


Human Coronaviruses

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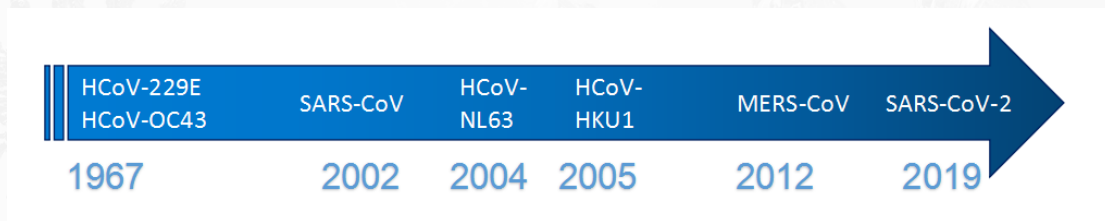
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Human coronaviruses (HCoVs) are enveloped, single-stranded, positive-sense RNA viruses that belong to the *Coronaviridae* family. HCoVs have been identified to be a frequent cause of respiratory tract infections, causing mild to severe respiratory diseases. The coronavirus subfamily is further classified into four genera: alpha, beta, gamma, and delta coronaviruses.

The seven identified HCoVs (HCoV-229E, HCoV-NL63, HCoV-HKU1, HCoV-OC43, MERS-CoV, SARS-CoV, and SARS-CoV-2) fall into two of the four genera: HCoV-229E and HCoV-NL63 belong to the *alpha coronaviruses*, and the other five belong to *beta coronaviruses*.



HCoV-229E and HCoV-OC43

HCoV-229E and HCoV-OC43 were first identified in 1967 as the cause of upper and mild respiratory tract infections. Younger children and the elderly are considered vulnerable to developing lower respiratory tract infections (LRTIs).

SARS-CoV

SARS-CoV emerged from Guangdong province of southeastern China in 2002. Within months, the outbreak had spread to 29 countries and regions causing over 8000 infected patients and almost 800 deaths in 2002-2003.

HCoV-NL63 and HCoV-HKU1

The outbreak of SARS renewed interest in this virus family and resulted in the identification of two additional HCoVs: HCoV-NL63 and HCoV-HKU1 were identified in 2004 and 2005.

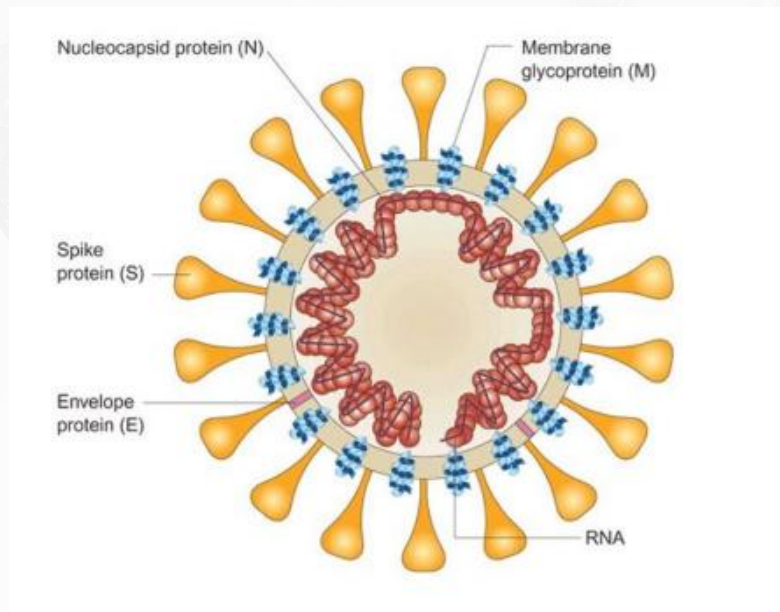
MERS-CoV

The Middle East respiratory syndrome-related coronavirus, known as the MERS-CoV, was first reported in Saudi Arabia in 2012. MERS-CoV was found in dromedaries from the Middle East, Africa and South Asia.

SARS-CoV-2

The outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, previously named 2019 novel coronavirus or 2019-nCoV) disease (COVID-19) from China at the end of 2019 has become a global pandemic and an unprecedented public health issue.

All coronaviruses share very similar structures. The genome encodes four or five structural proteins: the spike (S), membrane (M), envelope (E), nucleocapsid (N) and HE proteins. HCoV-229E and HCoV-NL63 possess four genes that encode the S, M, N, and E proteins, whereas HCoV-OC43 and HCoV-HKU1 also contain a fifth gene that encodes the HE protein. The pharmaceutical industry is interested in the two antigens of the S and N proteins. The S protein is a class-I viral fusion protein and an important target for antibody neutralization and vaccine development. It binds to the receptor on the target cell and mediates subsequent virus-cell fusion. Often conserved, the N protein can be used as a diagnostic marker.



- The spike (S) protein projects through the viral envelope and forms the characteristic spikes as the coronavirus "crown." It is heavily glycosylated, forms a homotrimer, and mediates receptor binding and fusion with the host cell membrane. The major antigens that stimulate neutralizing antibody, as well as important targets of cytotoxic lymphocytes, are on the S protein.
- The membrane (M) protein has a short N-terminal domain that projects on the external surface of the envelope and spans the envelope three times, leaving a long C terminus inside the envelope. The M protein plays an important role in viral assembly.
- The nucleocapsid protein (N) associates with the RNA genome to form the nucleocapsid. It may be involved in the regulation of viral RNA synthesis and interacts with M protein during virus budding.
- The hemagglutinin-esterase glycoprotein (HE) is found only in the beta coronaviruses OC43 and HKU1. The hemagglutinin moiety binds to neuraminic acid on the host cell surface, possibly permitting initial adsorption of the virus onto the membrane.
- The small envelope (E) protein leaves its C terminus inside the envelope and then either spans the envelope or bends around before projecting its N terminus internally.

HCoV Types	Genera	Disease	Host receptors
SARS-CoV-2	Betacoronavirus	COVID-19 (Coronavirus disease 2019)	ACE2 (angiotensin-converting enzyme 2)
SARS-CoV	Betacoronavirus	Severe acute respiratory syndrome(SARS)	ACE2 (angiotensin-converting enzyme 2)
MERS-CoV	Betacoronavirus	Middle East respiratory syndrome(MERS)	DPP4 (dipeptidyl peptidase 4)
HCoV-229E	Alphacoronavirus	Upper and lower respiratory tract disease	APN (aminopeptidase N, CD13)
HCoV-OC43	Betacoronavirus	Upper and lower respiratory tract disease	
HCoV-NL63	Alphacoronavirus	Upper and lower respiratory tract disease	ACE2 (angiotensin-converting enzyme 2)
HCoV-HKU1	Betacoronavirus	Upper and lower respiratory tract disease	

Cell entry of the coronavirus is a complex process, which requires a series of cellular factors. First, the virus binds to the attachment receptor. Homotrimers of S proteins make up the spike on the surface of virus particles. It is the sole viral membrane protein responsible for cell entry. Different viruses may utilize different surface receptors for binding. The HCOV- NL63, SARS-COV, and the new SARS-COV-2 all use the ACE2 receptor, while the MERS-COV virus selectively binds with the DPP4 receptor. The HCOV-229E virus targets APN receptor. The other two common coronaviruses, HKU1 and OC43, bind with O-acetylated sialic acids (O-ac Sia). The binding of O-ac Sia is required but the protein receptor remains unknown.

To support the fight against the current COVID-19, Creative Diagnostics provides recombinant coronavirus related antigens and antibodies, including spike protein antigens, nucleocapsid antigens and related antibodies. These antigens can be used for scientific research, detection of novel coronavirus, and preparation of neutralizing antibodies. Our antibodies are useful for researchers interested in viral research. These products are for research use only and are not intended for therapeutic or diagnostic applications. All of our products are produced using a standardized production process to ensure the highest quality and are performance-guaranteed for the applications listed on the detailed datasheet.

Product List of SARS-CoV-2 Reagents

Cat	Product Name	Application	Category
DAGC089	Recombinant SARS-CoV-2 Spike Protein Receptor Binding Domain [Fc]	ELISA, LFIA, WB	Antigen
DAGC091	Recombinant SARS-CoV-2 Spike Protein 1 [His]	SDS-PAGE	Antigen
DAGC092	Recombinant SARS-CoV-2 Spike Protein 1 [human Fc]	SDS-PAGE	Antigen
DAGC093	Recombinant SARS-CoV-2 Spike Protein 1 [mouse Fc]	SDS-PAGE	Antigen
DAGC094	Recombinant SARS-CoV-2 Nucleocapsid Protein [His]	ELISA, LFIA, WB	Antigen
DAGS029	Recombinant SARS-CoV-2 Nucleocapsid Protein (29-213 aa) [His]	ELISA, LFIA, WB	Antigen
DAGS059	Recombinant SARS-CoV-2 Nucleocapsid Protein (59-213 aa) [His]	ELISA, LFIA, WB	Antigen
CABT-RM320	Rabbit anti-SARS-CoV-2 NP monoclonal antibody, clone 120	ELISA, WB	Antibody
CABT-RM321	Rabbit anti-SARS-CoV-2 spike glycoprotein monoclonal antibody, clone 118	ELISA	Antibody
CABT-CS026	Mouse Anti-SARS-CoV-2 NP Monoclonal antibody, clone 7G21	ELISA, WB, IHC	Antibody
CABT-CS027	Mouse Anti-SARS-CoV-2 NP Monoclonal antibody, clone 4B21	ELISA, IHC	Antibody
CABT-CS024	Rabbit Anti-SARS-CoV-2 NP Polyclonal antibody	ELISA	Antibody
DTS920	2019-nCoV IgG/IgM Rapid Test		Rapid Test
CD019RT	2019-Novel Coronavirus Multiplex RT-qPCR Kit		RT-qPCR Kit
DEIA2021	COVID-19 Nucleoprotein ELISA Kit		ELISA Kit
DEIA2022	COVID-19 Spike glycoprotein ELISA Kit		ELISA Kit

Product List of SARS-CoV Reagents

Cat	Product Name	Applications	Category
DAG-P2619	SARS Active E Antigen	WB, ELISA	Antigen
DAG4727	SARS ACE (aa 1-76)	WB, ELISA	Antigen
DAG3591	SARS ACN (aa 1 - 49, 192 - 220)	WB, ELISA	Antigen
DAG2409	SARS Core Protein (aa 1 - 49)	WB, ELISA	Antigen
DAG2410	SARS Core Protein (aa 340 - 390)	WB, ELISA	Antigen
DAG2411	SARS Envelope protein (aa 1 - 76)	WB, ELISA	Antigen
DAG3593	SARS E Antigen (aa 340 - 390)	ELISA, WB	Antigen
DAG3594	SARS E1 glycoprotein (aa 182 - 216)	ELISA, WB	Antigen
DAG2412	SARS Matrix protein (aa 182 - 216)	WB, ELISA	Antigen
DAG1352	SARS Matrix	WB, ELISA	Antigen
DAG-P2620	SARS M protein (aa 182 - 216)	WB, ELISA	Antigen
DAG4742	SARS Membrane protein [GST]	WB, ELISA	Antigen
DAG517	SARS Nucleocapsid (aa 1 - 49) [GST]	WB, ELISA	Antigen
DAG522	SARS Nucleocapsid (aa 340 - 390) [GST]	WB, ELISA	Antigen
DAG1351	SARS Nucleocapsid (aa 1 - 422) [His]	WB	Antigen
DAGA-610	SARS spike mosaic protein S (N-terminal)	WB, ELISA	Antigen
DAG1861	SARS S1 [His]	SDS-PAGE	Antigen
DAG1862	SARS S2 [His]	SDS-PAGE	Antigen
DAG539	SARS Spike Protein (C - terminal) [GST]	ELISA, WB	Antigen
DAG547	SARS Spike Protein (N - terminal) [GST]	ELISA, WB	Antigen
DAG2408	SARS Spike protein (aa 1 - 1190) [His]	ELISA, WB	Antigen
DAG-H10342	SARS Spike Protein [His]	ELISA, WB	Antigen
DAG-H10344	SARS Spike Protein [Fc]	ELISA, WB	Antigen
DAG1345	SARS Spike Mosaic S	ELISA, WB	Antigen

DAG3596	SARS Spike glycoprotein C	ELISA, WB	Antigen
DAG4743	SARS Spike protein S1 [GST]	ELISA, WB	Antigen
DAG4744	SARS Spike protein S2 [GST]	ELISA, WB	Antigen
DAGA-609	Recombinant SARS Spike Protein (C-terminal section)	WB, ELISA	Antigen
DAG534	Recombinant SARS Spike protein (Middle) [GST]	ELISA, WB	Antigen
DAG3597	Recombinant SARS Spike Protein (a.a. 408-470, 540-573)	ELISA, WB	Antigen
DAGC096	Recombinant SARS Coronavirus Spike Glycoprotein 2 (C-Terminus)	ELISA, IgG/IgM detection, WB	Antigen
DAGA-606	Recombinant SARS Nucleoprotein (a.a. 1-49, 192-220)	WB, ELISA	Antigen
DAGA-607	Recombinant SARS Envelope protein	WB, ELISA	Antigen
DAG532	Recombinant SARS Envelope protein [GST]	ELISA, WB	Antigen
DAGA-608	Recombinant SARS M protein	WB, ELISA	Antigen
DAGC095	Recombinant Coronavirus Nucleocapsid 229E Protein [His]	ELISA, IgG/IgM detection	Antigen
DAGA-2009	Recombinant SARS-CoV (aa 1-49) [GST]	ELISA, WB	Antigen
DPAB1469	Rabbit Anti-SARS Spike Protein (C-Terminal) Polyclonal Antibody	ELISA	Antibody
DPAB1462	Rabbit Anti-SARS Spike Protein (N-terminal) Polyclonal Antibody	ELISA	Antibody
DMAB8869	Mouse Anti-SARS-CoV Nucleocapsid Monoclonal antibody, Clone W152K152	WB	Antibody
CABT-B8748	Mouse Anti-SARS-CoV Nucleoprotein monoclonal antibody, clone CEJ297	ELISA	Antibody
CABT-B8749	Mouse Anti-SARS-CoV Nucleoprotein monoclonal antibody, clone CEJ610	ELISA	Antibody
DPAB22549	Rabbit Anti-SARS-CoV Nucleocapsid Polyclonal antibody	IF, WB, ELISA	Antibody
CABT-RM318	Rabbit anti-SARS-CoV S1 polyclonal antibody	ELISA, IHC-P, FC, IF, IP	Antibody
CABT-RM319	Rabbit anti-SARS-CoV S1 polyclonal antibody	ELISA, IHC-P, FC, IF, IP	Antibody
CABT-RM311	Mouse anti-MERS & SARS-CoV NP monoclonal antibody, clone MN2167	ELISA, IFA	Antibody
CABT-RM312	Mouse anti-MERS & SARS-CoV NP monoclonal antibody, clone MN2168	ELISA, IFA	Antibody

Product List of MERS-CoV Reagents

Cat	Product Name	Applications	Category
DAG-H10295	MERS-CoV Nucleoprotein (aa 1-413) [His]	N/A	Antigen
DAG-H10296	MERS-CoV Spike protein S2 (aa 726-1296) [His]	N/A	Antigen
DAG-H10297	MERS-CoV Spike protein (aa 383-502) [Fc]	ELISA	Antigen
DAG-H10298	MERS-CoV Spike protein S1 (aa 1-725) [His]	ELISA	Antigen
DAG-H10300	MERS-CoV Spike protein (aa 1-1297) [His]	ELISA	Antigen
DAGB201	MERS-CoV Spike Protein (aa 367-606) [His]	ELISA	Antigen
DAGA-3103	Recombinant MERS-CoV Spike Protein (a.a.18-725, EMC 2C/2012) [His]	ELISA	Antigen
CABT-B1950	Anti-MERS-CoV Spike Protein polyclonal antibody	WB, IHC-P, IP	Antibody
CABT-B1951	Anti-MERS-CoV Spike Protein (aa 1-1297) polyclonal antibody	ELISA	Antibody
CABT-B1952	Anti-MERS-CoV Spike Protein S2 polyclonal antibody	WB, ELISA, IHC-P, IP	Antibody
CABT-B1953	Anti-MERS-CoV Spike Protein S1 (Center region) polyclonal antibody	WB, IF, IP	Antibody
CABT-B1954	Anti-MERS-CoV Spike Protein S1 (N-terminal) polyclonal antibody	WB, IHC, IF, IP	Antibody
CABT-B1955	Anti-MERS-CoV Spike Protein S1 (C-terminal) polyclonal antibody	WB, ELISA, IHC, IF, IP	Antibody
CABT-B1956	Anti-MERS-CoV Spike Protein S2 polyclonal antibody	WB, ELISA, IHC, IF, IP	Antibody
CABT-B1957	Anti-MERS-CoV Spike Protein (aa 1-1297) polyclonal antibody	WB, ELISA, IHC, IF, IP	Antibody
CABT-B1958	Anti-MERS-CoV Spike Protein (aa 726-1296) monoclonal antibody, clone 13	ELISA	Antibody
CABT-B1959	Anti-MERS-CoV Spike Protein (aa 1-1297) monoclonal antibody, clone 834	Neut	Antibody
CABT-B1960	Anti-MERS-CoV Spike Protein S1 (aa 1-725) polyclonal antibody	ELISA, WB	Antibody
CABT-B1961	Anti-MERS-CoV Nucleoprotein monoclonal antibody, clone 21	WB, ELISA, IHC, IF, IP	Antibody
CABT-B1963	Anti-MERS-CoV Nucleoprotein (N-terminal) polyclonal antibody	WB, ELISA, IHC, IF, IP	Antibody

CABT-B1964	Anti-MERS-CoV Nucleoprotein (Center region) polyclonal antibody	WB, ELISA, IHC, IF, IP	Antibody
CABT-B1965	Anti-MERS-CoV Nucleoprotein polyclonal antibody	WB, ELISA, IHC, IF, IP	Antibody
CABT-B1966	Anti-MERS-CoV Nucleoprotein (Center region) polyclonal antibody	WB	Antibody
CABT-RM313	Mouse anti-MERS-CoV S1 monoclonal antibody, clone MN2163	ELISA, IFA	Antibody
CABT-RM314	Mouse anti-MERS-CoV S1 monoclonal antibody, clone MN2164	ELISA, IFA	Antibody

Product List of HCoV Reagents

Cat	Product Name	Applications	Category
DAGC131	Recombinant HCoV-OC43 S Protein [His]	SDS-PAGE	Antigen
DAGC132	Recombinant HCoV-HKU1 S Protein [His]	SDS-PAGE	Antigen
DAGC133	Recombinant HCoV-NL63 S Protein [His]	SDS-PAGE	Antigen
DAGC134	Recombinant HCoV-229E S Protein [His]	SDS-PAGE	Antigen
CABT-CS025	Mouse Anti-HCoV OC43, 229E Nucleoprotein Monoclonal antibody, clone 6538E	IF	Antibody
CABT-B343	Anti-HCoV OC43 monoclonal antibody, clone 4616	ELISA	Antibody
CABT-B342	Anti-HCoV OC43 monoclonal antibody, clone 4615	ELISA	Antibody
CABT-RM315	Mouse anti-HCoV spike glycoprotein monoclonal antibody, clone 18	ELISA, IHC-P, FC, IF, IP	Antibody
CABT-RM316	Rabbit anti-HCoV spike glycoprotein monoclonal antibody, clone 139	ELISA, IHC-P, FC, IF, IP	Antibody
CABT-RM317	Rabbit anti-HCoV spike glycoprotein polyclonal antibody	ELISA, IHC-P, FC, IF, IP	Antibody



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