Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Academia Sinica (Taiwan) Scripps Research Institute (US)	cHA_{ng}	HA stalk, HA head	Recombinant proteins: Chimeric HA	Cross-reactive immune response	Intramuscular	Aluminum salts: Al(OH)3; C34 adjuvant		See preclinical information		Academia Sinica (Taiwan) Scripps Research Institute (US)	Academic, Academic							
Altimmune (UK) (Immune Targeting Systems Ltd)	FP-01.1	Nucleoprotein (NP), Matrix protein (M1), RNA polymerase PB1, RNA polymerase PB2, HA head domain, conserved epitopes	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Inactive, no longer in development	NCT01265914	Completed	Immune Targeting Systems Ltd	Industry	Phase 1	8/1/10	3/1/11	8/1/11	49 Adults (18 to 55 years)	London, United Kingdom	Results reported in peer-reviewed journal
Altimmune (UK) (Immune Targeting Systems Ltd)	FP-01.1	Nucleoprotein (NP), Matrix protein (M1), RNA polymerase PB1, RNA polymerase PB2, HA head domain, conserved epitopes	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Inactive, no longer in development	NCT02071329	Completed	Immune Targeting Systems Ltd	Industry	Phase 1	1/1/14	12/1/14	12/1/14	111 Adults (18 to 45 years)	London, United Kingdom	Results not yet reported
Altimmune (UK) (Immune Targeting Systems Ltd)	FP-01.1	Nucleoprotein (NP), Matrix protein (M1), RNA polymerase PB1, RNA polymerase PB2, HA head domain, conserved epitopes	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Other: Unspecified	Inactive, no longer in development	NCT01677676	Completed	Immune Targeting Systems Ltd	Industry	Phase 1	1/1/12	5/1/12	9/1/12	48 Adults (18 to 55 years)	Brisbane, Queensland, Australia	Results not yet reported
Altimmune (UK) (Immune Targeting Systems Ltd)	FP-01.1	Nucleoprotein (NP), Matrix protein (M1), RNA polymerase PB1, RNA polymerase PB2, HA head domain, conserved epitopes	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Other: Unspecified	Inactive, no longer in development	NCT01701752	Completed	Immune Targeting Systems Ltd	Industry	Phase 1	9/1/12	4/1/13	4/1/13	120 Older Adults (65 to 74 years)	Unspecified	Results not yet reported
Altimmune (UK) (Immune Targeting Systems Ltd)	FP-01.1	Nucleoprotein (NP), Matrix protein (M1), RNA polymerase PB1, RNA polymerase PB2, HA head domain, conserved epitopes	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular		Inactive, no longer in development	See preclinical information		Immune Targeting Systems Ltd	Industry							
Altimmune (UK) (Immune Targeting Systems Ltd)	FP-01.1	Nucleoprotein (NP), Matrix protein (M1), RNA polymerase PB1, RNA polymerase PB2, HA head domain, conserved epitopes	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular		Inactive, no longer in development			Immune Targeting Systems Ltd	Industry							
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	None	Active, currently in development	NCT03450915	Open, not recruiting	BiondVax Pharmaceuticals Ltd.	Industry	Phase 3	8/1/19	Estimated May 2020	Estimated December 2020	12,463 Adults and Older Adults (50 years and older); half over 65 years	83 clinical trial sites in 7 countries in Eastern Europe	Results not yet reported
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	None	Active, currently in development	NCT03058692	Completed	National Institute of Allergy and Infectious Disease (NIAID)	Government	Phase 2	4/9/18	1/14/19	1/14/19	120 Adults (18 to 49 years)	United States: Iowa, Ohio, Texas	Results reported in registry

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
			[1] Mice: Evaluate immunogenicity	[1] Liao 2020				[1] Liao 2020 (PMID: 32669430)		
	Peer-reviewed publication or journal 6/10/2014 Francis 2015 PMID: 24928790							[1] Francis 2015 (PMID: 24928790)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] https://clinicaltrials.gov/ct2/show/NCT01265914		
								[1] Francis 2015 (PMID: 24928790)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] https://clinicaltrials.gov/ct2/show/NCT02071329		
								[1] Francis 2015 (PMID: 24928790)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] https://clinicaltrials.gov/ct2/show/NCT01677676		
								[1] Francis 2015 (PMID: 24928790)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] https://clinicaltrials.gov/ct2/show/NCT01701752		
			Unknown	Unknown				[1] Francis 2015 (PMID: 24928790)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[1] Francis 2015 (PMID: 24928790) [2] Gottlieb 2014 (PMID: 25172355)		
								[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
								[4] Astmon 2014 (PMID: 25173483)		
								[5] Van Doorn 2017 (PMID: 28296763)		
								[6] Press Release 2019		
								[7] https://clinicaltrials.gov/ct2/show/NCT03450915		
		clinicaltrials.gov 2/5/2020 https://clinicaltrials.gov/ct2/show/results/NCT03058692						[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
								[4] Astmon 2014 (PMID: 25173483)		
								[5] Van Doorn 2017 (PMID: 28296763)		
								[6] Press release 2019		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	None		NCT02691130	Completed	(a) BiondVax Pharmaceuticals Ltd. (b) Seventh Framework Program	Industry, Government	Phase 2	11/1/15	10/1/16	1/1/17	224 Adults (18 to 60 years)	Budapest, Hungary	Interim results reported
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	None		NCT02293317	Completed	BiondVax Pharmaceuticals Ltd.	Industry	Phase 2	11/1/14	3/1/15	6/1/15	37 Adults and Older Adults (50 to 65 years)	Tel Aviv, Israel	Interim results reported
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	Aluminum salts: Alum		NCT01419925	Completed	BiondVax Pharmaceuticals Ltd.	Industry	Phase 2	8/1/11	1/1/12	1/1/12	120 Older Adults (65 years and older)	Jerusalem, Isreal	Interim results reported, Results reported in peer-reviewed journal
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: unspecified		NCT01146119	Completed	BiondVax Pharmaceuticals Ltd.	Industry	Phase 2	7/1/10	5/1/11	6/1/11	200 Adults (18 to 49 years)	Israel: Jerusalem, Tel Aviv	Interim results reported
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	Oil-in-water: Montanide ISA VG51		NCT01010737	Completed	BiondVax Pharmaceuticals Ltd.	Industry	Phase 1	9/1/09	3/1/10	3/1/10	60 Adults and Older Adults (55 to 75 years)	Tel Aviv, Israel	Interim results reported

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[7] Press release 2020		
								[8] https://clinicaltrials.gov/ct2/show/NCT03058692		
Sponsor press release 07/20/17 http://www.biondvax.com/2017/07/biondvax-reports-positive-phase-2b-clinical-trial-results-for-its-universal-flu-vaccine/								[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
								[4] Astmon 2014 (PMID: 25173483)		
								[5] Van Doorn 2017 (PMID: 28296763)		
								[6] https://clinicaltrials.gov/ct2/show/NCT02691130		
Sponsor website http://www.biondvax.com/clinical-trials/								[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
								[4] Astmon 2014 (PMID: 25173483)		
								[5] Van Doorn 2017 (PMID: 28296763)		
								[6] https://clinicaltrials.gov/ct2/show/NCT02293317		
Sponsor website http://www.biondvax.com/clinical-trials/	Peer-reviewed publication or journal Atsmon 2014 10/7/2014 PMID: 25173483 Peer-reviewed publication or journal Lowell 2017 2/1/2017 PMID: 28065476							[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
								[4] Astmon 2014 (PMID: 25173483)		
								[5] Van Doorn 2017 (PMID: 28296763)		
								[6] Lowell 2017 (PMID: 28065476)		
								[7] https://clinicaltrials.gov/ct2/show/NCT01419925		
Sponsor website http://www.biondvax.com/clinical-trials/								[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
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								[5] Van Doorn 2017 (PMID: 28296763)		
								[6] https://clinicaltrials.gov/ct2/show/NCT01146119		
Sponsor website http://www.biondvax.com/clinical-trials/								[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
								[4] Astmon 2014 (PMID: 25173483)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	Oil-in-water: Montanide ISA VG51		NCT00877448	Completed	BiondVax Pharmaceuticals Ltd.	Industry	Phase 1	6/1/09	10/1/09	11/1/09	63 Adults (18 to 49 years)	Tel Aviv, Israel	Interim results reported, Results reported in both peer reviewed journal and registry
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular	None		See preclinical information		BiondVax Pharmaceuticals Ltd.	Industry							
BiondVax Pharmaceuticals Ltd (Israel)	Multimeric-001 (M-001)	HA head domain, conserved epitopes, Nucleoprotein (NP), Matrix protein (M1)	Peptide-based, Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Intramuscular													
Bionor Pharma AS (Norway) Univ of Groningen (Neterlands)	Vacc-FLU	Membrane protein ion channel ectodomain (M2e), Membrane protein, IAV (M2), Nucleoprotein (NP)	Peptide-based	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Subcutaneous	ISA51		See preclinical information		Bionor Pharma	Industry							
Calder BioSciences (US) (previously Avatar Medical, LLC) Vanderbilt Univ (US)	DT-headless HA	Hemagglutinin (HA), conserved stalk domain	Other: headless HA	Strain-specific immunity	Unknown	Unknown		See preclinical information		Calder BioSciences (previously Avatar Medical, LLC) James Crowe, Vanderbilt University	Industry, Academic							
Ghent Univ (Belgium) Sanofi (US)	rNA antigens CBC NA	Neuraminidase (NA); 3 recombinant NA proteins (NA5200, NA7900, NA9100)	Recombinant proteins: NA	B cell response (e.g., neutralizing antibodies)	Intranasal	Sigma Adjuvant System (SAS), containing the immunostimulants monophosphoryl Lipid A and synthetic trehalose dicorynmycolate		See preclinical information		Ghent University (Belgium) Sanofi	Academic, Industry							
Icahn School of Medicine at Mount Sinai (US)	Mosaic HA	Hemagglutinin (HA), conserved stalk domain, HA head antigens	Recombinant proteins: mosaic HA	Cross-reactive immune response	Intranasal	None		See preclinical information		Ichan School of Medicine at Mount Sinai	Academic							
Icahn School of Medicine at Mount Sinai (US)	Chimeric HA	Hemagglutinin (HA), conserved stalk domain	Recombinant proteins: Chimeric HA	Antibody specific response	Intramuscular, Intranasal	None		See preclinical information		Ichan School of Medicine at Mount Sinai	Academic							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[5] Van Doorn 2017 (PMID: 28296763)		
								[6] https://clinicaltrials.gov/ct2/show/NCT01010737		
Sponsor website http://www.biondvax.com/clinical-trials/	Peer-reviewed publication or journal 2/9/2012 Atsmon 2012 PMID: 22318394	https://clinicaltrials.gov 3/27/2013 https://clinicaltrials.gov/ct2/show/results/NCT00877448						[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
								[4] Astmon 2014 (PMID: 25173483)		
								[5] Van Doorn 2017 (PMID: 28296763)		
								[6] https://clinicaltrials.gov/ct2/show/NCT00877448		
			[1] Aged Mice: Proof of Concept [2] Mice: Model to examine human epitopes	[1-2] Atsmon 2012				[1] Rudolph 2014 (PMID: 21285533)		
								[2] Gottlieb 2014 (PMID: 25172355)		
								[3] Astmon 2012 (PMID: 22318394)		
								[4] Astmon 2014 (PMID: 25173483)		
								[5] Van Doorn 2017 (PMID: 28296763)		
								[1] Rudolph 2014 (PMID: 21285533) [2] Gottlieb 2014 (PMID: 25172355) [3] Astmon 2012 (PMID: 22318394) [4] Astmon 2014 (PMID: 25173483) [5] Van Doorn 2017 (PMID: 28296763)		
			[1] Mice: Determine the cellular and humoral immune responses; and to assess protective potential of induced immune response [2] Mice: Evaluate efficacy	[1] Herrera-Rodriguez 2018 [2] Bionor press release 2011				[1] Herrera-Rodriquez 2018 (PMID: 29223787)		
								[2] Bionor press release 2011		
			[1] Mice: evaluate efficacy [2] Ferrets and mice: test heterologous protection	[1] Grant proposal [2] Grant proposal				[1] Calder UIV program description		
								[2] Grant Summary		
			[1] Mice: Evaluate protective capability [2] Mice: evaluate if vaccination could reduce viral lung load [3] Mice: examine if antibodies were the major mediators of protection induced by vaccination with CBC NAs [4] Mice: evaluate scope of protection [5] Mice: evaluate if CBC designs could mediate NI against an HA variant	[1-5] Job 2018				[1] Job 2018 (PMID: 30510776)		
			[1] Mice: Evaluate the pathogenicity of mosaic viruses; evaluate immunogenicity and efficacy; evaluate cirus clearance in lungs by cross-reactive antibodies	[1] Sun 2019				[1] Sun 2019 (PMID: 30944178)		
			[1] Mice: Evaluate protective effect of sequential vaccination; evaluate efficacy [2] Mice: Evaluate vaccine efficacy	[1] Ermler 2017 [2] Margine 2013				[1] Ermler 2017 (PMID: 28356526)		
								[2] Margine 2013 (PMID: 23903831)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Icahn School of Medicine at Mount Sinai (US)	Hyperglycosylated HA1 Proteins	Hemagglutinin (HA), conserved stalk domain	Recombinant protein	Humoral response	Intramuscular	polyinosinic-polycytidylic acid (poly I:C)		See preclinical information		Ichan School of Medicine at Mount Sinai	Academic							
Icahn School of Medicine at Mount Sinai (US)	rNA proteins	Neuraminidase (NA)	Recombinant NA proteins	Mucosal immune response	Intramuscular, Intranasal	polyinosinic-polycytidylic acid (poly I:C)		See preclinical information		Ichan School of Medicine at Mount Sinai	Academic							
Imutex Ltd (SEEK/hVIVO) (UK)	FLU-v	Nucleoprotein (NP), Matrix protein (M1), Membrane protein, IAV (M2)	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Other: Subcutaneous	Oil-in-water: Montanide ISA VG51	Active, currently in development	NCT02962908 2015-001932-38	Completed	(a) PepTcell Limited (b) Seventh Framework Program (c) University of Groningen (d) University Medical Center Groningen (e) Robert Koch Institute (f) Norwegian Institute of Public Health	Industry, Government, Academic, Academic, Government, Government	Phase 2	8/1/16	7/18/17	7/18/17	170 Adults (18 to 60 years)	Zwolle, Netherlands	Interim results reported, Results reported in registry
Imutex Ltd (SEEK/hVIVO) (UK)	FLU-v	Nucleoprotein (NP), Matrix protein (M1), Membrane protein, IAV (M2)	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Other: Subcutaneous	Oil-in-water: Montanide ISA VG51		NCT03180801 FLU-v-004 2016-002134-74 2015-25472	Completed	(a) PepTcell Limited (b) NIAID	Industry, Government	Phase 2	8/18/16	3/31/17	5/25/17	153 Adults (18 to 55 years)	London, United Kingdom	Interim results reported, Results reported in registry
Imutex Ltd (SEEK/hVIVO) (UK)	FLU-v	Nucleoprotein (NP), Matrix protein (M1), Membrane protein, IAV (M2)	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Other: Subcutaneous	Oil-in-water: Montanide ISA VG51		NCT01226758	Completed	PepTcell Limited	Industry	Phase 1	6/1/10	12/1/10	12/1/10	32 Adults (18 to 45 years)	London, United Kingdom	Results reported in peer-reviewed journal
Imutex Ltd (SEEK/hVIVO) (UK)	FLU-v	Nucleoprotein (NP), Matrix protein (M1), Membrane protein, IAV (M2)	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Other: Subcutaneous	Oil-in-water: Montanide ISA VG51		NCT01181336	Completed	PepTcell Limited	Industry	Phase 1	4/1/10	7/1/10	7/1/10	48 Adults (18 to 40 years)	London, United Kingdom	Results reported in peer-reviewed journal
Imutex Ltd (SEEK/hVIVO) (UK)	FLU-v	Nucleoprotein (NP), Matrix protein (M1), Membrane protein, IAV (M2)	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Other: Subcutaneous	Oil-in-water: Montanide ISA VG51		See preclinical information		PepTcell Limited	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[3] Krammer 2019 (PMID: 30715353)		
			[1] Mice: test reactivity to parental strain; assess binding to stalk without interference from head reactivity; evaluate immunogenicity	[1] Eggink 2014				[1] Eggink 2014 (PMID: 24155380)		
			[1] Guinea pigs: evaluate immunogenicity; determine delivery method; determine bredth of immunity	[1] McMahon 2019				[1] McMahon 2019 (PMID: 31113896)		
Sponsor press release 6/18/2018 https://www.ipgroupplc.com/media/portfolio-news/2018/2018-06-18	Peer-reviewed publication of journal 3/10/2020 Plequezuelos 2020 PMID: 32150750	clinicaltrials.gov 04/08/19 https://clinicaltrials.gov/ct2/show/results/NCT02962908						[1] Van Doorn 2017 (PMID: 28376743)		
								[2] Plequezuelos 2015 (PMID: 25994549)		
								[3] Gottlieb 2014 (PMID: 25172355)		
								[4] Plequezuelos 2012 (PMID: 22575166)		
								[5] Plequezuelos 2020 (PMID: 32150750)		
								[6] Abbasi 2020 (PMID: 32286631)		
								[7] https://clinicaltrials.gov/ct2/show/NCT02962908		
Sponsor press release 03/26/18 https://www.ipgroupplc.com/media/portfolio-news/2018/2018-03-26	Peer-reviewed publication of journal 3/13/2020 Plequezuelos 2020 PMID: 32194999	clinicaltrials.gov 04/01/19 https://clinicaltrials.gov/ct2/show/results/NCT03180801						[1] Van Doorn 2017 (PMID: 28376743)		
								[2] Plequezuelos 2015 (PMID: 25994549)		
								[3] Gottlieb 2014 (PMID: 25172355)		
								[4] Plequezuelos 2012 (PMID: 22575166)		
								[5] Plequezuelos 2020 (PMID: 32194999)		
								[5] https://clinicaltrials.gov/ct2/show/NCT03180801		
	Peer-reviewed publication of journal 6/23/2012 Plequezuelos 2015 PMID: 25994549							[1] Van Doorn 2017 (PMID: 28376743)		
								[2] Plequezuelos 2015 (PMID: 25994549)		
								[3] Gottlieb 2014 (PMID: 25172355)		
	Peer-reviewed publication of journal 8/2015 Plequezuelos 2015 PMID: 26084515							[4] Plequezuelos 2012 (PMID: 22575166)		
								[5] Plequezuelos 2015 (PMID: 26084515)		
								[6] https://clinicaltrials.gov/ct2/show/NCT01226758		
	Peer-reviewed publication of journal 6/29/2012 Plequezuelos 2012 PMID: 22575166							[1] Van Doorn 2017 (PMID: 28376743)		
								[2] Plequezuelos 2015 (PMID: 25994549)		
								[3] Gottlieb 2014 (PMID: 25172355)		
								[4] Plequezuelos 2012 (PMID: 22575166)		
								[5] https://clinicaltrials.gov/ct2/show/NCT01181336		
			[1] Mice: Evaluate Immunogenicity	[1] Stoloff 2007				[1] Van Doorn 2017 (PMID: 28376743)		
								[2] Plequezuelos 2015 (PMID: 25994549)		
								[3] Gottlieb 2014 (PMID: 25172355)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Imutex Ltd (SEEK/hVIVO) (UK)	FLU-v	Nucleoprotein (NP), Matrix protein (M1), Membrane protein, IAV (M2)	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Other: Subcutaneous	Oil-in-water: Montanide ISA VG51				PepTcell Limited	Industry							
Janssen Pharmaceuticals (The Netherlands) Crucell Vaccine Institute and Scripps Research Institute	Mini-HA	Hemagglutinin (HA), conserved stalk domain	Recombinant protein	Humoral response	Intramuscular	Aluminum salts: Alum		See preclinical information		Janssen Pharmaceuticals, Crucell Vaccine Institute and Scripps Research Institute	Industry, Industry, Academic							
Korea Univ College of Pharmacy (Korea)	nM2PR	Membrane protein ion channel ectodomain (M2e)	Peptide-based	Immunogen-specific response	Intraperitoneal	Freund's adjuvant		See preclinical information		Korea Univ College of Pharmacy	Academic							
Monash University (Australia) Victoria University of Wellington (New Zealand)	SLP-conjugate vaccines	Neuraminidase (NA)	Synthetic peptide-based	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	alpha-GalCer-adjuvant		See preclinical information		Monash University (Australia) Victoria University of Wellington (New Zealand)	Academic, Academic							
NIAID Indian Institute of Science	Stem-only immunogens	Hemagglutinin (HA), conserved stalk domain	SI-based	Non-neutralizing antibody response	Intramuscular; Intraperitoneal; Intranasally	Squalene-based oil-in-water adjuvants		See preclinical information		NIAID	Government							
National Yang-Ming Univ (Taiwan)	Monoglycosylated H1 stem protein	Hemagglutinin (HA), conserved stalk domain	Recombinant proteins	B cell response (e.g., neutralizing antibodies)	Intramuscular	Glycolipid C34		See preclinical information		National Yang-Ming University (Taiwan)	Academic							
Pasteur Institute of Iran	3M2e-HSP	Membrane protein ion channel ectodomain (M2e)	Recombinant protein	B cell response (e.g., neutralizing antibodies)	Subcutaneous	HSP70		See preclinical information		Pasteur Institute of IRAN	Government							
Shanghai University of Traditional Chinese Medicine (China) Shanghai Institute of Biological Products (China)	Recombinant influenza TAT-NP	Nucleoprotein (NP)	Recombinant protein	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		See preclinical information		Shanghai University of Traditional Chinese Medicine (China) Shanghai Institute of Biological Products (China)	Academic, Industry							
SutroVax, Inc. (US)	HA stem trimer antigen	Hemagglutinin (HA), conserved stalk domain	Cell-free recombinant protein	B cell response (e.g., neutralizing antibodies)	Unknown	Unknown		See preclinical information		SutroVax, INC.	Industry							
Texas Tech Univ (US)	EFn-3xM2e-HA2+PA	Three tandem M2e repeats plus HA stalk (HA2)	Recombinant antigen	B cell response (e.g., neutralizing antibodies)	Intranasal	Detoxified anthrax toxin system		See preclinical information		Texas Tech University	Academic							
Trudeau Institute (US) Infectious Disease Research Institute (US) Univ of Connecticut School of Medicine (US)	rNP+SLA-SE	Nucleoprotein (NP)	Recombinant proteins: NA	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Oil-in-water: SLA-SE; Alhydrogel		See preclinical information		Trudeau Institute (US) Infectious Disease Research Institute (US) Univ of Connecticut School of Medicine (US)	Industry, Government, Academic							
Univ Autonoma del Estrado de Morelos (Mexico)	α-DEC-205:M2e conjugate	Membrane protein ion channel ectodomain (M2e)	Peptide-based	B cell response (e.g., neutralizing antibodies)	Subcutaneous	Polyinosinic-polycytidylic acid (poly I:C)		See preclinical information		Univ Autonoma del Estrado de Morelos	Academic							
Univ of Copenhagen (Denmark) Scripps Research Institute (US)	CLP-HA-stem	Hemagglutinin (HA), conserved stalk domain	Recombinant protein	Humoral response; Antigen-specific response	Intramuscular	None		See preclinical information		Univ of Copenhagen (Denmark) Scripps Research Institute (US)	Academic, Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[4] Plequezuelos 2012 (PMID: 22575166)		
								[5] Stoloff 2007 (PMID: 17668898)		
								[1] Van Doorn 2017 (PMID: 28376743)		
								[2] Plequezuelos 2015 (PMID: 25994549)		
								[3] Gottlieb 2014 (PMID: 25172355)		
								[4] Plequezuelos 2012 (PMID: 22575166)		
								[5] Stoloff 2007 (PMID: 17668898)		
			[1] Mice: evaluate bredth of protection [2] Mice: evaluate whether serum antibodies are responsible for in vivo protection [3] Cynomolgus monkeys: evaluate immunogenicity and protective efficacy [4] Mice: evaluate the impact of previous exposure to influenza on the induction of broadly influenza reactive antibodies by mini-HA antigen [5] Mice: Evaluate potency of AAV vector expressing influenza wild-type HA to confer broad protection	[1] Impagliazzo 2015 [2] Impagliazzo 2015 [3] Impagliazzo 2015 [4] Van der Lubbe 2018 [5] Demminger 2020				[1] Impagliazzo 2015 (PMID: 26303961)		
								[2] Van der Lubbe 2018 (PMID: 29977611)		
								[3] Demminger 2020 (PMID: 32163240)		
			[1] Mice: investigate production and specificity of the anti-nM2e Abs in mice; evaluate efficacy	[1] Kim 2019				[1] Kim 2019 (PMID: 31501717)		
			[1] Mice: Evaluate immunogenicity	[1] Anderson 2017				[1] Anderson 2017 (PMID: 29043774)		
			[1] Mice: evaluate immunogenicity [2] Mice: evaluate efficacy [3] Mice: passive transfer experiment to determine whether protection was antibody-mediated [4] Ferrets: evaluate antibody response [5] Ferrets: evaluate efficacy [6] Mice: evaluate immunogenicity and efficacy [7] Mice: evaluate immunogenicity [8] Mice: evaluate efficacy	[1-5] Sutton 2017 [6] Mallajosyula 2015 [7] Mallajosyula 2014 [8] Bommakanti 2012				[1] Sutton 2017 (PMID: 29263889)		
								[2] Mallajosyula 2014 (PMID: 24927560)		
								[3] Mallajosyula 2015 (PMID: 26167164)		
								[4] Angeletti 2019 (PMID: 31213541)		
								[5] Naiar 2018 (PMID: 29863853)		
								[6] Bommakanti 2012 (PMID: 23015722)		
			[1] Mice: Evaluate immunogenicity	[1] Wang 2019				[1] Wang 2019 (PMID: 30388628)		
			[1] Mice: evaluate immunogenicity	[1] Farahmand 2018				[1] Farahmand 2018 (PMID: 30382564)		
			[1] Mice: evaluate immunogenicity and protective efficacy	[1] Yin 2020				[1] Yin 2020 (PMID: 32811334)		
			[1] Mice and ferrets: Determine immunogenicity and protective efficacy	[1] Grant summary				[1] Grant summary		
								[2] SutroVax Website		
			[1] Mice: Evaluate systemic antibody responses [2] Mice: Test if specific immunity against anthrax toxins was also developed	[1] Arevalo 2017				[1] Arévalo 2017 (PMID: 27775159)		
			[1] Mice: Evaluate efficacy with different adjuvants	[1] Cookenham 2020				[1] Cookenham 2020 (PMID: 32540272)		
			[1] Mice: evaluate immunogenicity; evaluate role of effector CD4+ T cells on protection	[1] Padilla-Quirarte 2019				[1] Padilla-Quirarte 2019 (PMID: 30955979)		
			[1] Mice: evaluate imporved immunogenicity and vaccine efficacy	[1] Thrane 2020				[1] Thrane 2020 (PMID: 32679905)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
University of Hong Kong	HA mini-stems	Hemagglutinin (HA), conserved stalk domain	Recombinant proteins with pre-fusion headless HA mini-stem	Humoral response	Intramuscular	Addavax (Invivogen)		See preclinical information		University of Hong Kong	Academic							
University of Hong Kong	Single ADCC activating peptides	HA Head	Peptide-based	ADCC specific response	Unknown	None		See preclinical information		University of Hong Kong	Academic							
University of Oxford Blue Water Vaccines (UK)	OREO epitope	HA1 epitope of limited variability (OREO)	Epitope-based	Cross-reactive immune response	Intramuscular	Alum: Alhydrogel		See preclinical information		University of Oxford Blue Water Vaccines	Academic, Industry							
University of Rochester Medical Center (US)	cH7/3	Chimeric HA protein (H7 globular head, H3 stem)	Recombinant proteins: Chimeric	B cell response (e.g., neutralizing antibodies)	Subcutaneous	Aluminum salts: Alum		See preclinical information		University of Rochester	Academic							
VA Pharma LLC (Russia) Russian Federation Ministry of Health	Uniflu	Membrane protein ion channel ectodomain (M2e), HA2 stalk epitopes	Recombinant proteins	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Other: Flagellin		NCT03789539	Open, not recruiting	VA Pharma Limited Liability Company	Industry	Phase 1	6/2/18	12/2/18	Estimated 12/31/18	54 Adults (18 to 60 years)	Saint-Petersburg, Russia	
VA Pharma LLC (Russia) Russian Federation Ministry of Health	Uniflu	Membrane protein ion channel ectodomain (M2e), HA2 stalk epitopes	Recombinant proteins	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Other: Flagellin		See preclinical information		VA Pharma Limited Liability Company	Industry							
VA Pharma LLC (Russia) Russian Federation Ministry of Health	Uniflu	Membrane protein ion channel ectodomain (M2e), HA2 stalk epitopes	Recombinant proteins	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Other: Flagellin				VA Pharma Limited Liability Company	Industry							
VaxInnate Corp (US)	VAX102 TIV+VAX102 STF2.4xM2e Vax102 is a recombinant influenza M2e-flagellin vaccine fused to the TLR5 agonist, flagellin	Membrane protein ion channel ectodomain (M2e)	Recombinant fusion protein	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: TLR5 agonist: Flagellin		NCT00921973	Completed	VaxInnate Corporation	Industry	Phase 1	6/1/09	7/1/09	9/1/09	80 Adults (18 to 49 years)	Lenexa, Kansas Nashville, Tennessee	Results reported in peer-reviewed journal
VaxInnate Corp (US)	VAX102 TIV+VAX102 STF2.4xM2e Vax102 is a recombinant influenza M2e-flagellin vaccine fused to the TLR5 agonist, flagellin	Membrane protein ion channel ectodomain (M2e)	Recombinant fusion protein	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: TLR5 agonist: Flagellin		NCT00921947	Completed	VaxInnate Corporation	Industry	Phase 1	6/1/09	7/1/09	8/1/09	60 Adults (18 to 49 years)	Salt Lake City, Utah	Results reported in registry
VaxInnate Corp (US)	VAX102 TIV+VAX102 STF2.4xM2e Vax102 is a recombinant influenza M2e-flagellin vaccine fused to the TLR5 agonist, flagellin	Membrane protein ion channel ectodomain (M2e)	Recombinant fusion protein	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: TLR5 agonist: Flagellin		NCT00921206	Completed	VaxInnate Corporation	Industry	Phase 1	6/1/09	10/1/09	12/1/09	21 Adults (18 to 49 years)	Denver, Colorado	Results not yet reported

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
			[1] Mice: evaluate use of group 1 HA mini-stem to induce protection against both group 1 and group 2 viruses	[1] Valkenburg 2016				[1] Valkenburg 2016 (PMID: 26947245)		
			[1] Mice: Determine protective potential of universal vaccine targets identified for stimulating ADCC responses	[1] Kavian 2020				[1] Kavian 2020 (PMID: 32718818)		
			[1] Mice: evaluate immunogenicity	[1] Thompson 2018				[1] Thompson 2018 (PMID: 30242149)		
								[2] Recker 2007 (PMID: 17460037)		
								[3] Blue Water Vaccines website		
			[1] Mice: Evaluate immunogenicity	[1] DiPiazza 2019				[1] DiPiazza 2019 (PMID: 31399519)		
								[1] Tsybalova 2015 (PMID: 25976545)		
								[2] Tsybalova 2018 (PMID: 30138320)		
								[3] Stepanova 2015 (PMID: 25799221)		
								[4] Stepanova 2018 (PMID: 29631629)		
								[5] Stepanova 2018 (PMID: 29713522)		
								[6] https://clinicaltrials.gov/ct2/show/NCT03789539		
			[1] Mice: Evaluate immunogenicity and protective properties of vaccine preparations [2] Mice: evaluate immunogenicity of enhanced vaccine candidate [3] Mice: evaluate immunogenicity and efficacy [4] Mice: compare immunogenicity and protective action of two recombinant proteins which feature different designs which target different antigens [5] Mice: compare the effect of different insertion points of the target antigens into flagellin on the structure, stability and immunogenicity of the recombinant proteins	[1] Tsybalova 2015 [2] Tsybalova 2018 [3] Stepanova 2015 [4] Stepanova 2018 [5] Stepanova 2018				[1] Tsybalova 2015 (PMID: 25976545)		
								[2] Tsybalova 2018 (PMID: 30138320)		
								[3] Stepanova 2015 (PMID: 25799221)		
								[4] Stepanova 2018 (PMID: 29631629)		
								[5] Stepanova 2018 (PMID: 29713522)		
								[1] Tsybalova 2015 (PMID: 25976545) [2] Tsybalova 2018 (PMID: 30138320) [3] Stepanova 2015 (PMID: 25799221) [4] Stepanova 2018 (PMID: 29631629) [5] Stepanova 2018 (PMID: 29713522)		
	Peer-reviewed publication or journal 12/28/2010 Talbot 2010 PMID: 21203437							[1] Turley 2011 (PMID: 21624416)		
								[2] Talbot 2010 (PMID: 21203437)		
								[3] https://clinicaltrials.gov/ct2/show/NCT00921973		
		clinicaltrials.gov 08/22/11 https://clinicaltrials.gov/ct2/show/results/NCT00921947						[1] Turley 2011 (PMID: 21624416)		
								[2] Talbot 2010 (PMID: 21203437)		
								[3] https://clinicaltrials.gov/ct2/show/NCT00921947		
								[1] Turley 2011 (PMID: 21624416)		
								[2] Talbot 2010 (PMID: 21203437)		
								[3] https://clinicaltrials.gov/ct2/show/NCT00921206		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
VaxInnate Corp (US)	VAX102 TIV+VAX102 STF2.4xM2e Vax102 is a recombinant influenza M2e-flagellin vaccine fused to the TLR5 agonist, flagellin	Membrane protein ion channel ectodomain (M2e)	Recombinant fusion protein	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: TLR5 agonist: Flagellin		NCT00603811	Completed	VaxInnate Corporation	Industry	Phase 1	9/1/07	10/1/08	10/1/08	60 Adults (18 to 49 years)	Lenexa, Kansas Galveston, Texas	Results not yet reported
VaxInnate Corp (US)	VAX102	Membrane protein ion channel ectodomain (M2e)	Recombinant fusion protein	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: TLR5 agonist: Flagellin		See preclinical information		VaxInnate Corporation	Industry							
VaxInnate Corp (US)	VAX102	Membrane protein ion channel ectodomain (M2e)	Recombinant fusion protein	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: TLR5 agonist: Flagellin				VaxInnate Corporation	Industry							
Reassortant/Recombinant Influenza Virus-Based Vaccines																		
Codagenix, Inc. (US)	CodaVax	Neuraminidase (NA), HA gene suppression	Live-attenuated influenza virus (e.g., single-replication viruses)	Humoral and cellular	Intranasal	None		NCT03926416 CODA01-001	Completed	Codagenix	Industry	Phase 1	2/21/17	5/29/18	9/14/18	125 Adults (18 to 45 years)	Queensland, Australia	Results not yet reported
Codagenix, Inc. (US)	CodaVax	Neuraminidase (NA), HA gene suppression	Live-attenuated influenza virus (e.g., single-replication viruses)	Humoral and cellular	Intranasal	None		See preclinical information		Codagenix	Industry							
Codagenix, Inc. (US)	CodaVax	Neuraminidase (NA), HA gene suppression	Live-attenuated influenza virus (e.g., single-replication viruses)	Humoral and cellular	Intranasal	None				Codagenix	Industry							
Flugen, Inc (US)	M2SR	M2-deficient	Live-attenuated influenza virus (e.g., single-replication viruses)	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		2017-004971-30	Completed	FluGen Inc	Industry	Phase 2	2/27/18	3/6/19	3/6/19	120 Adults (18 to 55 years)	Madison, Wisconsin	Interim results reported, Results reported in registry
Flugen, Inc (US)	M2SR H3N2 M2SR coadministered with QIV boost	M2-deficient	Live-attenuated influenza virus (e.g., single-replication viruses)	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal, Intramuscular	None	Active, currently in development	NCT03553940	Open, not recruiting	National Institute of Allergy and Infectious Disease (NIAID)	Government	Phase 1	8/2/18	Estimated 10/31/20	Estimated 10/31/20	43 Adolescents and Children (9 to 17 years)	Saint Louis, Missouri	Results not yet reported
Flugen, Inc (US)	M2SR H3N2 M2SR coadministered with QIV boost	M2-deficient	Live-attenuated influenza virus (e.g., single-replication viruses)	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal, Intramuscular	None		NCT02822105	Completed	FluGen Inc	Industry	Phase 1	6/1/16	4/1/17	11/1/17	96 Adults (18 to 49 years)	Lenexa, Kansas	Results not yet reported

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[1] Turley 2011 (PMID: 21624416)		
								[2] Talbot 2010 (PMID: 21203437)		
								[3] https://clinicaltrials.gov/ct2/show/NCT00603811		
			[1] Mice: Evaluate immunogenicity and protective efficacy	[1] Talbot 2010; Turley 2011				[1] Turley 2011 (PMID: 21624416)		
								[2] Talbot 2010 (PMID: 21203437)		
								[1] Turley 2011 (PMID: 21624416)		
								[2] Talbot 2010 (PMID: 21203437)		
								[1] Yang 2013 (PMID: 23690603)		
								[2] https://clinicaltrials.gov/ct2/show/NCT03926416		
			[1] Mice: Evaluate efficacy	[1] Yang 2013				[1] Yang 2013 (PMID: 23690603)		
								[2] Mueller 2010 (PMID: 20543832)		
								[1] Yang 2013 (PMID: 23690603)		
								[2] Mueller 2010 (PMID: 20543832)		
[1] Sponsor Press Release 02/12/19 https://www.businesswire.com/news/home/20190212005173/en/FluGen%E2%80%99s-M2SR-Influenza-Vaccine-Succeeds-Phase-2		https://www.clinicaltrialsregister.eu/ctr-search/trial/2017-004971-30/results						[1] Hatta 2018 (PMID: 30007825)		
								[2] Hatta 2017 (PMID: 28668565)		
								[3] Sarawar 2016 (PMID: 27595896)		
[2] Press Release 02/12/19 https://www.fiercepharma.com/vaccines/flugen-plans-further-development-universal-flu-shot-after-phase-2-win								[4] Hatta 2011 (PMID: 21272601)		
								[5] Watanabe 2009 (PMID: 19321619)		
								[6] https://www.clinicaltrialsregister.eu/ctr-search/trial/2017-004971-30/BE		
								[1] Hatta 2018 (PMID: 30007825)		
								[2] Hatta 2017 (PMID: 28668565)		
								[3] Sarawar 2016 (PMID: 27595896)		
								[4] Hatta 2011 (PMID: 21272601)		
								[5] Watanabe 2009 (PMID: 19321619)		
								[6] https://clinicaltrials.gov/ct2/show/NCT03553940		
								[1] Hatta 2018 (PMID: 30007825)		
								[2] Hatta 2017 (PMID: 28668565)		
								[3] Sarawar 2016 (PMID: 27595896)		
								[4] Hatta 2011 (PMID: 21272601)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Flugen, Inc (US)	M2SR	M2-deficient	Live-attenuated influenza virus (e.g., single-replication viruses)	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		See preclinical information		FluGen Inc NIAID	Industry, Government							
Flugen, Inc (US)	M2SR	M2-deficient	Live-attenuated influenza virus (e.g., single-replication viruses)	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None				FluGen Inc NIAID	Industry, Government							
Gamma Vaccines Pty Ltd (Australia)	GammaFlu	Other: Whole virus	Whole virion gamma-irradiated virus	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	Self-adjuvanted		See preclinical information		Gamma Vaccines	Industry							
Icahn School of Medicine at Mount Sinai (US)	Mosaic HA (mHA)-based vaccine	Hemagglutinin (HA) head domain, HA conserved stalk domain	Mosaic HA (mHA)	Antibody specific response	Intramuscular	Oil-in-water: AddaVax		See preclinical information		Ichan School of Medicine at Mount Sinai	Academic							
Icahn School of Medicine at Mount Sinai (US)	cHA Ca2 M2 virus vaccine	Membrane protein, IAV (M2), Hemagglutinin (HA), conserved stalk domain; cHA	Inactivated influenza virus	Antibody specific response	Intramuscular	Squalene-based oil-in-water adjuvants		See preclinical information		Ichan School of Medicine at Mount Sinai	Academic							
Icahn School of Medicine at Mount Sinai (US) GSK (US)	Chimeric HA (cHA)-based vaccines: cH8/1N1 LAIV and cH5/1N1 IIV with adjuvant Flu D-SUIV (GSK3816302A)	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved epitopes, Novel Antigen: cHA, Neuraminidase (NA)	Headless HA; Functional chimeric HA (cHA)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal, Intramuscular	Aluminum salts: ASO3A		NCT03300050	Completed	PATH	Industry	Phase 1	10/10/17	4/24/18	8/9/19	65 Adults (18 to 39 years)	Durham, North Carolina	Results reported in peer-reviewed journal
Icahn School of Medicine at Mount Sinai (US) GSK (US)	Chimeric HA (cHA)-based vaccines: cH8/1N1 LAIV and cH5/1N1 IIV with adjuvant Flu D-SUIV	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved	Headless HA; Functional chimeric HA (cHA)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-	Intramuscular	Aluminum salts: ASO3A	Inactive, no longer in development	NCT03275389 EUCTR2017-001584-20-	Completed	GlaxoSmithKline	Industry	Phase 1	9/18/17	3/26/20	3/26/20	470 Adults (18 to 39 years)	South Miami, Florida Wichita, Kansas	Interim results reported

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[5] Watanabe 2009 (PMID: 19321619)		
								[6] https://clinicaltrials.gov/ct2/show/NCT02822105		
			[1] Ferrets: Evaluate efficacy with preexisting immunity to influenza [2] Mice and Ferrets: Evaluate efficacy against H5N1 highly pathogenic avian influenza viruses [3] Mice: Evaluate immunogenicity [4] Mice: Assess attenuation and protective efficacy [5] Mice: Evalate potential of M2KO influenza A virus as a live attenuanted vaccine [6] Mice: Evaluate efficacy against heterologous influenza B virus challenge	[1] Hatta 2018 [2] Hata 2017 [3] Sarawar 2016 [4] Hatta 2011 [5] Watanabe 2009 [6] Moser 2019				[1] Hatta 2018 (PMID: 30007825)		
								[2] Hatta 2017 (PMID: 28668565)		
								[3] Sarawar 2016 (PMID: 27595896)		
								[4] Hatta 2011 (PMID: 21272601)		
								[5] Watanabe 2009 (PMID: 19321619)		
								[6] Moser 2019 (PMID: 31280945)		
								[1] Hatta 2018 (PMID: 30007825) [2] Hatta 2017 (PMID: 28668565) [3] Sarawar 2016 (PMID: 27595896) [4] Hatta 2011 (PMID: 21272601) [5] Watanabe 2009 (PMID: 19321619) [6] Moser 2019 (PMID: 31280945)		
			[1] Mice: investigate mechanism behind cross-protection	[1] Fuyura 2010				[1] Fuyura 2010 (PMID: 20164231)		
			[1] Mice: evaluate immunogenicity	[1] Broecker 2019				[1] Broecker 2019 (PMID: 31341648)		
			[1] Mice: evaluate vaccine efficacy	[1] Sun 2019				[1] Sun 2019 (PMID: 31540436)		
	Peer-reviewed journal - Bernstein 2019 10/17/19 PMID: 31630990							[1] Liu 2019 (PMID: 31105689)		
								[2] Nachbagauer 2017 (PMID: 29263881)		
								[3] Krammer 2019 (PMID: 30715353)		
								[4] Nachbagauer 2018 (PMID: 30044403)		
								[5] Sunwoo 2018 (PMID: 30223475)		
								[6] Choi 2019 (PMID: 31032479)		
								[7] https://clinicaltrials.gov/ct2/show/NCT03300050		
								[8] Bernstein 2019 (PMID: 31630990)		
								[9] Nachbagauer 2016 (PMID: 26719251)		
								[10] Destexhe 2020 (PMID: 32119974)		
Sponsor Press Release 05/01/19								[1] Liu 2019 (PMID: 31105689)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
	(GSK3816302A)	epitopes, Novel Antigen: cHA, Neuraminidase (NA)		lymphocytes)				BE									Rochester, New York Austin, Texas Norfolk, Virginia Wilrijk, Belgium	
Icahn School of Medicine at Mount Sinai (US) GSK (US)	Chimeric HA (cHA)-based vaccines: cH8/1N1 LAIV and cH5/1N1 IIV with adjuvant Flu D-SUIV (GSK3816302A)	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved epitopes, Novel Antigen: cHA, Neuraminidase (NA)	Headless HA; Functional chimeric HA (cHA)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Aluminum salts: ASO3A		See preclinical information		GlaxoSmithKline Path	Industry, Industry							
Icahn School of Medicine at Mount Sinai (US) GSK (US)	Chimeric HA (cHA)-based vaccines: cH8/1N1 LAIV and cH5/1N1 IIV with adjuvant Flu D-SUIV (GSK3816302A)	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved epitopes, Novel Antigen: cHA, Neuraminidase (NA)	Headless HA; Functional chimeric HA (cHA)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Aluminum salts: ASO3A				GlaxoSmithKline	Industry							
Institute of Experimental Medicine (Russia)	cHA LAIV LAIV+NP	Nucleoprotein (NP), cHA	Reassortant LAIV	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-	Intranasal	None		See preclinical information		Institute of Experimental Medicine (Russia) Icahn School of Medicine at	Academic, Academic							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
https://www.fiercebiotech.com/biotech/gsk-dumps-universal-flu-vaccine-after-interim-data-readout								[2] Nachbagauer 2017 (PMID: 29263881)		
								[3] Krammer 2019 (PMID: 30715353)		
								[4] Nachbagauer 2018 (PMID: 30044403)		
								[5] Sunwoo 2018 (PMID: 30223475)		
								[6] Choi 2019 (PMID: 31032479)		
								[7] https://clinicaltrials.gov/ct2/show/NCT03275389		
								[8] Development discontinued		
								[9] Nachbagauer 2016 (PMID: 26719251)		
								[10] Destexhe 2020 (PMID: 32119974)		
			[1] Ferrets: Evaluate immunogenicity; compare one and two dose regimen; and examine bredth of protective immunity [2] Ferrets: Evaluate efficacy in male ferrets to determine if ferret model recapitulates gender differences in immune responses observed in humans [3] Pigs: Assess immune responses and efficacy [4] Mice: explore the cHA strategy in mice by comparing use of two adjuvants [5] Mice: Evaluate immunogenicity and efficacy [6] Ferrets: Evaluate efficacy [7] Rabbits: evaluate local tolerance and the local and systemic effects	[1] Nachbagauer 2017 [2] Nachbagauer 2018 [3] Sunwoo 2018 [4] Choi 2019 [5] Nachbagauer 2016 [6] Nachbagauer 2016 [7] Destexhe 2020					[1] Liu 2019 (PMID: 31105689)		
								[2] Nachbagauer 2017 (PMID: 29263881)		
								[3] Krammer 2019 (PMID: 30715353)		
								[4] Nachbagauer 2018 (PMID: 30044403)		
								[5] Sunwoo 2018 (PMID: 30223475)		
								[6] Choi 2019 (PMID: 31032479)		
								[7] Development discontinued		
								[8] Nachbagauer 2016 (PMID: 29250436)		
								[9] Nachbagauer 2016 (PMID: 26719251)		
								[10] Destexhe 2020 (PMID: 32119974)		
								[1] Liu 2019 (PMID: 31105689)		
								[2] Nachbagauer 2017 (PMID: 29263881)		
								[3] Krammer 2019 (PMID: 30715353)		
								[4] Nachbagauer 2018 (PMID: 30044403)		
								[5] Sunwoo 2018 (PMID: 30223475)		
								[6] Choi 2019 (PMID: 31032479)		
								[7] Development discontinued		
								[8] Nachbagauer 2016 (PMID: 29250436)		
								[9] Nachbagauer 2016 (PMID: 26719251)		
								[10] Nachbagauer 2019 (PMID: 31839997)		
								[11] Destexhe 2020 (PMID: 32119974)		
			[1] Mice: evaluate efficacy [2] Ferrets: evaluate immunogenicity	[1] Isakova-Sivak 2018 [2] Korenkov 2018				[1] Isakova-Sivak 2018 (PMID: 29574336)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
				lymphocytes)						Mount Sinai								
Institute of Experimental Medicine (Russia)	LAIV-AdV T cell-based	Neuraminidase (NA), Nonstructural protein (NS1)	Recombinnt LAIV	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		See preclinical information		Institute of Experimental Medicine (Russia)	Academic							
KJ Biosciences LLC (US)	Flu-ECP	Low-pH treated HA1, HA2 antigens	Inactivated influenza virus	Cross-reactive immune response	Intramuscular	None		See preclinical information		KJ Biosciences LLC Texas A&M University	Industry, Academic							
Univ of Georgia (US)	H1, H3 COBRA IIC	HA head COBRA	Inactivated influenza virus	Cellular immune response	Intramuscular	[1] IFA or alum hydroxide [2] AF03 squalene-in-water emulsion [3] Imject alum		See preclinical information		University of Georgia	Academic							
Univ of Hong Kong	alpha-1,3-galactosyltransferase	Neuraminidase (NA)	Live-attenuated influenza virus (e.g., single-replication viruses)	Antibody mediated immune response	Intranasal	None		See preclinical information		University of Hong Kong	Academic							
Univ of Oxford (UK)	S-FLU	HA head domain, conserved epitopes	Single replication (signal minus) virus, Inactivated influenza virus	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	TS6		See preclinical information		University of Oxford	Academic							
Vacthera BioTech GmbH (Austria)	VTH201 UniFluVec	Nonstructural protein (NS1), Nuclear export protein (NEP)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	Unknown		See preclinical information		Vacthera Biotech	Industry							
Vivaldi Biosciences (US)	deltaFLU	Nonstructural protein (NS1)-deficient	Replication-deficient LAIV	Interferon, mucosal cross-neutralizing IgA antibodies, systemic cytotoxic T-cell response (Th1) and B-cell response with cross-neutralizing antibodies, memory T-cell response	Intranasal	Self-adjuvanted	Active, currently in development	NCT01078701	Completed	Vivaldi Biosciences	Industry	Phase 2	12/1/09	5/1/10	5/1/10	49 Adult males (18 to 50 years)	Vienna, Austria	Results not yet reported
Vivaldi Biosciences (US)	deltaFLU	Nonstructural protein (NS1)-deficient	Replication-deficient LAIV	Interferon, mucosal cross-neutralizing IgA antibodies, systemic cytotoxic T-cell response (Th1) and B-cell response with cross-neutralizing antibodies, memory T-cell response	Intranasal	Self-adjuvanted	Active, currently in development	NCT01369862 GHB-CS08	Completed	Vivaldi Biosciences	Industry	Phase 1	1/1/11	8/1/11	8/1/11	80 Adults (18 to 60 years)	Vienna, Austria	Results reported in peer-reviewed journal
Vivaldi Biosciences (US)	deltaFLU	Nonstructural protein (NS1)-deficient	Replication-deficient LAIV	Interferon, mucosal cross-neutralizing IgA antibodies, systemic cytotoxic T-cell response (Th1) and B-cell response with cross-neutralizing antibodies, memory T-cell response	Intranasal	Self-adjuvanted	Active, currently in development	NCT00724997 2006-001176-20	Completed	Vivaldi Biosciences	Industry	Phase 1	3/1/07	7/1/08	8/1/08	48 Adults (18 to 50 years)	Vienna, Austria	Results reported in peer-reviewed journal
Vivaldi Biosciences (US)	deltaFLU	Nonstructural protein (NS1)-deficient	Replication-deficient LAIV	Interferon, mucosal cross-neutralizing IgA antibodies, systemic cytotoxic T-cell response (Th1) and B-cell response with cross-neutralizing antibodies, memory T-cell response	Intranasal	Self-adjuvanted	Active, currently in development	See preclinical information		Vivaldi Biosciences	Industry							
Vivaldi Biosciences (US)	deltaFLU	Nonstructural protein (NS1)-deficient	Replication-deficient LAIV	Interferon, mucosal cross-neutralizing IgA antibodies, systemic cytotoxic T-cell response (Th1) and B-cell response with cross-neutralizing antibodies, memory T-cell response	Intranasal	Self-adjuvanted	Active, currently in development			Vivaldi Biosciences	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[2] Korenkov 2018 (PMID: 29929009)		
								[3] Korenkov 2018 (PMID: 29252117)		
			[1] Mice: Evaluate bivalent vaccines for efficacy and select conserved and immunodominant epitopes to insert into LAIV genome	[1] Isakova-Sivak 2018				[1] Isakova-Sivak 2020 (PMID: 32344618)		
			[1] Mice: evaluate the potential of low pH-treated antigens for increased cross-reactive immune response and cross protection	[1] Ni 2018				[1] KJ Biosciences Website		
								[2] Ni 2018 (PMID: 30140267)		
			[1] Mice: assess viral replication; evaluate efficacy [2] Ferrets: evaluate efficacy [3] Mice and ferrets: evaluate efficacy	[1] Sautto 2018 [2] Allen 2018 [3] Giles 2012				[1] Sautto 2018 (PMID: 31022693)		
								[2] Allen 2018 (PMID: 30265682)		
								[3] Giles 2012 (PMID: 22190399)		
			[1] Mice: evaluate an increase in immunogenicity and breadth of protection	[1] Yan 2020				[1] Yan 2020 (PMID: 32127444)		
			[1] Mice and ferrets: evaluate efficacy, and investigate cellular immune response [2] Ferrets and pigs: evaluate efficacy [3] Mice: Evaluate immunogenicity	[1] Baz 2015 [2] Holzer 2018 [3] Powell 2019				[1] Baz 2015 (PMID: 26489862)		
								[2] Holzer 2018 (PMID: 29703861)		
								[3] Powell 2019 (PMID: 30714896)		
			[1] Mice and ferrets: evaluate immunogenicity	[1] Vacthera Website				[1] Vacthera Website		
								[1] Morokutti 2014 (PMID: 24560674)		
								[2] Mossler 2013 (PMID: 24183981)		
								[3] Wacheck 2010 (PMID: 20039806)		
								[4] https://clinicaltrials.gov/ct2/show/study/NCT01078701		
	Peer-reviewed publication or journal 12/16/2013 Mossler 2013 PMID: 24183981							[1] Morokutti 2014 (PMID: 24560674)		
								[2] Mossler 2013 (PMID: 24183981)		
								[3] Wacheck 2010 (PMID: 20039806)		
								[4] https://clinicaltrials.gov/ct2/show/NCT01369862		
	Peer-reviewed publication or journal 2/22/14 Morokutti 2014 PMID: 24560674							[1] Morokutti 2014 (PMID: 24560674)		
								[2] Mossler 2013 (PMID: 24183981)		
	Peer-reviewed publication or journal 2/01/10 Wacheck 2010 PMID: 20039806							[3] Wacheck 2010 (PMID: 20039806)		
								[4] https://clinicaltrials.gov/ct2/show/NCT00724997		
			[1] Unknown: generate supporting information to advance these viruses into the clinic	[1] Grant Summary				[1] Morokutti 2014 (PMID: 24560674)		
								[2] Mossler 2013 (PMID: 24183981)		
								[3] Wacheck 2010 (PMID: 20039806)		
								[4] Grant Summary		
								[1] Morokutti 2014 (PMID: 24560674)		
								[2] Mossler 2013 (PMID: 24183981)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Virus-Vectored Vaccines																		
Altimmune, Inc (US)	NasoVAX	Other: targets respiratory tract without directly attacking the IFV	Other: Replication-deficient Ad5-vectored HA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None	Static (not progressing or terminated), looking for addional research collaborators	NCT03760549	Completed	Altimmune, Inc.	Industry	Phase 2	1/21/19	2/18/19	2/18/19	8 Adults (18 to 49 years)	Rockville, Maryland	Results not yet reported
Altimmune, Inc (US)	NasoVAX	Other: targets respiratory tract without directly attacking the IFV	Other: Replication-deficient Ad5-vectored HA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None	Static (not progressing or terminated), looking for addional research collaborators	NCT03232567	Completed	Altimmune, Inc.	Industry	Phase 2	9/18/17	3/7/18	6/15/18	60 Adults (18 to 49 years)	Rockville, Maryland	Results reported in registry
Altimmune, Inc (US)	NasoVAX	Other: targets respiratory tract without directly attacking the IFV	Other: Replication-deficient Ad5-vectored HA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None	Static (not progressing or terminated), looking for addional research collaborators	See preclinical information		Altimmune, Inc.	Industry							
Altimmune, Inc (US)	NasoVAX	Other: targets respiratory tract without directly attacking the IFV	Other: Replication-deficient Ad5-vectored HA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None	Static (not progressing or terminated), looking for addional research collaborators			Altimmune, Inc.	Industry							
China Center for Disease Control & Prevention	RVJ-4M2eNP	Nucleoprotein (NP), Matrix protein (M1), Membrane protein, IAV (M2), RNA polymerase PB1	Viral vector	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		See preclinical information		China Center for Disease Control & Prevention	Government							
Etubics (US)	Ad5-InfA-HA/M2e and Ad5-InfB-HA	HA, Membrane protein, IBV (BM2), Membrane protein, IAV (M2), Nucleoprotein (NP)	Ad-vectored Vaccine	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal; Intradermal	None		See preclinical information		Etubics Corporation	Industry							
Ewha Womans University (South Korea)	rAd/B-NP	Nucleoprotein (NP)	rAd-vectored	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		See preclinical information		Ewha Womans University (South Korea)	Academic							
Food and Drug Administration (US)	A/NP+M2-rAd	Nucleoprotein (NP), Membrane protein, IAV (M2)	rAd-vectored	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		See preclinical information		FDA	Government							
Icahn School of Medicine at Mount Sinai (US)	cHA, NP and M1 delivered by cHAdOx1 and MVA viral-vectored vaccines	Nucleoprotein (NP), Matrix protein (M1), cHA	Viral vector; chimeric HA	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		See preclinical information		Ichan School of Medicine at Mount Sinai	Academic							
Jenner Institute/ Univ of Oxford (UK)	MVA/ChAdOx1-NP+M1 (2-dose heterologous regimen)	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		NCT01818362	Completed	University of Oxford	Academic	Phase 1	4/1/13	11/1/15	11/1/15	72 Adults (18 to 50 years)	Oxford, Guildford and Southampton, United Kingdom	Results reported in peer-reviewed journal

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[3] Wacheck 2010 (PMID: 20039806) [4] Grant Summary		
								[1] Zhang 2011 (PMID: 21818346)		
								[2] https://clinicaltrials.gov/ct2/show/NCT03760549		
		clinicaltrials.gov 04/11/19 https://clinicaltrials.gov/ct2/show/study/NCT03232567						[1] Zhang 2011 (PMID: 21818346)		
								[2] https://clinicaltrials.gov/ct2/show/NCT03232567		
			[1] Mice: Evaluate protective efficacy and immunogenicity	[1] Zhang 2011				[1] Zhang 2011 (PMID: 21818346)		
								[1] Zhang 2011 (PMID: 21818346)		
			[1] Mice: Characterize immunogenicity of fusion antigens expressed by the recombinant vaccinia viruses; evaluate protective efficacy	[1] Wang 2019				[1] Wang 2019 (PMID: 31240620)		
			[1] Mice and Ferrets: Evaluate efficacy against various influenza A and B viruses [2] Mice: determine immunologic effect of immunizations with increasing doses and determine efficacy [3] Ferrets: evaluate efficacy [4] Rhesus macaques: evaluate ability of vaccine to overcome pre-existing Ad5 immunity	[1] Grant summary [2,3] Jones 2011 [4] Gabitzsch 2012				[1] Grant Summary		
								[2] Jones 2011 (PMID: 21821082)		
								[3] Gabitzsch 2012 (PMID: 23041546)		
			[1] Mice: evaluate immunization route; evaluate efficacy; identify epitope in the NP to determine specific T-cell responses [2] Mice: examine efficacy, antibody responses, CTL responses, and morbidity/mortality after challenge were measured	[1] Kim 2019 [2] Lee 2019				[1] Kim 2019 (PMID: 30639307)		
								[2] Lee 2019 (PMID: 30775351)		
			[1] Mice: Evaluate immunization route and efficacy [2] Mice: Evaluate immunogenicity [3] Mice: Evaluate efficacy and immunization route [4] Mice: Evaluate efficacy with diverse prior histories [5] Mice: evaluate impact of prior influenza infection on vaccine performance; examine effect of RSV-A2 and RV1B on performance	[1] Price 2010 [2] Soboleski 2011 [3] Price 2018 [4] Rowell 2018 [5] Rowell 2019				[1] Price 2010 (PMID: 20976273)		
								[2] Soboleski 2011 (PMID: 21789196)		
								[3] Price 2018 (PMID: 30037481)		
								[4] Rowell 2018 (PMID: 29249542)		
								[5] Rowell 2019 (PMID: 30986224)		
			[1] Mice: Determine protective effect against 2 HA expressing viruses [2] Ferrets: evaluate efficacy and assess the impact of the cHA-NP+M1 bivalent viral vectors on inducing both cellular and humoral immunity	[1] Arunkumar 2019 [2] McMahon 2019				[1] Arunkumar 2019 (PMID: 31399277)		
								[2] McMahon 2019 (PMID: 31497029)		
	Peer-reviewed publication or journal 2/15/2018 Coughlan 2018 PMID: 29519670							[1] Antrobus 2014 (PMID: 24374965)		
								[2] Coughlan 2018 (PMID: 29519670)		
								[3] Coughlan 2018 erratum (PMID: 29735416)		
								[4] Lambe 2013 (PMID: 23485942)		
								[5] Altenburg 2014 (PMID: 25036462)		
								[6] Tully 2017 (PMID: 28724579)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Jenner Institute/ Univ of Oxford (UK)	MVA/ChAdOx1-NP+M1 (2-dose heterologous regimen)	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		NCT01623518	Completed	University of Oxford	Academic	Phase 1	6/1/12	3/1/13	3/1/13	15 Adults (18 to 50 years)	Oxford, United Kingdom	Results not yet reported
Jenner Institute/ Univ of Oxford (UK)	MVA/ChAdOx1-NP+M1 (2-dose heterologous regimen)	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		See preclinical information		University of Oxford	Academic							
Jenner Institute/ Univ of Oxford (UK)	MVA/ChAdOx1-NP+M1 (2-dose heterologous regimen)	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None				University of Oxford	Academic							
Purdue Univ (US)	Multi-epitope Ad-based vaccine	Neuraminidase (NA), Nucleoprotein (NP), Hemagglutinin (HA)	Ad-vectored	Humoral and cell-mediated immune responses	Intramuscular	None		See preclinical information		Purdue University	Academic							
Univ of Hong Kong	Wyeth/IL-15/5flu	HA, NA, M1, M2, NP	Live multivalent-influenza vaccine	T cell response (e.g., cytotoxic T-lymphocytes), B cell response (e.g., neutralizing antibodies)	Subcutaneous	IL-15		See preclinical information		University of Hong Kong	Academic							
Univ of Nebraska-Lincoln (US)	Multivalent consensus HA gene, Ad-vectored prime/boost vaccine	Centralized consensus HA genes	Ad-vectored	Cross-protective immune response, B and T cell responses	Intramuscular	None		See preclinical information		University of Nebraska-Lincoln	Academic							
Univ of Ottawa (Canada) National Institutes for Food and Drug Control (China)	rAd-SHA2	HA2 subunit	Viral vector	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	Targeting ligand/molecular adjuvant: CD40L		See preclinical information		University of Ottawa National Institutes for Food and Drug Control (China)	Industry, Government							
VA Pharma LLC (Russia) Russian Federation Ministry of Health	Plant-produced Flg-4M protein	Membrane protein ion channel ectodomain (M2e)	Recombinant subunit VLP (fusion), Viral vector	B cell response (e.g., neutralizing antibodies)	Intranasal	Other: Flagellin		See preclinical information		VA Pharma Limited Liability Company	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[7] https://clinicaltrials.gov/ct2/show/NCT01818362		
								[1] Antrobus 2014 (PMID: 24374965)		
								[2] Coughlan 2018 (PMID: 29519670)		
								[3] Coughlan 2018 erratum (PMID: 29735416)		
								[4] Lambe 2013 (PMID: 23485942)		
								[5] Altenburg 2014 (PMID: 25036462)		
								[6] Tully 2017 (PMID: 28724579)		
								[7] https://clinicaltrials.gov/ct2/show/NCT01623518		
			[1] Mice: Evaluate efficacy [2] Mice: Evaluate immunogenicity [3] Ferrets: Evaluate efficacy	[1] Tully 2017 [2] Lambe 2013 [3] Altenburg 2014				[1] Antrobus 2014 (PMID: 24374965)		
								[2] Coughlan 2018 (PMID: 29519670)		
								[3] Coughlan 2018 erratum (PMID: 29735416)		
								[4] Lambe 2013 (PMID: 23485942)		
								[5] Altenburg 2014 (PMID: 25036462)		
								[6] Tully 2017 (PMID: 28724579)		
								[1] Antrobus 2014 (PMID: 24374965) [2] Coughlan 2018 (PMID: 29519670) [3] Coughlan 2018 erratum (PMID: 29735416) [4] Lambe 2013 (PMID: 23485942) [5] Altenburg 2014 (PMID: 25036462) [6] Tully 2017 (PMID: 28724579)		
			[1] Mice: Evaluate immunogenicity and protective efficacy [2] Ferrets: Evaluate immunogenicity and protective efficacy	[1] Hasssan 2017 [2] Grant Summary				[1] Hassan 2017 (PMID: 29023601)		
								[2] Grant Summary		
			[1] Mice: Evaluate protective efficacy; evaluate immunogenicity; evaluate vaccine efficacy [2] Mice: Evaluate mechanisms of T cell protection and the universality of the vaccine	[1] Valkenburg 2014 [2] Valkenburg 2016				[1] Valkenburg 2014 (PMID: 24706798)		
								[2] Valkenburg 2018 (PMID: 29887326)		
			[1] Mice: Evaluate efficacy [2] Mice: Evaluate immunogenicity [3] Mice: Evaluate immunogenicity	[1] Lingel 2017 [2] Webby 2015 [3] Corder 2019				[1] Lingel 2017 (PMID: 29097763)		
								[2] Webby 2015 (PMID: 26469190)		
								[3] Corder 2019 (PMID: 31771231)		
			[1] Mice: Evaluate the effects of using CD40L as an adjuvant and targeting molecule on the induction of HA2-specific immune response [2] Mice: Investigate the potential of vaccines to provide cross-protection against influenza viruses from different HA suptypes	[1,2] Fan 2014				[1] Fan 2015 (PMID: 25052763)		
			[1] Mice: evaluate immunogenicity and efficacy of vaccine linked to flagellin in plants [2] Mice: evaluate strength of immune response and direction of response [3] Mice: evaluate immunogenicity and efficacy	[1] Mardanova 2015 [2] Mardanova 2016 [3] Blokhina 2020				[1] Mardanova 2015 (PMID: 26022390)		
								[2] Mardanova 2016 (PMID: 26710263)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Vaccitech (UK)	MVA-NP+M1	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		NCT03300362	Withdrawn	(a) Vaccitech Ltd. (b) University of Oxford	Industry, Academic	Phase 2	10/13/17	10/31/18	10/31/18	862 Older Adults (65 years and older)	United Kingdom: Bicester, Oxford, Pangbourne, Witney, Wokingham	Results not yet reported
Vaccitech (UK)	MVA-NP+M1	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		NCT03277456	Completed	(a) Vaccitech Ltd. (b) University of Oxford	Industry, Academic	Phase 1	9/18/17	11/2/17	11/2/17	6 Adults (18 to 50 years)	Oxford, United Kingdom	Results reported in peer-reviewed journal
Vaccitech (UK)	MVA-NP+M1 (co-administered with Viroflu®)	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		NCT02014168	Withdrawn	University of Oxford	Academic	Phase 1	1/1/14	4/1/14	4/1/14	3 Adults and Older Adults (18 years and older)	Oxford, United Kingdom	Results not yet reported

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
			of vaccine					[3] Mardanova 2018 (PMID: 29521217)		
								[4] Blokhina 2020 (PMID: 32013187)		
								[1] 2019 press release		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		
								[8] Mullarkey 2013 (PMID: 23589155)		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Swayze 2019 (PMID: 32089822)		
								[14] Puksuriwong 2019 (PMID: 31740938)		
								[15] https://clinicaltrials.gov/ct2/show/NCT03300362		
	Peer-reviewed publication or journal 3/22/2019 Folegatti 2019 PMID: 30909516							[1] 2019 press release		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		
								[8] Mullarkey 2013 (PMID: 23589155)		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Puksuriwong 2019 (PMID: 31740938)		
								[14] https://clinicaltrials.gov/ct2/show/NCT03277456		
								[1] 2019 press release		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Vaccitech (UK)	MVA-NP+M1 (co-administered with TIV)	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		NCT01465035	Completed	University of Oxford	Academic	Phase 1	10/1/11	11/1/12	11/1/12	24 Adults and Older Adults (50 years and older)	Oxford, United Kingdom	Results reported in peer-reviewed journal
Vaccitech (UK)	MVA-NP+M1	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		NCT00993083	Completed	(a) University of Oxford (b) Wellcome Trust	Academic, Other: specify (note developer if different from sponsor)	Phase 2	6/1/09	3/1/10	3/1/10	27 Adults (18 to 45 years)	United Kingdom: Southampton, Oxford	Results reported in peer-reviewed journal

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		
								[8] Mullarkey 2013 (PMID: 23589155)		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Puksuriwong 2019 (PMID: 31740938)		
								[14] https://clinicaltrials.gov/ct2/show/NCT02014168		
	Peer-reviewed publication or journal 8/6/2013 Antrobus 2014 PMID: 23831594							[1] 2019 press release		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		
								[8] Mullarkey 2013 (PMID: 23589155)		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Puksuriwong 2019 (PMID: 31740938)		
								[14] https://clinicaltrials.gov/ct2/show/NCT01465035		
	Peer-reviewed publication or journal 3/22/12 Lillie 2012 PMID: 22441650							[1] 2019 press release		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Vaccitech (UK)	MVA-NP+M1	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		NCT00942071	Completed	(a) University of Oxford (b) Wellcome Trust	Academic, Other: specify (note developer if different from sponsor)	Phase 1	8/1/08	11/1/12	11/1/12	58 Adults and Older Adults (18 years and older)	Oxford, United Kingdom	Results reported in peer-reviewed journal
Vaccitech (UK)	MVA-NP+M1 (co-administered with QIV)	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT03880474	Open, not recruiting	(a) Vaccitech Limited (b)Clinical Network Services (CNS) Pty Ltd	Industry, Industry	Phase 2	3/18/19	10/15/19	Estimated 10/1/2021	6000 Adults and Older Adults (18 years and older)	Australia (New South Wales, Queensland, South Australia, Victoria)	Results not yet reported

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		
	Peer-reviewed publication or journal 5/3/13 Powell 2013 PMID: 23658773							[8] Mullarkey 2013 (PMID: 23589155)		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Puksuriwong 2019 (PMID: 31740938)		
								[14] https://clinicaltrials.gov/ct2/show/NCT00993083		
	Peer-reviewed publication or journal 1/1/11 Berthoud 2011 PMID: 21148512							[1] 2019 press release		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		
	Peer-reviewed publication or journal 10/3/12 Antrobus 2012 PMID: 23118984							[8] Mullarkey 2013 (PMID: 23589155)		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Puksuriwong 2019 (PMID: 31740938)		
								[14] https://clinicaltrials.gov/ct2/show/NCT00942071		
								[1] 2019 press release		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Vaccitech (UK)	MVA-NP+M1	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT03883113	Completed	Vaccitech Limited	Industry	Phase 2	5/3/19	12/16/19	4/7/20	145 Adults (18 to 55 years)	Antwerp, Belgium	Results not yet reported
Vaccitech (UK)	MVA-NP+M1	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		See preclinical information		Vaccitech Limited	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[8] Mullarkey 2013 (PMID: 23589155)		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Development Update		
								[14] Puksuriwong 2019 (PMID: 31740938)		
								[15] https://clinicaltrials.gov/ct2/show/NCT03880474		
								[1] 2019 press release		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		
								[8] Mullarkey 2013 (PMID: 23589155)		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Development Update 2019		
								[14] Puksuriwong 2019 (PMID: 31740938)		
								[15] https://clinicaltrials.gov/ct2/show/NCT03883113		
			[1] Ponies: Evaluate immunogenicity [2] Mice, chickens and pigs: evaluate use of candidate as adjuvant [3] Mice: evaluate effect of pre-existing immunity to MVA	[1] Brethnach 2006 [2] Mullarkey 2012 [3] Altenburg 2018				[1] 2019 press release		
								[2] Folegatti 2019 (PMID: 30909516)		
								[3] De Vries 2018 (PMID: 29912453)		
								[4] Coughlan 2018 (PMID: 29519670)		
								[5] Altenburg 2018 (PMID: 29692427)		
								[6] Mullin 2016 (PMID: 26902548)		
								[7] Antrobus 2012 (PMID: 23831594)		
								[8] Mullarkey 2013 (PMID: 23589155)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Vaccitech (UK)	MVA-NP+M1	Nucleoprotein (NP), Matrix protein (M1)	Viral vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None				Vaccitech Limited	Industry							
Vaxart, Inc (US)	Oral Vaccine: VXA-A1.1	Hemagglutinin (HA): H1	Ad-based viral vector	B cell response (e.g., neutralizing antibodies)	Mucosal	dsRNA	Active, currently in development	NCT02918006	Completed	Vaxart Partner: BARDA	Industry	Phase 2, Challenge study	8/31/16	5/19/17	1/19/18	179 Adults (18 to 49 years)	Costal Mesa, California	Interim results reported
Vaxart, Inc (US)	Oral Vaccine: VXA-A1.1	Hemagglutinin (HA): H1	Ad-based viral vector	B cell response (e.g., neutralizing antibodies)	Mucosal	dsRNA	Active, currently in development	NCT03121339	Completed	Vaxart	Industry	Phase 1	3/31/17	5/5/17	4/3/18	8 Adult Males (18 to 49 years)	Lexington, Kentucky	Results not yet reported
Vaxart, Inc (US)	Oral Vaccine: VXA-A1.1	Hemagglutinin (HA): H1	Ad-based viral vector	B cell response (e.g., neutralizing antibodies)	Mucosal	dsRNA	Active, currently in development	See preclinical information		Vaxart	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[9] Powell 2013 (PMID: 23658773)		
								[10] Lillie 2012 (PMID: 22441650)		
								[11] Antrobus 2012 (PMID: 23118984)		
								[12] Berthoud 2011 (PMID: 21148512)		
								[13] Breathnach 2006 (PMID: 16194586)		
								[14] Puksuriwong 2019 (PMID: 31740938)		
								[15] Puksuriwong 2018		
								[1] 2019 press release [2] Folegatti 2019 (PMID: 30909516) [3] De Vries 2018 (PMID: 29912453) [4] Coughlan 2018 (PMID: 29519670) [5] Altenburg 2018 (PMID: 29692427) [6] Mullin 2016 (PMID: 26902548) [7] Antrobus 2012 (PMID: 23831594) [8] Mullarkey 2013 (PMID: 23589155) [9] Powell 2013 (PMID: 23658773) [10] Lillie 2012 (PMID: 22441650) [11] Antrobus 2012 (PMID: 23118984) [12] Berthoud 2011 (PMID: 21148512) [13] Breathnach 2006 (PMID: 16194586) [14] Puksuriwong 2019 (PMID: 31740938) [15] Puksuriwong 2019		
Poster https://idsa.confex.com/idsa/2018/webprogram/Paper72242.html	Peer-reviewed journal 1/21/2020 Liebowitz 2020 PMID: 31978354							[1] Scallan 2013 (PMID: 23155123) [2] Scallan 2016 (PMID: 27071663) [3] Liebowitz 2020 (PMID: 31978354) [4] https://clinicaltrials.gov/ct2/show/NCT02918006		
								[1] Scallan 2013 (PMID: 23155123) [2] Scallan 2016 (PMID: 27071663) [3] https://clinicaltrials.gov/ct2/show/NCT03121339		
			[1] Mice, Ferrets: Evaluate immunogenicity and delivery method [2] Evaluate efficacy of mono-, bi-, tri- and quadrivalent vaccine combinations	[1] Scallan 2013 [2] Scallan 2016				[1] Scallan 2013 (PMID: 23155123) [2] Scallan 2016 (PMID: 27071663)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	**Candidate Name (Specify)**	**Target Antigen(s)**	**Vaccine Platform**	**Proposed Immune Mechanism of Action**	**Delivery Method**	**Adjuvant (Type: Specify name)**	**R&D Status**	**Registry ID number(s)**	**Trial Status**	**Sponsor Name**	**Sponsor Type**	**Phase**	**Study Start Date**	**Primary Completion Date**	**Study Completion Date**	**Sample Size, Enrollment and Age**	**Location**	**Results Reporting Status**
Recombinant Antigens/Proteins																		
Vaxart, Inc (US)	Oral Vaccine: VXA-A1.1	Hemagglutinin (HA): H1	Ad-based viral vector	B cell response (e.g., neutralizing antibodies)	Mucosal	dsRNA	Active, currently in development			Vaxart	Industry							
Wistar Institute, Univ of Pennsylvania (US)	AdC68M2e(3)-NP vector E1-deleted adenovirus (Ad) vectors from chimpanzee serotypes expressing three M2e sequences fused to H1N1 NP	Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP)	Viral vector based on AdC vector	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None		See preclinical information		Wistar Institute	Industry							
Virus-Like Particle (VLP)																		
Beijing Institute of Microbiology and Epidemiology (China)	3M2e-NP-HBc	Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP)	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intraperitoneal	Oil-in-water: SP01		See preclinical information		Beijing Institute of Microbiology and Epidemiology (China)	Academic							
Chinese Academy of Sciences (China)	$M2e_{tet}$-HBc+NP_{int}	Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP)	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intraperitoneal	None		See preclinical information		Chinese Academy of Sciences (China)	Academic							
Cytos Biotechnology AG (Switzerland)	M2e-AP205	Membrane protein ion channel ectodomain (M2e)	Recombinant subunit VLP (fusion)	Innate immune response; M2e-specific response	Subcutaneous	None		See preclinical information		Cystos Biotechnology	Industry							
Georgia State Univ (US) Health Canada	N1 VLP	Neuraminidase (NA)	Recombinant subunit VLP (fusion)	Cross-reactive immune response	Intramuscular	None		See preclinical information		Georgia State University Health Canada	Academic, Government							
Georgia State Univ (US) Kyung Hee Univ (S Korea) Recently fromed small biotech ADVAC LLC	M2e5x VLP	M2e, Novel/Enhanced Antigen: 4/M2e-HA (PR8 backbone)+LAIV/IIV seasonal	Recombinant subunit VLP (fusion)	Humoral and cellular	Intramuscular; Intranasal; Microneedle patch	5-m2e-VLPs		See preclinical information		Georgia State University ADVAC LLC	Academic, Industry							
Georgia State Univ (US)	HA/M1 VLPs	H1, H8 and H13 from HA Group 1 H3, H4, and H10 from HA Group 2	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies)	Intranasal	None		See preclinical information		Georgia State University	Academic							
Indiana Univ Bloomington (US)	NP-P22 VLP nanoparticle Vaccine	Hemagglutinin (HA), conserved stalk domain, Nucleoprotein (NP)	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		See preclinical information		Indiana University Bloomington	Academic							
Institute of Experimental Medicine (Russia)	AP-M2e/tri-stalk VLP	HA stalk, M2e	VLP	Heterosubtypic immune response	Intraperitoneal	Aluminum salts: Alum		See preclinical information		Institute of Experimental Medicine (Russia)	Academic							
iQur Ltd (UK)	Tandiflu1 VLP	HA stalk, M2e	VLP	Cellular immune response	Intraperitoneal	Addavax Invivogen	Active, currently in development	See preclinical information		iQur LTD	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[1] Scallan 2013 (PMID: 23155123) [2] Scallan 2016 (PMID: 27071663)		
			[1] Mice: Evaluate antibody response; evaluate immunogenicity; elucidate the immune mechanisms that contribute to protenction in vaccinated mice; evaluate the role of antibodies in adoptive transfer studies [2] Mice: test whether VR1 or VR4 hexon modifications perturb binding of neutralizing antibodies to native hexon; measure M2e-specific antibody responses; evaluate vaccine efficacy	[1] Zhou 2010 [2] Zhou 2013				[1] Zhou 2010 (PMID: 20877342) [2] Zhou 2013 (PMID: 23229092) [3] Patent		
			[1] Mice: Evaluate immunogenicity and vaccine efficacy	[1] Gao 2013				[1] Gao 2013 (PMID: 23416215)		
			[1] Mice: Evaluate immunogenicity and vaccine efficacy	[1] Wei 2020				[1] Wei 2020 (PMID: 32713681)		
			[1] Mice: determine importance of the IgG2a/c isotope; determine importance of RNA for protective potency of M2e-AP205	[1] Schmitz 2012				[1] Schmitz 2012 (PMID: 22531913)		
			[1] Mice: evaluate immunogeniciy and efficacy of homologous and cross protection in comparison with inactivated split virus vaccine	[1] Kim 2019				[1] Kim 2019 (PMID: 31310875)		
			[1] Mice: evaluate humoral and cellular immunogenicity and cross-protective efficacy [2] Mice: evaluate efficacy when immunizing mice early to induce pre-existing immunity and then by subsequent following vaccination of these previously split vaccine-induced mice iwth the VLP vaccine [3] Mice: evaluate efficacy; compare efficacy of cross protection with wilt-type and recombinant viruses [4] Mice: Evaluate immunogenicity; evaluate cross protective immune correlates [5] Mice: evaluate possible mechanisms of immune response; evaluate differences between VLP and proteins in stimulating innate immune response [6] Mice: determine whether Flag VLP exhibit adjuvant effects on eliciting Th1 type immune responses and improving efficacy [7] Mice: evaluate efficacy of delivery via microneedle patch [8] Mice: evaluate efficacy of supplementing LAIV with M2e5x VLP [9] Mice: evaluate vaccine efficacy induced by combinatorial VLPS	[1] Kim 2013 [2] Kim 2014 [3] Kim 2017 [4] Lee 2018 [5] Kim 2018 [6] Kim 2018 [7] Kim 2019 [8] Lee 2019 [9] Kang 2019				[1] Kim 2013 (PMID: 23247101) [2] Kim 2014 (PMID: 25171841) [3] Kim 2017 (PMID: 29107058) [4] Lee 2018 (PMID: 29324805) [5] Kim 2018 (PMID: 30241300) [6] Kim 2018 (PMID: 30199754) [7] Kim 2019 (PMID: 31003421) [8] Lee 2019 (PMID: 30685658) [9] Kang 2019 (PMID: 31246961) [10] Grant Summary		
			[1] Mice: Evaluate optimal immunogen designs and iterative antigen exposure [2] Mice: Evaluate enhanced immune protection against drifted viruses [3] Guinea pigs: Determine enhanced protection	[1] Luo 2018 [2-3] Grant proposal				[1] Luo 2018 (PMID: 29545521) [2] Grant summary		
			[1] Mice: Evaluate immunogenicity and efficacy	[1] Patterson 2013				[1] Patterson 2013 (PMID: 23540530) [2] Grant summary		
			[1] Mice: Investigate immunogenicity and efficacy of a panel of broadly protective influenza vaccine prototypes	[1] Kirsteina 2020				[1] Kirsteina 2020 (PMID: 32344753)		
			[1] Mice: Evaluate immunogenicity [2] Mice: Evaluate efficacy	[1] Kazaks 2017 [2] Ramirez 2018				[1] iQur Ltd Website [2] FLUTCORE project site [3] Kazaks 2017 (PMID: 29126399) [4] Ramirez 2018 (PMID: 29306508)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT03739112	Completed	Medicago	Industry	Phase 3	9/18/18	5/17/19	6/14/19	12,793 Elderly Adults (65 years and older)	104 Locations: United States, Canada, Finland, Germany, Thailand	Results not yet reported
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT03301051	Completed	Medicago	Industry	Phase 3	8/21/17	5/2/18	6/12/18	10,137 Adults (18 to 64 years)	74 Locations: United States, Canada, Finland, Germany, Philippines, Thailand, United Kingdom	Results not yet reported
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT03321968	Completed	Medicago	Industry	Phase 3	9/29/17	12/1/17	12/1/17	1200 Adults (18 to 49 years)	10 Locations in Canada: Nova Scotia, Ontario and Quebec	Results not yet reported
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT02831751	Completed	Medicago	Industry	Phase 2	4/1/16	7/1/16	1/1/17	1001 Elderly Adults (64 years and older)	15 Locations: United States and Canada	Results not yet reported
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT02768805	Completed	Medicago	Industry	Phase 2	3/2/16	5/17/16	11/26/16	900 Adults (18 to 64 years)	9 Locations: United States and Canada	Results not yet reported
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT02236052	Completed	Medicago	Industry	Phase 2	7/16/14	6/17/15	6/17/15	450 Older Adults (50 years and older)	3 Locations: Quebec, Canada	Results reported in peer-reviewed journal
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT02233816	Completed	Medicago	Industry	Phase 2	8/1/14	6/22/15	6/22/15	300 Adults (18 to 49 years)	Florida, United States	Results reported in peer-reviewed journal
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT01991587	Completed	Medicago	Industry	Phase 1	10/8/13	6/30/14	6/30/14	120 Adults (18 to 49 years)	Florida, United States	Results reported in peer-reviewed journal
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Aluminum salts: Alhydrogel	Active, currently in development	See preclinical information		Medicago	Industry							
Medicago, Inc (Canada)	Quadrivalent VLP (QVLP)	Hemagglutinin (HA)	HA-bearing quadrivalent virus-like particle (QVLP)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development			Medicago	Industry							
Medigen, Inc (Canada)	Medigen multivalent VLP vaccine	HA	Novel multivalent VLPs	Neutralizing immune response	Intramuscular	None		See preclinical information		Industry	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987) [3] https://clinicaltrials.gov/ct2/show/NCT03739112		
								[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987) [3] https://clinicaltrials.gov/ct2/show/NCT03301051		
								[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987) [3] https://clinicaltrials.gov/ct2/show/NCT03321968		
								[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987) [3] https://clinicaltrials.gov/ct2/show/NCT02831751		
								[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987) [3] https://clinicaltrials.gov/ct2/show/NCT02768805		
	Peer-reviewed publication or journal 6/5/19 Pillet 2019 PMID: 31166987							[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987) [3] https://clinicaltrials.gov/ct2/show/NCT02236052		
	Peer-reviewed publication or journal 6/5/19 Pillet 2019 PMID: 31166987							[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987) [3] https://clinicaltrials.gov/ct2/show/NCT02233816		
	Peer-reviewed journal July 2016 Pillet 2016 PMID: 26987887							[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987) [3] https://clinicaltrials.gov/ct2/show/NCT01991587		
			[1] Mice: determine wheter H1 and H5-VLPs stimulated DCs in vivo	[1] Won 2018				[1] Won 2018 (PMID: 30448064) [2] Pillet 2019 (PMID: 31166987)		
								[1] Won 2018 (PMID: 30448064) [2] Pillet 2016 (PMID: 26987887)		
			[1] Ferrets: Evaluate the H1- and quadri subtype H5/H7/H9/H10 VLPs containing H10 protein for safety and immunogenicity; and evaluate protective efficacy of mono- and quadri- subtype VLPs	[1] Pushko 2016				[1] Pushko 2016 (PMID: 27663671) [2] Tretyakova 2016 (PMID: 26529299) [3] Pushko 2020 (PMID: 32397182)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Merck Research Laboratories (US)	Merck M2 based vaccines	Membrane protein ion channel ectodomain (M2e)	Recombinant subunit VLP (fusion)	M2 peptide-specific antibody response	Intraperitoneal	Aluminum salts: amorphous aluminum hydroxide sulfate		See preclinical information		Merck Research Laboratories	Industry							
National Tsing Hua Univ (Taiwan)	BAFF-VLPs	HA, NA, M1, M2	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies); T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Aluminum salts: Alum		See preclinical information		National Tsing Hua University (Taiwan)	Academic							
NIAID (US)	VLP cocktail	HA	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies)	Intranasal	None		See preclinical information		NIAID	Government							
Sanofi Pasteur (US)	ACAM FLU-A	Membrane protein ion channel ectodomain (M2e)	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies)	Intramuscular	Aluminum salts: Alhydrogel; Stimulon QS-21		NCT00819013	Completed	Sanofi	Industry	Phase 1	7/1/07	1/1/09	2/1/09	87 Adults (18 to 40 years)	Miami, Florida Lenexa, Kansas Tacoma, Washington	Results reported in both peer reviewed journal and registry
Sanofi Pasteur (US)	ACAM FLU-A	Membrane protein ion channel ectodomain (M2e)	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies)	Intramuscular	Aluminum salts: Alhydrogel; Stimulon QS-21		See preclinical information		Sanofi	Industry							
Sanofi Pasteur (US)	ACAM FLU-A	Membrane protein ion channel ectodomain (M2e)	Recombinant subunit VLP (fusion)	B cell response (e.g., neutralizing antibodies)	Intramuscular	Aluminum salts: Alhydrogel; Stimulon QS-21				Sanofi	Industry							
Sanofi Pasteur (US) Univ of Georgia (US)	COBRA-VLP	HA head domain, conserved epitopes	COBRA based VLP	B cell response (e.g., neutralizing antibodies)	Intramuscular	Aluminum salts: Imject		See preclinical information		Sanofi Pasteur University of Georgia	Industry, Academic							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[4] Grant Summary		
			[1] Mice and Rhesus Monkeys: Compare immunogenicity of M2 peptide conjugated to OMPC and M2 peptide expressed on the surface of HBVc antigen basedon dose-titration responses	[1] Fu 2009				[1] Fu 2009 (PMID: 19146898)		
			[1] Mice: evaluate immunogenicity with and without alum adjuvant; evaluate protective immunity	[1] Hong 2019				[1] Hong 2019 (PMID: 30738089)		
			[1] Mice: Assess protection afforded by immunization	[1] Schwartzman 2015				[1] Schwartzman 2015 (PMID: 26199334)		
								[2] Schultz-Cherry 2015 (PMID: 26443464)		
								[3] NIAID Press release		
	Peer-reviewed publication or journal 3/18/2013 Ibanez 2013 PMID: 23527091	clinicaltrials.gov 1/16/2012 https://clinicaltrials.gov/ct2/show/results/NCT00819013						[1] De Filette 2008 (PMID: 18835315)		
								[2] Ibanez 2013 (PMID: 23527091)		
								[3] https://clinicaltrials.gov/ct2/show/NCT00819013		
			[1] Mice: Evaluate immunogenicity [2] Mice: Evaluate immunogenicity and protective efficacy	[1] Mice: De Filette 2008 [2] Ibanez 2013				[1] De Filette 2008 (PMID: 18835315)		
								[2] Ibanez 2013 (PMID: 23527091)		
								[1] De Filette 2008 (PMID: 18835315) [2] Ibanez 2013 (PMID: 23527091)		
			[1] Mice and Ferrets: Evaluate protective efficacy and immunogenicity [2] Mice and Ferrets: Evaluate immunogenicities and efficacies of two strategies [3] Mice: evaluate protective efficacy of three different H5N1 COBRA vaccines; expand the bredth of antibody recognition; to stimulate the broadest bredth of HAI activity against each of the vaccines [4] Mice: determine protective efficacy and bredth of vaccine-elicited antibodies and efficacy of cocktail mixtures [5] Ferrets: evaluate efficacy with preexisting immune status, assess the ehancement of stem-specific antibody titers [6] Mice and Ferrets: Determine specific HAI antibody response; evaluate ability of elicited antibody response to block live virus infection [7] Mice: Evaluate immunogenicity with emulsion-based adjuvant [8] Chickens: evaluate immunogenicity [9] Mice: assess the ablity of a set of H1 COBRA HA vaccines to elicit protective antibodies with HAI activity against both human and swine H1 influenza viruses [10] Mice: Evaluate mechanism(s) of bredth conferred by a COBRA HA-based vaccine [11] Mice: Evaluate immunogenicity and determine which epitopes are responsible for eliciting broadly protective antibodies against heterologous clades of viruses [12] Mice: Evaluate the effect of glycosylation on the elicitation of broadly-reactive antibodies against H1N1 strains	[1] Giles 2011 [2] Giles 2012 [3] Crevar 2015 [4] Carter 2016 [5] Carter 2017 [6] Wong 2017 [7] Allen 2017 [8] Ross 2019 [9] Skarlupka 2019 [10] Sautto 2019 [11] Nunez 2019 [12] Huang 2019				[1] Giles 2011 (PMID: 21320540)		
								[2] Giles 2012 (PMID: 22190399)		
								[3] Crevar 2015 (PMID: 25671661)		
								[4] Carter 2016 (PMID: 26912624)		
								[5] Carter 2017 (PMID: 28978709)		
								[6] Wong 2017 (PMID: 28978710)		
								[7] Allen 2017 (PMID: 28789850)		
								[8] Bar-Peled 2019 (PMID: 31481254)		
								[9] Ross 2019 (PMID: 30905528)		
								[10] Skarlupka 2019 (PMID: 31448974)		
								[11] Sautto 2019 (PMID: 31811019)		
								[12] Nunez 2019 (PMID: 31733946)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Technovax, Inc. (US)	Technovax's VLP vaccine	HA, NA, M1, NP, M2, Novel/enhanced antigen: remodeled HA	Recombinant subunit VLP (fusion)	Broadly neutralizing antibody response	Unknown	Unknown		See preclinical information		TechnoVax NIAID NIH	Industry, Government, Government							
Univ Putra Malaysia (Malaysia)	NvC-M2ex3	Membrane protein ion channel ectodomain (M2e)	Recombinant subunit VLP (fusion)	M2e specific antibody response	Subcutaneous	None		See preclinical information		Univ Putra Malaysia (Malaysia)	Academic							
Nanoparticle-Based Vaccines																		
Chinese Academy of Sciences (China)	3M2e-rHF	Membrane protein ion channel ectodomain (M2e)	Self-assembling nanoparticle	B cell response (e.g., neutralizing antibodies), humoral, cellular and mucosal immune responses	Intranasal	None		See preclinical information		Chinese Academy of Sciences (China)	Academic							
Georgia State Univ (US)	Multivalent layered nanocluster vaccine	Novel/Enhanced Antigen: 4xM2e+ conformation stabilized HA stem	Nanoparticles	B cell response (e.g., neutralizing antibodies)	Intramuscular, Dissolvable microneedle patch	None		See preclinical information		Georgia State University	Academic							
Immvention Therapeutix, Inc (US) Univ North Carolina- Chapel Hill (US)	Ace-DEX polymeric microparticle vaccine	Membrane protein ion channel ectodomain (M2e), HA	Nanoparticles	B cell response (e.g., neutralizing antibodies)	Intramuscular	cGAMO		See preclinical information		Immvention Therapeutix	Industry							
KJ Biosciences LLC (US)	Bifluagen	Membrane protein ion channel ectodomain (M2e), HA2	Dual-domain nanoparticle fusion protein	Cross-reactive immune response	Intramuscular	Oil-in-water: Squalene oil-in-water emulsion containing MPL and trehalose dicorynomycolate		See preclinical information		KJ Biosciences LLC	Industry							
Laval University (Canada)	PapMV-sM2e	Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP)	Nanoparticles	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	PapMV-sM2e nanoparticles possess an adjuvant property		See preclinical information		Laval University (Canada)	Academic							
NIAID VRC (US)	Mosaic receptor-binding domain (RBD) nanoparticle	HA Receptor-binding domain (RBD)	Nanoparticles	B cell response (e.g., neutralizing antibodies)	Intramuscular	SAS adjuvant (Sigma)		See preclinical information		National Institute of Allergy and Infectious Disease (NIAID)	Government							
NIAID VRC (US)	H1ssF_3928	Hemagglutinin (HA), conserved stalk domain	Ferritin-based nanoparticles	B cell response (e.g., neutralizing antibodies)	Intramuscular	None	Active, currently in development	NCT03814720	Open, recruiting	National Institute of Allergy and Infectious Disease (NIAID)	Government	Phase 1	4/1/19	Estimated 6/30/21	Estimated 12/31/21	70 Adults and Older Adults (18 to 70 years)	Bethesda, Maryland	Results not yet reported

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[13] Huang 2019 (PMID: 31852790)		
			[1] Mice: Evaluate immunogenicity and efficacy of a single or combined candidate vaccine	[1] Grant summary				[1] Grant Summary 1		
								[2] Grant Summary 2		
								[3] Press Release 2013		
								[4] TechnoVax Pipeline		
			[1] Mice: Evaluate protective efficacy and immune responses induced without an adjuvant	[1] Ong 2019				[1] Ong 2019 (PMID: 31430965)		
			[1] Mice: Evaluate immunogenicity and protective efficacy	[1] Qi 2018				[1] Qi 2018 (PMID: 29430819)		
			[1] Mice: evaluate protective efficacy; investigate antibody-mediated effector mechanisms [2] Mice: explore protection mechanisms [3] Mice: Examine the potential of crosslinked protein nanoparticles to maintain immunogenicity after cold-chain-independent storage [4] Mice: evaluate immunogenicity [5] Mice: compare immunogenicity against protein nanoparticles, evaluate cross-protection against influenza challenges, explore immunological mechanisms of protection	[1] Deng 2018 [2] Deng 2018 [3] Chang 2018 [4] Wang 2014 [5] Wang 2019				[1] Deng 2018 (PMID: 29367723)		
								[2] Deng 2018 (PMID: 30065113)		
								[3] Chang 2018 (PMID: 30365905)		
								[4] Wang 2018 (PMID: 30394725)		
								[5] Chang 2018 (PMID: 30092060)		
								[6] Grant Summary		
								[7] Wang 2014 (PMID: 23988715)		
								[8] Wang 2019 (PMID: 31840437)		
			[1] Mice: Evaluate efficacy of adjuvant; evaluate immunogenicity and long-term vaccine efficacy [2] Mice: Identify optimal degradation rate of vaccine; evaluate the effect of controlled antigen or adjuvant delivery on immune activation kinetics; evaluate protective efficacy; and evaluate potential for cross-reactivity	[1] Junkins 2018 [2] Chen 2018				[1] Junkins 2018 (PMID: 29170142)		
								[2] Chen 2018 (PMID: 30261204)		
								[3] Grant Summary		
			[1] Mice: Evaluate immunogenicity and efficacy	[1] Ni 2017				[1] Ni 2017 (PMID: 29102171)		
								[2] Biofluagen UIV		
			[1] Mice: Evaluate immunogenicity and protective efficacy; evaluate adjuvant	[1] Bolduc 2018				[1] Bolduc 2018 (PMID: 30193813)		
			[1] Mice: Evaluate immunogenicity	[1] Kanekiyo 2019				[1] Kanekiyo 2019 (PMID: 30742080)		
								[2] Krammer 2019 comment (PMID: 30742079)		
								[1] Corbett 2019 (PMID: 30808695)		
								[2] Yassine 2015 (PMID: 26301691)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
NIAID VRC (US)	H1ssF_3928	Hemagglutinin (HA), conserved stalk domain	Ferritin-based nanoparticles	B cell response (e.g., neutralizing antibodies)	Intramuscular	None	Active, currently in development	NCT03186781	Completed	National Institute of Allergy and Infectious Disease (NIAID)	Government	Phase 1	10/25/17	9/3/19	4/23/20	50 participants Part 1: Adults at least 18 and bom after 1969; Part 2: Adults 18-70 (not bom in 1966-1969)	Bethesda, Maryland	Results not yet reported
NIAID VRC (US)	H1ssF_3928	Hemagglutinin (HA), conserved stalk domain	Ferritin-based nanoparticles	B cell response (e.g., neutralizing antibodies)	Intramuscular	None		See preclinical information		National Institute of Allergy and Infectious Disease (NIAID)	Government							
NIAID VRC (US)	H1ssF_3928	Hemagglutinin (HA), conserved stalk domain	Ferritin-based nanoparticles	B cell response (e.g., neutralizing antibodies)	Intramuscular	None				National Institute of Allergy and Infectious Disease (NIAID)	Government							
Novavax (US)	Nano-Flu	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved epitopes	Recombinant HA nanoparticle	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: Matrix-M1	Active, currently in development	NCT04120194	Open, not recruiting	Novavax	Industry	Phase 3	10/14/19	3/16/20	Estimated 11/1/20	Estimated 2650 Older Adults (65 years and older)	United States: Florida, Georgia, Idaho, Kansas, Maryland, Nebraska, New York, Ohio, Oklahoma, Rhode Island, South Carolina, South Dakota, Tennessee, Texas	

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[3] Kanekiyo 2013 (PMID: 23698367)		
								[4] Demminger 2020 (PMID: 32163240)		
								[5] Schneck 2019 (PMID: 31595432)		
								[6] NIH press release		
								[7] Kelly 2020 (PMID: 32434990)		
								[8] https://clinicaltrials.gov/ct2/show/NCT03814720		
								[1] Corbett 2019 (PMID: 30808695)		
								[2] Yassine 2015 (PMID: 26301691)		
								[3] Kanekiyo 2013 (PMID: 23698367)		
								[4] Demminger 2020 (PMID: 32163240)		
								[5] Schneck 2019 (PMID: 31595432)		
								[6] NIH press release		
								[7] Kelly 2020 (PMID: 32434990)		
								[8] https://clinicaltrials.gov/ct2/show/NCT03186781		
			[1] Mice and Ferrets: Evalate protective efficacy [2] Mice: Evaluate immunogenicity [3] Mice: Evaluate potency of AAV vector expressing influenza wild-type HA to confer broad protection	[1] Yassine 2015 [2] Corbett 2019 [3] Demminger 2020				[1] Corbett 2019 (PMID: 30808695)		
								[2] Yassine 2015 (PMID: 26301691)		
								[3] Kanekiyo 2013 (PMID: 23698367)		
								[4] Demminger 2020 (PMID: 32163240)		
								[5] Schneck 2019 (PMID: 31595432)		
								[6] NIH press release		
								[7] Kelly 2020 (PMID: 32434990)		
								[1] Corbett 2019 (PMID: 30808695) [2] Yassine 2015 (PMID: 26301691) [3] Kanekiyo 2013 (PMID: 23698367) [4] Demminger 2020 (PMID: 32163240) [5] Schneck 2019 (PMID: 31595432) [6] NIH press release [7] Kelly 2020 (PMID: 32434990)		
								[1] Smith 2017 (PMID: 28844407)		
								[2] Shinde 2018 (PMID: 29897849)		
								[3] Press Release 2019		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Novavax (US)	Nano-Flu	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved epitopes	Recombinant HA nanoparticle	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: Matrix-M		NCT03293498	Completed	Novavax	Industry	Phase 1	8/18/17	3/14/18	10/29/18	330 Adults and Older Adults (60 years and older)	North Carolina, United States	Results reported in peer-reviewed journal
Novavax (US)	Nano-Flu	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved epitopes	Recombinant HA nanoparticle	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: Matrix-M		NCT02078674	Completed	Novavax Department of Health and Human Services	Industry, Government	Phase 1	3/1/14	7/1/15	7/1/15	610 Adults (18 to 64 years)	United States: California, Florida, Idaho, New York, South Carolina	Results not yet reported
Novavax (US)	Nano-Flu	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved epitopes	Recombinant HA nanoparticle	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: Matrix-M		See preclinical information		Novavax	Industry							
Novavax (US)	Nano-Flu	Hemagglutinin (HA), conserved stalk domain, HA head domain, conserved epitopes	Recombinant HA nanoparticle	B cell response (e.g., neutralizing antibodies)	Intramuscular	Other: Matrix-M				Novavax	Industry							
Osivax SAS (France)	OVX836	Nucleoprotein (NP)	Self-assembling nanoparticle	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None	Active, currently in development	NCT04192500	Open, not recruiting	Osivax S.A.S	Industry	Phase 2	12/11/19	Estimated 9/1/20	Estimated 1/1/21	300 Adults (18 to 65 years)	Ghent, Belgium	
Osivax SAS (France)	OVX836	Nucleoprotein (NP)	Self-assembling nanoparticle	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular, Intranasal	None	Active, currently in development	NCT03594890	Completed	Osivax S.A.S	Industry	Phase 1	6/12/18	7/7/19	7/7/19	72 Adults (18 to 49 years)	Antwerp, Belgium	Results not yet reported
Osivax SAS (France)	OVX836	Nucleoprotein (NP)	Self-assembling nanoparticle	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular, Intranasal	None	Active, currently in development	See preclinical information		Osivax S.A.S	Industry							
Osivax SAS (France)	OVX836	Nucleoprotein (NP)	Self-assembling nanoparticle	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular, Intranasal	None	Active, currently in development			Osivax S.A.S	Industry							
Texas Tech Univ (US)	AuNP-based vaccine AuNP-M2e+sCpG	M2e, NA	Nanoparticles	Humoral and cellular; M2e-specific response	Intranasal	CpG		See preclinical information		Texas Tech University	Academic							
TRIA Bioscience Corp (US)	Peptide containing highly conserved Helix A epitope	Hemagglutinin (HA), conserved stalk domain	Nanoparticles	B cell response (e.g., neutralizing antibodies)	Intranasal	None		See preclinical information		TRIA Bioscience Corp	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[4] https://clinicaltrials.gov/ct2/show/NCT04120194		
	Peer-reviewed publication or journal 6/14/2018 Shinde 2018 PMID: 29897849							[1] Smith 2017 (PMID: 28844407)		
								[2] Shinde 2018 (PMID: 29897849)		
								[3] https://clinicaltrials.gov/ct2/show/NCT03293498		
								[1] Smith 2017 (PMID: 28844407)		
								[2] Shinde 2018 (PMID: 29897849)		
								[3] https://clinicaltrials.gov/ct2/show/NCT02078674		
			[1] Ferrets: Evaluate immunogenicity [2] Mice: further evaluate immunogenicity	[1] Smith 2017 [2] Portnoff 2020				[1] Smith 2017 (PMID: 28844407)		
								[2] Shinde 2018 (PMID: 29897849)		
								[3] Portnoff 2020 (PMID: 32098409)		
								[1] Smith 2017 (PMID: 28844407) [2] Shinde 2018 (PMID: 29897849)		
								[1] Del Campo 2019 (PMID: 30701093)		
								[2] Development Update		
								[3] Press Release 2019		
								[4] Press Release 2020		
								[5] https://clinicaltrials.gov/ct2/show/NCT04192500		
								[1] Del Campo 2019 (PMID: 30701093)		
								[2] Development Update		
								[3] Press Release 2019		
								[4] https://clinicaltrials.gov/ct2/show/NCT03594890		
			[1] Mice: Evaluate immunogenicity	[1] Del Campo 2019				[1] Del Campo 2019 (PMID: 30701093)		
								[2] Development Update		
								[1] Del Campo 2019 (PMID: 30701093) [2] Development Update		
			[1] Mice: Evaluate protective ability against influenza A; evaluate immunogenicity [2] Mice: evaluate the role of free M2e not immobilized on AuNPs towards induction of protective immunity; evaluate the longevity of vaccine-induced immunity [3] Mice: Evaluate broad protection of vaccine; characterize the mucosal immune response generated by the vaccine [4] Mice: Evaluate vaccine efficacy with age and determine if it might require re-administration during a lifetime	[1] Tao 2014 [2] Tao 2015 [3] Tao 2017 [4] Bimler 2019				[1] Tao 2014 (PMID: 23829488)		
								[2] Tao 2015 (PMID: 25842219)		
								[3] Tao 2017 (PMID: 28161578)		
								[4] Bimler 2019 (PMID: 31507643)		
								[5] Grant Summary		
			[1] Mice: Evaluate immunogenicity and efficacy	[1] Zeigler 2019				[1] Zeigler 2019 (PMID: 31341647)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Univ of Gothenburg (Sweden) Ghent Univ (Belgium)	HA:FPM2e:NPL	Membrane protein ion channel ectodomain (M2e)	Nanoparticles, Fusion protein	B cell response (e.g., neutralizing antibodies)	Intranasal	CTA1-DD		See preclinical information		Ghent University; University of Gothenburg	Academic, Academic							
Univ of Iowa Iowa State Univ (US)	IAV-nanovax	rHA (seasonal and novel immunogen based on equine recombinant HA3 (rHA3)), NP	Nanoparticles	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	CpG		See preclinical information		University of Iowa, Iowa State University	Academic, Academic							
Vanderbilt Univ (US)	pH-responsive NP vaccine	Nucleoprotein (NP)	Nanoparticles	Tissue-resident memory T cells response	Intranasal	CpG		See preclinical information		Vanderbilt Univ (US)	Academic							
Versatope Therapeutics, Inc (US)	Versatope M2e-rOMVs	M2e, Conserved domains from HA, NA and NP	Nanoparticles: Exosome-like particles (extracellular vesicles)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes), Th1-biased immune response	Intramuscular	CC rOMVs		See preclinical information		Versatope Therapeutics, Inc.	Industry							
Winstar Institute (US) Univ of Pennsylvania (US) Inovio (US)	DLnanovaccine	Hemagglutinin (HA)	Nanoparticles	Humoral and cellular	Intradermal	None		See preclinical information		Winstar Institute (US) Univ of Pennsylvania (US) Inovio (US)	Industry, Academic, Industry							
DNA/RNA-Based Vaccines																		
BioNTech (Germany) Pfizer (US)	sa-RNA	Hemagglutinin (HA)	mRNA (e.g., self-amplifying RNA)	B cell response (e.g., neutralizing antibodies)	Intramuscular	None		See preclinical information		BioNTech (Germany) Pfizer (US)	Industry, Industry							
Chinese Academy of Sciences	p-tPA-p3M2e and p-p3M2e	Membrane protein ion channel ectodomain (M2e)	DNA	B cell response (e.g., neutralizing antibodies)	Other: Electroporation	None		See preclinical information		Chinese Academy of Sciences	Academic							
CureVac (Germany)	mRNA vaccines based on RNActive platform	HA, NP	Synthetic mRNA (e.g., self-amplifying RNA)	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	Self-adjuvanted		See preclinical information		CureVac (Germany)	Industry							
GeneOne Life Sciences, Inc. (S Korea) Inovio Pharmaceuticals (US)	VGX-3400	Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP)	DNA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular, Other: Electroporation (EP)	None		NCT01184976	Completed	GeneOne Life Sciences, Inc. Inovio Pharmaceuticals	Industry	Phase 1	8/1/10	4/1/12	4/1/12	30 Adults (18 to 39 years)	Seoul, South Korea	Results not yet reported
GeneOne Life Sciences, Inc. (S Korea) Inovio Pharmaceuticals (US)	VGX-3400	Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP)	DNA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-	Other: Electroporation	None		NCT01142362	Completed	GeneOne Life Sciences, Inc. Inovio Pharmaceuticals	Industry	Phase 1	6/1/10	11/1/11	11/1/11	32 Adults (18 to 50 years)	Overland Park, Kansas Rockville, Maryland	Results not yet reported

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
			[1] Mice: map the M2e T-cell recognition epitope and elucidate its possible mechanisms for protection [2] Mice: Evaluate whether combined HA:FPM2e:NPL vaccine vactor, hosting the CTA1-3M2e-DD and recombinant HA, stimulated enhanced protective immunity against influenza virus infections [3] Mice: Assess immunogenicityand protective potential of a combination between LNPs and CTA1-3M2e-DD	[1] Eliasson 2018 [2] Bernasconi 2018 [3] Bernasconi 2020				[1] Eliasson 2018 (PMID: 28295019) [2] Bernasconi 2018 (PMID: 30271406) [3] Eliasson 2011 (PMID: 21481325) [4] Eliasson 2008 (PMID: 18243429) [5] Bernasconi 2020 (PMID: 32807838)		
			[1] Mice: Evaluate immune capabilities [2] Mice: Evaluate protective efficacy [3] Unknown: Determine optimal vaccine formulation for immunity and protection	[1] Zacharias 2018 [2] Ross 2019 [3] Grant Summary				[1] Zacharias 2018 (PMID: 30233573) [2] Ross 2019 (PMID: 30663733) [3] Grant summary		
			[1] Mice: evaluate immunogenicity and efficacy and demonstrate that clinically relevant antigen, NP, can be delivered via nanoparticle	[1] Knight 2019				[1] Knight 2019 (PMID: 31553872)		
			[1] Mice: Assess the role LPS play in eliciting humoral response against rOMV displayed proteins; evaluate safety of OMVs; assess humoral vaccine response; evaluate efficacy [2] Ferrets: Evaluate safety and efficacy [3] Mice: Evaluate efficacy and immunogenicity [4] Mice: evaluate whether rOMBs could be released in a controlled fashion; to determine whether controlled release of rOMVs could lead to immune protection; assess longevity of a single dose rOMV vs. traditional prime/bost regimine	[1-2] Watkins 2017 [3] Rappazzo 2016				[1] Watkins 2017 (PMID: 28215994) [2] Watkins 2017 (PMID: 28866291) [3] Rappazzo 2016 (PMID: 26827663) [4] Grant summary [5] Grant summary [6] Verstope Website		
			[1] Mice and Guinea Pigs: Evaluate delivery methods, immunogenicity and efficacy	[1] Xu 2020				[1] Xu 2020 (PMID: 32328416)		
			[1] Mice: determine whether combining antigens in an RNA vaccine affects efficacy; compare sa-RNA vaccines to DNA vaccines and mRNA vaccines [2] Mice: Evaluate Immunogenicity [3] Mice: Evaluate Immunogenicity	[1] Vogel 2018 [2] Beissert 2019 [3] Petsch 2012				[1] Vogel 2018 (PMID: 29275847) [2] Press release [3] Beissert 2019 (PMID: 31624015) [4] Petsch 2012 (PMID: 23159882)		
			[1] Mice: Evaluate immunogenicity and protective efficacy	[1] Yao 2019				[1] Yao 2019 (PMID: 30866759)		
			[1] Mice: Evaluate immunogenicity of RNActive vaccine; evaluate whether a more conserved antigen could mediate protection against homologous and heterologous viral challenge [2] Pigs: investigate whether RNActive vaccines are immunogenic to animals with a weight more similar to humans [3] Mice: compare mRNA vaccines to licensed vaccines based on inactivated virus; evaluate immunogenicity; evaluate vaccine efficacy	[1,2] Kallen 2013 [3] Lutz 2017				[1] Kallen 2013 (PMID: 23921513) [2] Lutz 2017 (PMID: 29263884)		
								[1] GeneOne Life Science [2] https://clinicaltrials.gov/ct2/show/NCT01184976		
								[1] GeneOne Life Science		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
				lymphocytes)														
GeneOne Life Sciences, Inc. (S Korea) Inovio Pharmaceuticals (US)	VGX-3400: Preclinical	Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP)	DNA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-	Other: Electroporation	None		See preclinical information		GeneOne Life Sciences, Inc. Inovio Pharmaceuticals	Industry							
GeneOne Life Sciences, Inc. (S Korea) Inovio Pharmaceuticals (US)	VGX-3400	Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP)	DNA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-	Other: Electroporation	None				GeneOne Life Sciences, Inc. Inovio Pharmaceuticals	Industry							
Ghent Univ (Belgium)	mRNA encoding NP	Nucleoprotein (NP)	mRNA (e.g., self-amplifying RNA)	T cell response (e.g., cytotoxic T-lymphocytes)	Other: Intranodal	None		See preclinical information		Ghent University	Academic							
GSK (US)	SAM(M1-NP)	Nucleoprotein (NP), Matrix protein (M1)	mRNA (e.g., self-amplifying RNA)	T cell response (e.g., cytotoxic T-lymphocytes)	Intramuscular	None; Oil-in-water cationic nanoemulsion (CNE)		See preclinical information		GSK (US)	Industry							
Inovio Pharmaceuticals (US)	INO-3401	HA, Neuraminidase (NA), Nucleoprotein (NP)	DNA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Other: Electroporation	None		NCT01403155 FLU-001	Completed	Inovio	Industry	Phase 1	5/1/11	8/1/12	8/1/12	22 Adults (18 to 50 years)	Rockville, Maryland	Results not yet reported
Inovio Pharmaceuticals (US)	INO-3401	HA, Neuraminidase (NA), Nucleoprotein (NP)	DNA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Other: Electroporation	None		See preclinical information		Inovio	Industry							
Inovio Pharmaceuticals (US)	INO-3401	HA, Neuraminidase (NA), Nucleoprotein (NP)	DNA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Other: Electroporation	None				Inovio	Industry							
Inovio Pharmaceuticals (US) Winstar Institute, Univ of Pennsylvania (US)	pH3HA	Contemporary H3N2 antigens	Synthetic DNA	B cell response (e.g., neutralizing antibodies)	Other: Intramuscular electroporation (EP)	None		See preclinical information										
Moderna, Inc. (US)	Modified mRNA lipid nanoparticles	HA	mRNA (e.g., self-amplifying RNA)	B cell response (e.g., neutralizing antibodies)	Intramuscular	None		NCT03076385 2015-003452-48	Completed	ModernaTX, Inc.	Industry	Phase 1	12/1/15	10/1/18	10/1/18	201 Adults (18 to 64 years)	Results reported in peer-reviewed journal	Results reported in peer-reviewed journal
Moderna, Inc. (US)	Modified mRNA lipid nanoparticles	HA	mRNA (e.g., self-amplifying RNA)	B cell response (e.g., neutralizing antibodies)	Intramuscular	None	Active, currently in development	NCT03345043	Open, not recruiting	ModernaTX, Inc.	Industry	Phase 1	5/25/16	Estimated 2/1/2020	Estimated 2/1/2020	156 Adults (18 to 49 years)	Miami, Florida	Results reported in peer-reviewed journal
Moderna, Inc. (US)	Modified mRNA lipid nanoparticles	HA	mRNA (e.g., self-amplifying RNA)	B cell response (e.g., neutralizing antibodies)	Intramuscular	None		See preclinical information		ModernaTX, Inc.	Industry							
Moderna, Inc. (US)	Modified mRNA lipid nanoparticles	HA	mRNA (e.g., self-amplifying RNA)	B cell response (e.g., neutralizing antibodies)	Intramuscular	None				ModernaTX, Inc.	Industry							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[2] https://clinicaltrials.gov/ct2/show/NCT01142362		
			Unknown	Unknown						
								[1] GeneOne Life Science		
			[1] Mice: Evaluate wheter intranodally delivered naked mRNA can elicit robust T-cell responses againsed NP of H3N2 strain compared to DNA vaccination	[1] Joe 2019				[1] Joe 2019 (PMID: 31345237)		
			[1] Mice: Evaluate immunogenicity and efficacy [2] Mice and ferrets: evaluate protective immune responses after vaccination with novel HA-based vaccine; evaluate efficacy [3] Mice: Investigate possibility to enhance the immune response induced by a single immunization with SAM by increasing recruitment of APCs at the site of injection	[1] Magini 2016 [2] Brazzoli 2016 [3] Manara 2019				[1] Magini 2016 (PMID: 27525409)		
								[2] Brazzoli 2016 (PMID: 26468547)		
								[3] Marana 2019 (PMID: 31227353)		
								[1] Yan 2018 (PMID: 29100705)		
								[2] Yan 2014 (PMID: 24631084)		
								[3] https://clinicaltrials.gov/ct2/show/study/NCT01403155		
			[1] Mice, guinea pics, non human primates and ferrets: Evaluate efficacy	[1] Ferrets: Yan 2018				[1] Yan 2018 (PMID: 29100705)		
								[2] Yan 2014 (PMID: 24631084)		
								[1] Yan 2018 (PMID: 29100705) [2] Yan 2014 (PMID: 24631084)		
			[1] Mice: Evaluate immunogenicity and protective efficacy	[1] Elliot 2018				[1] Elliott 2018 (PMID: 30062926)		
	Peer-reviewed publication or journal 5/10/2019 Feldman 2019 PMID: 310798949							[1] Feldman 2019 (PMID: 31079849)		
								[2] Bahl 2017 (PMID: 28457665)		
								[3] Liang 2017 (PMID: 28958578)		
								[4] Lindgren 2017 (PMID: 29181005)		
								[5] https://clinicaltrials.gov/ct2/show/NCT03076385		
	Peer-reviewed publication or journal 5/10/2019 Feldman 2019 PMID: 310798949							[1] Feldman 2019 (PMID: 31079849)		
								[2] Bahl 2017 (PMID: 28457665)		
								[3] Liang 2017 (PMID: 28958578)		
								[4] Lindgren 2017 (PMID: 29181005)		
								[5] https://clinicaltrials.gov/ct2/show/NCT03076385		
			[1] Mouse, Ferret, and Cynomolgus macaques: Evaluate immunogenicity [2] Cynomolgus macaques: Evaluate immunogenicity [3] Chinese rhesus macaques: Evaluate whether adjuvant could further enhance immune responses; evaluate immunogenicity with different delivery methods	[1] Bahl 2017 [2] Liang 2017 [3] Lindgren 2017				[1] Feldman 2019 (PMID: 31079849)		
								[2] Bahl 2017 (PMID: 28457665)		
								[3] Liang 2017 (PMID: 28958578)		
								[4] Lindgren 2017 (PMID: 29181005)		
								[1] Feldman 2019 (PMID: 31079849)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Profectus Biosciences (US) University of Washington	Novel DNA prime/subunit boost (LT-adjuvanted multi-antigen DNA vaccine)	Hemagglutinin (HA), conserved stalk domain, Membrane protein ion channel ectodomain (M2e), Nucleoprotein (NP), Matrix protein (M1)	DNA, Viral vector boost	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Gene gun (epidermal)	Other: LT adjuvant		See preclinical information		Profectus Biosciences (US) University of Washington	Industry, Academic							
Saint Louis Univ (US)	Multiple pan-DR- and HLA-A2 restricted, highly conserved influenza epitopes	Matrix protein (M1), Membrane protein, IAV (M2), Nucleoprotein (NP)	DNA	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		See preclinical information		Saint Louis Univ (US)	Academic							
Shanghai Institute of Biological Products East China Univ of Science and Technology Shanghai Centre for Clinical Laboratory	DNA encoding M1	Matrix protein (M1)	DNA	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal	None		See preclinical information		Shanghai Institute of Biological Products East China Univ of Science and Technology Shanghai Centre for Clinical Laboratory	Industry, Academic, Industry							
State Research Center of Virology and Biotechnology (Russia)	DNA encoding artificial HA stalk and M2 protein	Hemagglutinin (HA), conserved stalk domain, Membrane protein ion	DNA	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-	Intramuscular	None		See preclinical information		State Research Center of Virology and Biotechnology (Russia)	Academic							
Statens Serum Institute (Denmark) UNIFLUSECURE consortium	Polyvalent DNA vaccine	Internally expressed matrix and nucleoprotein and externally expressed hemagglutinin and neuraminidase	DNA, Viral vectored	B cell response (e.g., neutralizing antibodies), T cell response (e.g., cytotoxic T-lymphocytes)	Needle-free intradermal	None		See preclinical information		Statens Serum Institute UNIFLUSECURE consortium	Industry							
Univ of Oslo (Norway)	Multiple HA	HA	DNA	B cell response (e.g., neutralizing antibodies)	Other: Electroporation	None		See preclinical information		University of Oslo	Academic							
Univ of Pennsylvania (US)	HA mRNA-LPNs	Hemagglutinin (HA), conserved stalk domain	mRNA (e.g., self-amplifying RNA)	Adaptive immune response; Stalk-specific response	Intramuscular, Intranasal	None		See preclinical information		University of Pennsylvania	Academic							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[2] Bahl 2017 (PMID: 28457665) [3] Liang 2017 (PMID: 28958578) [4] Lindgren 2017 (PMID: 29181005)		
			[1] Cynomolgus macaques: Investigate immunogenicity and protective efficacy	[1] Koday 2017				[1] Koday 2017 (PMID: 29267331) [2] Press release 2016 [3] Grant summary		
			[1] Mice: Evaluate protective efficacy	[1] Eickhoff 2019				[1] Eickhoff 2019 (PMID:31331771)		
			[1] Mice: Evaluate protective efficacy	[1] Liu 2020				[1] Liu 2020 (PMID: 32139720)		
			[1] Mice: Evaluate immunogenicity and protectivity	[1] Bazhan 2020				[1] Bazhan 2020 (PMID: 32784907)		
			[1] Pigs: Investigate immunogenicity of an optimized version of polyvalent DNA vaccine, characterized by a next-generation expression vector without antibiotic resistance markers [2] Rabbits: evaluate immunogenicity when preciously used genes were mixed and administered; evaluate potential of this polyvalent influenza DNA in an optimized setting with codon-optimized influenza DNA in an optimized setting with codon-optimized influenza genes inserted into next generation vectors and delivered with the needle-free jet-injector	[1] Borggren 2016 [2] Borggren 2015				[1] Borggren 2016 (PMID: 27211039) [2] Borggren 2015 (PMID: 25746201)		
			[1] Mice: evaluate immunogenicity; assess potential enhancement of immune responses resulting from tageting of HA to MHCII molecules [2] Mice: Evaluate efficacy and immunogenicity [3] Mice: Evaluate inhanced immunogenicity approach with HA stem inserted into previous vaccine format	[1] Anderson 2018 [2] Braathen 2020 [3] Grodeland 2020				[1] Anderson 2018 (PMID: 29427414) [2] Braathen 2020 (PMID: 32128342) [3] Grodeland 2020 (PMID: 32269566)		
			[1] Mice: Evaluate immunogenicity; determine if HA stalk-specific antibodies could be elicited with a different influenza HA immunogen; evaluate protective efficacy; evaluate protective immune response against antigenically distant subtypes [2] Rabbits and Ferrets: evaluate potency of nucleoside-modified mRNA-LNP influenza virus vaccine [3] Mice: Evaluate efficacy of nasal delivery; evaluate the potential of AAV9.FI6 as a vaccine for pandemic influenza [4] Ferrets: evaluate efficacy of intranasal delivery [5] Rhesus macaques: assess feasibility of translating this intranasal delivery strategy into primates [6] Mice: Evaluate immunogenicity; demonstrate that influenza virus-specific matAbs inhibited de novo antibody responses in mouse pups elicited by influenza infections or conventional influenza vaccines [7] Mice: Evaluate immunogenicity of lipid nanoparticle-encapsulated, nucleoside-modifiend mRNA vaccines	[1,2] Pardi 2018 [3-5] Limberis 2015 [6] Willis 2020 [7] Freyn 2020				[1] Pardi 2018 (PMID: 30135514) [2] Limberis 2013 (PMID: 23720583) [3] Willis 2020 (PMID: 31915303)		

Vaccine Candidate								Clinical Trial Information										
Developer Name (Specify)	Candidate Name (Specify)	Target Antigen(s)	Vaccine Platform	Proposed Immune Mechanism of Action	Delivery Method	Adjuvant (Type: Specify name)	R&D Status	Registry ID number(s)	Trial Status	Sponsor Name	Sponsor Type	Phase	Study Start Date	Primary Completion Date	Study Completion Date	Sample Size, Enrollment and Age	Location	Results Reporting Status
Recombinant Antigens/Proteins																		
Multiple Platforms																		
Sanofi (US)	HA-ferritin nanoparticles	Divergent H1 sequences, COBRA HA antigens	Nanoparticles, Recombinant proteins (COBRA)	Strain-specific immunity	Intramuscular	SAS; AF03		See preclinical information		Sanofi Pasteur	Industry							
Shanghai Public Health Clinical Center and Institutes of Biomedical Sciences	Three vaccines expressing immunogen sequences PAPB1M1 and PB2NPM2	Highly conserved internal viral epitopes	DNA, Viral Vector	T cell response (e.g., cytotoxic T-lymphocytes)	Intranasal, Intramuscular	None		See preclinical information		Shanghai Public Health Clinical Center and Institutes of Biomedical Sciences	Academic							

Results Reporting Information			Preclinical Studies		Key Partners		Other	Data Sources		
Interim Publication Type, Date, and Link	Full Publication Type, Date, and Link	Clinical Trials Registry, Publication Date and Link	Study Intent	Publication Link	Name(s)	Contact Information	Notes	References		
								[4] Freyn 2020 (PMID: 32359470)		
			[1] Mice and Ferrets: Evaluate immunogenicity; Evaluate the HAI cross-reactivity elicited by combinations of select HA-Nps; evaluate efficacy	[1] Darricarrère 2018				[1] Darricarrère 2018 (PMID: 30185594)		
			[1] Mice: Evaluate immunogenicity, efficacy and combined administration of vaccines	[1] Xie 2019				[1] Xie 2019 (PMID: 31379782)		