loss, damage or other prejudice of any kind that may arise from or in connection with the procurement, distribution or use of any product included in any of these landscape documents.

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
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	li-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 other epitopes)	Saint-Petersburg scientific research institute of vaccines and serums	SARS-CoV2	Pre-Clinical	
Protein Subunit	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	

**DISCLAIMER:**

These landscape documents have been prepared by the World Health Organization (WHO) for information purposes only concerning the 2019-2020 global of the novel coronavirus. Inclusion of any particular product or entity in any of these landscape documents does not constitute, and shall not be deemed or construed as, any approval or endorsement by WHO of such product or entity (or any of its businesses or activities). While WHO takes reasonable steps to verify the accuracy of the information presented in these landscape documents, WHO does not make any (and hereby disclaims all) representations and warranties regarding the accuracy, completeness, fitness for a particular purpose (including any of the aforementioned purposes), quality, safety, efficacy, merchantability and/or non-infringement of any information provided in these landscape documents and/or of any of the products referenced therein. WHO also disclaims any and all liability or responsibility whatsoever for any death, disability, injury, suffering, loss, damage or other prejudice of any kind that may arise from or in connection with the procurement, distribution or use of any product included in any of these landscape documents.

Protein Subunit	Synthetic Long Peptide Vaccine candidate for S and M proteins	OncoGen	SARS-CoV2	Pre-Clinical	
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 Subunit	OMV-based vaccine	BiOMViS Srl/Univ. of Trento	SARS-CoV2		
Protein subunit	structurally modified spherical particles of the tobacco mosaic virus (TMV)	Lomonosov Moscow State University	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 Subunit	Recombinant protein	Yisheng Biopharma	SARS-CoV2	Pre-Clinical	
Protein Subunit	Recombinant S protein in IC-BEVS	Vabiotech	SARS-CoV2	Pre-Clinical	
Protein Subunit	Orally delivered, heat stable subunit	Applied Biotechnology Institute, Inc.	SARS-CoV2	Pre-Clinical	
Protein Subunit	S-2P protein + CpG 1018	Medigen Vaccine Biologics Corporation/NIAID/Dynavax	SARS-CoV2	Pre-Clinical	
Protein Subunit	Peptides derived from Spike protein	Axon Neuroscience SE	SARS-CoV2	Pre-Clinical	
Protein Subunit	Adjuvanted recombinant protein (RBD-Dimer)	Anhui Zhifei Longcom Biopharmaceutical/ Institute of Microbiology, Chinese Academy of Sciences	SARS-CoV2	Pre-Clinical	
Protein Subunit	RBD-based	Neovii/Tel Aviv University	SARS-CoV2	Pre-Clinical	
Protein Subunit	RBD-based	Kentucky Bioprocessing, Inc	SARS-CoV2	Pre-Clinical	
Protein Subunit	Outer Membrane Vesicle (OMV)-peptide	Intravacc/Epivax	SARS-CoV2	Pre-Clinical	
Replicating Viral Vector	YF17D Vector	KU Leuven	SARS-CoV2	Pre-Clinical	
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 attenuated virus	Measles Virus (S, N targets)	DZIF – German Center for Infection Research	SARS-CoV2	Pre-clinical	Zika, H7N9, CHIKV
Replicating Viral Vector	Horsepox vector expressing S protein	Tonix Pharma/Southern Research	SARS-CoV2	Pre-Clinical	Smallpox, monkeypox
Replicating Viral Vector	Live viral vectored vaccine based on attenuated influenza virus backbone (intranasal)	BiOCAD and IEM	SARS-CoV2	Pre-Clinical	Influenza

**DISCLAIMER:**

These landscape documents have been prepared by the World Health Organization (WHO) for information purposes only concerning the 2019-2020 global of the novel coronavirus. Inclusion of any particular product or entity in any of these landscape documents does not constitute, and shall not be deemed or construed as, any approval or endorsement by WHO of such product or entity (or any of its businesses or activities). While WHO takes reasonable steps to verify the accuracy of the information presented in these landscape documents, WHO does not make any (and hereby disclaims all) representations and warranties regarding the accuracy, completeness, fitness for a particular purpose (including any of the aforementioned purposes), quality, safety, efficacy, merchantability and/or non-infringement of any information provided in these landscape documents and/or of any of the products referenced therein. WHO also disclaims any and all liability or responsibility whatsoever for any death, disability, injury, suffering, loss, damage or other prejudice of any kind that may arise from or in connection with the procurement, distribution or use of any product included in any of these landscape documents.

Replicating Viral Vector	Recombinant vaccine based on Influenza A virus, for the prevention of COVID-19 (intranasal)	FBRI SRC VB VECTOR, Rospotrebnadzor, Koltsovo	SARS-CoV2	Pre-Clinical	Influenza
Replicating Viral Vector	Attenuated Influenza expressing an antigenic portion of the Spike protein	Fundação Oswaldo Cruz and Instituto Buntantan	SARS-CoV2	Pre-Clinical	Influenza
Replicating Viral Vector	Influenza vector expressing RBD	University of Hong Kong	SARS-CoV2	Pre-Clinical	
Replicating Viral Vector	Replication-competent VSV chimeric virus technology (VSVΔG) delivering the SARS-CoV-2 Spike (S) glycoprotein.	IAVI/Batavia/Merck	SARS-CoV2	Pre-Clinical	Ebola, Marburg, Lassa
Replicating Viral Vector	VSV-S	University of Western Ontario	SARS-CoV2	Pre-Clinical	HIV, MERS
Replicating Viral Vector	VSV vector	FBRI SRC VB VECTOR, Rospotrebnadzor, Koltsovo	SARS-CoV2	Pre-Clinical	
Replicating Viral Vector	M2-deficient single replication (M2SR) influenza vector	UW–Madison/FluGen/Bharat Biotech	SARS-CoV2	Pre-Clinical	influenza
Replicating Viral Vector	Newcastle disease virus vector (NDV-SARS-CoV-2/Spike)	Intravacc/ Wageningen Bioveterinary Research/Utrecht Univ.	SARS-CoV2	Pre-Clinical	
Replicating Viral Vector	Avian paramyxovirus vector (APMV)	The Lancaster University, UK	SARS-CoV2	Pre-Clinical	
RNA	LNP-mRNA	Translate Bio/Sanofi Pasteur	SARS-CoV2	Pre-Clinical	
RNA	LNP-mRNA	CanSino Biologics/Precision NanoSystems	SARS-CoV2	Pre-Clinical	
RNA	LNP-encapsulated mRNA cocktail encoding VLP	Fudan University/ Shanghai JiaoTong University/RNACure Biopharma	SARS-CoV2	Pre-Clinical	
RNA	LNP-encapsulated mRNA encoding RBD	Fudan University/ Shanghai JiaoTong University/RNACure Biopharma	SARS-CoV2	Pre-Clinical	
RNA	Replicating Defective SARS-CoV-2 derived RNAs	Centro Nacional Biotecnología (CNB-CSIC), Spain	SARS-CoV2	Pre-Clinical	
RNA	LNP-encapsulated mRNA	University of Tokyo/ Daiichi-Sankyo	SARS-CoV2	Pre-Clinical	MERS
RNA	Liposome-encapsulated mRNA	BIOCAD	SARS-CoV2	Pre-Clinical	
RNA	Several mRNA candidates	RNAimmune, Inc.	SARS-CoV2	Pre-Clinical	
RNA	mRNA	FBRI SRC VB VECTOR, Rospotrebnadzor, Koltsovo	SARS-CoV2	Pre-Clinical	
RNA	mRNA	China CDC/Tongji University/Stermina	SARS-CoV2	Pre-Clinical	
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, YFV; MERS, InfA, ZIKV, DengV, NIPV
RNA	mRNA in an intranasal delivery system	eTheRNA	SARS-CoV2	Pre-Clinical	
RNA	mRNA	Greenlight Biosciences	SARS-CoV2	Pre-Clinical	

**DISCLAIMER:**

These landscape documents have been prepared by the World Health Organization (WHO) for information purposes only concerning the 2019-2020 global of the novel coronavirus. Inclusion of any particular product or entity in any of these landscape documents does not constitute, and shall not be deemed or construed as, any approval or endorsement by WHO of such product or entity (or any of its businesses or activities). While WHO takes reasonable steps to verify the accuracy of the information presented in these landscape documents, WHO does not make any (and hereby disclaims all) representations and warranties regarding the accuracy, completeness, fitness for a particular purpose (including any of the aforementioned purposes), quality, safety, efficacy, merchantability and/or non-infringement of any information provided in these landscape documents and/or of any of the products referenced therein. WHO also disclaims any and all liability or responsibility whatsoever for any death, disability, injury, suffering, loss, damage or other prejudice of any kind that may arise from or in connection with the procurement, distribution or use of any product included in any of these landscape documents.

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	ADDomer™ 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	

**DISCLAIMER:**

These landscape documents have been prepared by the World Health Organization (WHO) for information purposes only concerning the 2019-2020 global of the novel coronavirus. Inclusion of any particular product or entity in any of these landscape documents does not constitute, and shall not be deemed or construed as, any approval or endorsement by WHO of such product or entity (or any of its businesses or activities). While WHO takes reasonable steps to verify the accuracy of the information presented in these landscape documents, WHO does not make any (and hereby disclaims all) representations and warranties regarding the accuracy, completeness, fitness for a particular purpose (including any of the aforementioned purposes), quality, safety, efficacy, merchantability and/or non-infringement of any information provided in these landscape documents and/or of any of the products referenced therein. WHO also disclaims any and all liability or responsibility whatsoever for any death, disability, injury, suffering, loss, damage or other prejudice of any kind that may arise from or in connection with the procurement, distribution or use of any product included in any of these landscape documents.