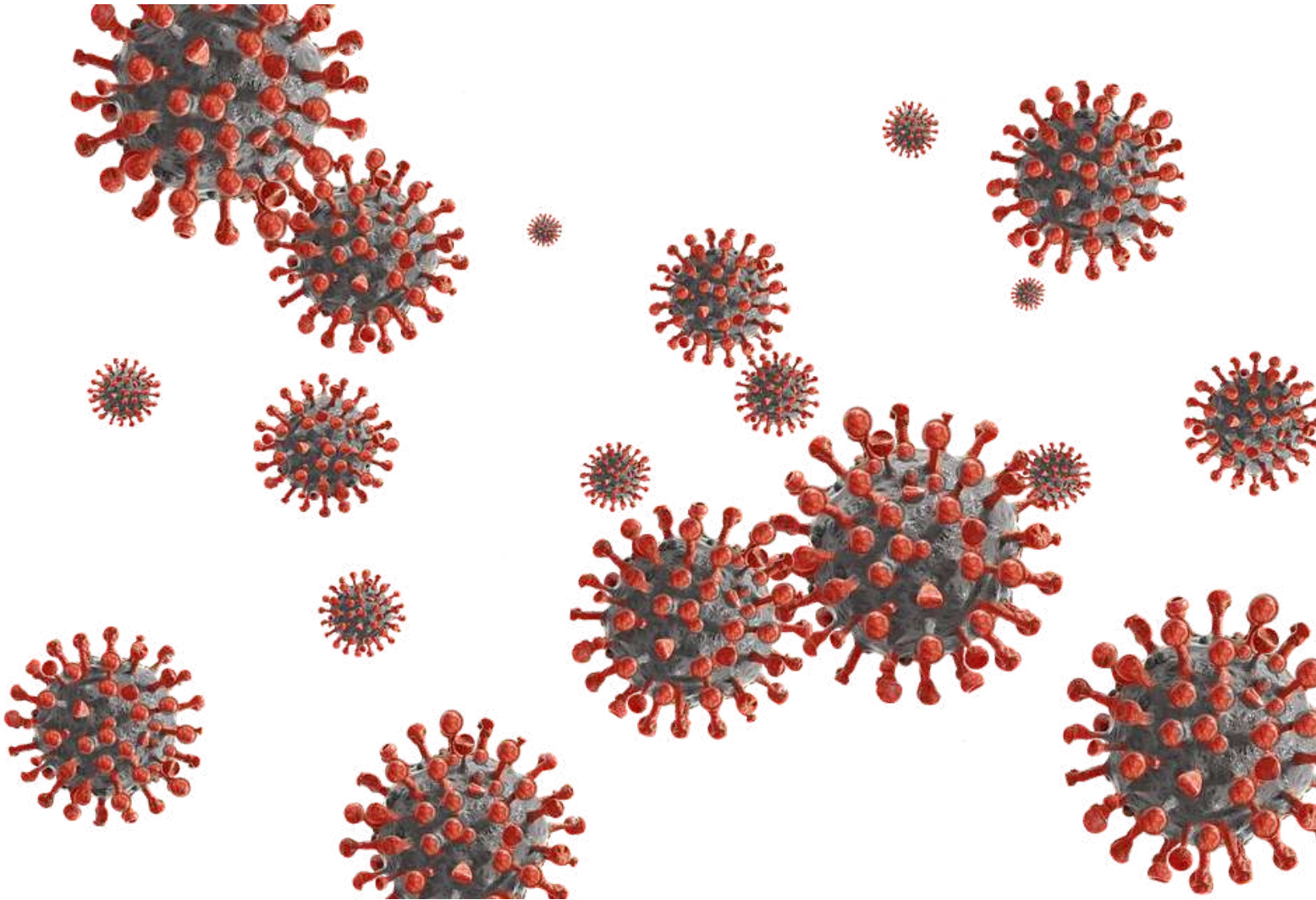


COVID-19 PUBLICATIONS



thsti

ट्रांसलेशनल स्वास्थ्य विज्ञान
एवं प्रौद्योगिकी संस्थान

TRANSLATIONAL HEALTH SCIENCE
AND TECHNOLOGY INSTITUTE

Our Mission

By integrating the fields of medicine, science, engineering and technology into translational knowledge and making the resulting biomedical innovations accessible to public health, to improve the health of the most disadvantaged people in India and throughout the world

Our Vision

As a networked organization linking many centers of excellence, THSTI is envisioned as a collective of scientists, engineers and physicians that will effectively enhance the quality of human life through integrating a culture of shared excellence in research, education and translational knowledge with the entrepreneurial spirit to take technologies into the public sphere. In fulfilment of its vision, THSTI will work with other constituents of the technology cluster at Faridabad through long term partnerships.



FROM THE EXECUTIVE DIRECTOR

In the beginning of 2020, when SARS-CoV-2 virus struck affecting countries globally, nobody had imagined that a pandemic of such a scale would affect the mankind so ferociously. The pandemic shocked the entire world. But this pandemic will always be remembered for the triumph of science over cynicism, optimism over skepticism and service over self. India, as a nation, invested heavily early on to fight the pandemic at all fronts with great success. I am extremely happy that THSTI contributed immensely in our collective fight against the COVID-19 pandemic. Notable achievements of THSTI during the pandemic include work towards vaccine development, antibody kits, community testing, training of manpower in advanced molecular techniques, genome sequencing, clinical outcomes of COVID-19 and vaccine effectiveness against SARS-CoV-2. The pandemic tested our capabilities to the limit but also provided an opportunity by stimulating us to innovate, indigenize, and rapidly scale up our efforts to contribute to national missions such as 'Atmanirbhar Bharat,' 'Make in India' and 'Skill India.' This compendium enlists THSTI's COVID-19 research contributions which were published in peer reviewed journals and recognized globally.

Dr. Pramod Garg

THE LANCET

Infectious Diseases

Effectiveness of ChAdOx1 nCoV-19 vaccine against SARS-CoV-2 infection during the delta (B.1.617.2) variant surge in India: a test-negative, case-control study and a mechanistic study of post-vaccination immune responses.

Thiruvengadam R, Awasthi A, Medigeshi G, Bhattacharya S, Mani S, Sivasubbu S, Shrivastava T, Samal S, Rathna Murugesan D, Koundinya Desiraju B, Kshetrapal P, Pandey R, Scaria V, Kumar Malik P, Taneja J, Binayke A, Vohra T, Zaheer A, Rathore D, Ahmad Khan N, Shaman H, Ahmed S, Kumar R, Deshpande S, Subramani C, Wadhwa N, Gupta N, Pandey AK, Bhattacharya J, Agrawal A, Vrati S, Bhatnagar S, Garg PK; Department of Biotechnology India Consortium for COVID-19 research.

Lancet Infect Dis. 2022 Apr;22(4):473-482. doi: 10.1016/S1473-3099(21)00680-0.

The study showed that the vaccine effectiveness of the Covishield, predominantly against the delta variant was 63.1% in fully vaccinated individuals, 46.2% in individuals vaccinated with a single dose of Covishield, 81.5% in completely vaccinated against moderate-to-severe disease and 79.2% in those vaccinated with a single dose against moderate-to-severe disease. The antigen-specific T-cell responses were conserved against the delta variant and wild-type SARS-CoV-2.

PLOS PATHOGENS

A combination of potently neutralizing monoclonal antibodies isolated from an Indian convalescent donor protects against the SARS-CoV-2 Delta variant.

Hingankar N, Deshpande S, Das P, Rizvi ZA, Wibmer CK, Mashilo P, Ansari MY, Burns A, Barman S, Zhao F, Mukherjee S, Torres JL, Chattopadhyay S, Mehdi F, Sutar J, Rathore DK, Pargai K, Singh J, Sonar S, Jakhar K, Dandotiya J, Bhattacharyya S, Mani S, Samal S, Singh S, Kshetrapal P, Thiruvengadam R, Batra G, Medigeshi G, Ward AB, Bhatnagar S, Awasthi A, Sok D, Bhattacharya J.

PLoS Pathog. 2022 Apr 28;18(4):e1010465. doi: 10.1371/journal.ppat.

Herein, the researchers report isolation of five neutralizing mAbs from an Indian convalescent donor, out of which two (THSC20.HVTR04 and THSC20.HVTR26) showed potent neutralization of SARS-CoV-2 VOCs.

Sub-optimal neutralisation of omicron (B.1.1.529) variant by antibodies induced by vaccine alone or SARS-CoV-2 Infection plus vaccine (hybrid immunity) post 6-months.

Medigeshi GR, Batra G, Murugesan DR, Thiruvengadam R, Chattopadhyay S, Das B, Gosain M, Ayushi, Singh J, Anbalagan A, Shaman H, Pargai K, Mehdi F, Das SJ, Kahlon N, Singh S, Kshetrapal P, Wadhwa N, Pandey AK, Bhatnagar S, Garg PK.

EBioMedicine. 2022 Apr;78:103938. doi: 10.1016/j.ebiom.2022.103938.

In this cross-sectional study, researchers tested the ability of vaccine and natural infection induced antibodies to neutralise omicron variant in a live virus neutralisation assay in four groups of individuals: (i) ChAdOx1 nCoV-19 vaccination, (ii) ChAdOx1 nCoV-19 vaccination plus prior SARS-CoV-2 infection, (iii) vaccination with inactivated virus vaccine (BBV152), and (iv) BBV152 vaccination plus prior SARS-CoV-2 infection.



Golden Syrian hamster as a model to study cardiovascular complications associated with SARS-CoV-2 infection.

Rizvi ZA, Dalal R, Sadhu S, Binayke A, Dandotiya J, Kumar Y, Shrivastava T, Gupta SK, Aggarwal S, Tripathy MR, Rathore DK, Yadav AK, Medigeshi GR, Pandey AK, Samal S, Asthana S, Awasthi A.

Elife. 2022 Jan 11;11:e73522. doi: 10.7554/eLife.73522.

In this study, researchers have used hamster models to show that the early phase of SARS-CoV-2 infection leads to an acute inflammatory response and lung pathologies, while the late phase of infection causes cardiovascular complications (CVCs). The results show hamsters as a suitable animal model to study post-COVID sequelae associated with CVC.

Pre-existing antibody levels negatively correlate with antibody titers after a single dose of BBV152 vaccination.

Das S, Singh J, Shaman H, Singh B, Anantharaj A, Sharanabasava P, Pandey R, Lodha R, Pandey AK, Medigeshi GR.

Nat Commun. 2022 Jun 15;13(1):3451. doi: 10.1038/s41467-022-31170-1.

In this study, researchers have assessed whether pre-existing antibodies are further boosted by a single dose of BBV152 (Covaxin) vaccine, and, if these antibodies can neutralize SARS-CoV-2 Delta and Omicron variants. The results show that natural infection leads to generation of neutralizing antibodies against SARS-CoV-2. A single dose of BBV152 boosted antibody titers against the Delta and the Omicron variants. Boosting of antibodies showed negative correlation with baseline neutralizing antibody titers.



International Journal of Biological Macromolecules

journal homepage: www.elsevier.com/locate/ijbiomac



Designing and characterization of a SARS-CoV-2 immunogen with receptor binding motif grafted on a protein scaffold: An epitope-focused vaccine approach.

Khatri R, Parray HA, Agrahari AK, Rizvi ZA, Kaul R, Raj S, Asthana S, Mani S, Samal S, Awasthi A, Ahmed S.

Int J Biol Macromol. 2022 Jun 1;209(Pt A):1359-1367. doi: 10.1016/j.ijbiomac.2022.04.148.

The scientists have explored the possibility of immune-focusing the receptor binding motif (RBM) of the spike protein of SARS-CoV-2 in this study. The results showed that the scaffolded RBM can bind to Angiotensin Converting Enzyme 2 (ACE2) and induced a strong antigenic T cell response.



Resolution of viral load in mild COVID-19 patients is associated with both innate and adaptive immune responses.

Anantharaj A, Gujjar S, Verma N, Khan NA, Shaman H, Sharanabasava P, Das A, Pandey R, Pandey AK, Medigeshi GR.

J Clin Virol. 2022 Jan;146:105060. doi: 10.1016/j.jcv.2021.105060.

In this study, serial samples from 23 hospitalized COVID-19 patients with mild symptoms were collected and the kinetics of SARS-CoV-2 viral load in respiratory samples and markers of inflammation in serum samples measured. The results suggest that most mild infections are associated with absence of inflammation coupled with an active innate immune response, T-cell activation and neutralizing antibodies.



The SARS CoV-2 spike directed non-neutralizing polyclonal antibodies cross-react with Human immunodeficiency virus (HIV-1) gp41.

Perween R, PraveenKumar M, Shrivastava T, Parray HA, Singh V, Singh S, Chiranjivi A, Jakhar K, Sonar S, Tiwari M, Reema, Panchal AK, Sharma C, Rathore DK, Ahamed S, Samal S, Mani S, Bhattacharyya S, Das S, Luthra K, Kumar R.

Int Immunopharmacol. 2021 Dec;101(Pt B):108187. doi: 10.1016/j.intimp.2021.108187.

In the present study, the researchers examined whether the SARS-CoV-2 directed antibodies confer any cross-reactive neutralization against HIV-1. The findings show that SARS-CoV-2 spike immunized mice antibodies cross-react with the HIV-1 Env protein and is targeted towards the gp41 region of the HIV-1 Env (gp160) protein.



Non-neutralizing SARS CoV-2 directed polyclonal antibodies demonstrate cross-reactivity with the HA glycans of influenza virus.

Murugavelu P, Perween R, Shrivastava T, Singh V, Ahmad Parray H, Singh S, Chiranjivi AK, Thiruvengadam R, Singh S, Yadav N, Jakhar K, Sonar S, Mani S, Bhattacharyya S, Sharma C, Vishwakarma P, Khatri R, Kumar Panchal A, Das S, Ahmed S, Samal S, Kshetrapal P, Bhatnagar S, Luthra K, Kumar R.

Int Immunopharmacol. 2021 Oct;99:108020. doi: 10.1016/j.intimp.2021.108020.

Potential cross-protection from influenza vaccine has been reported in COVID-19 infected individuals in several epidemiological studies recently; however, the scientific basis for these observations remains elusive. This study shows that the anti-SARS-CoV2 antibodies cross-reacts with the Hemagglutinin (HA) protein of influenza virus. Epitope mapping suggests that the cross-reactive antibodies are targeted towards glycan epitopes of the SARS-CoV-2 spike and HA.



Applied Microbiology and Biotechnology

Inhalation monoclonal antibody therapy: a new way to treat and manage respiratory infections.

Parray HA, Shukla S, Perween R, Khatri R, Shrivastava T, Singh V, Murugavelu P, Ahmed S, Samal S, Sharma C, Sinha S, Luthra K, Kumar R.

Appl Microbiol Biotechnol. 2021 Aug;105(16-17):6315-6332. doi: 10.1007/s00253-021-11488-4.

This review highlights the current state and future prospects of inhaled therapies, immunologic strategies for preventing mucosal transmission of respiratory pathogens, mucosal-mediated immunoprophylaxis in COVID-19 prevention, applications of monoclonal antibodies in passive immunization.

Molecular Dynamics Simulations Reveal the Interaction Fingerprint of Remdesivir Triphosphate Pivotal in Allosteric Regulation of SARS-CoV-2 RdRp.

Srivastava M, Mittal L, Kumari A, Asthana S.

Front Mol Biosci. 2021 Aug 20;8:639614. doi: 10.3389/fmolb.2021.639614.

Remdesivir (RDV) is established to inhibit RNA-dependent RNA polymerase (RdRp) in distinct viral families including Ebola and SARS-CoV-2. In this study, a comparative analysis of RDV, RMP (RDV monophosphate), and RTP (RDV triphosphate) was performed to understand the inhibition mechanism caused by RTP as it is a metabolically active form of RDV. The results showed the RTP binding pose and key residues that render the SARS-CoV-2 RdRp inactive, paving crucial insights towards the discovery of potent inhibitors.



RNA-protein interaction analysis of SARS-CoV-2 5' and 3' untranslated regions reveals a role of lysosome-associated membrane protein-2a during viral infection.

Verma R, Saha S, Kumar S, Mani S, Maiti TK, Surjit M.

mSystems. 2021 Aug 31;6(4):e0064321. doi: 10.1128/mSystems.00643-21.

SARS-CoV-2's genome is capped at the 5' end, followed by an untranslated region (UTR). In this study, researchers identified host interaction partners of SARS-CoV-2 5' and 3' UTRs and generated an RNA-protein interaction network. By combining these data with the previously known protein-protein interaction data proposed to be involved in virus replication, the RNA-protein-protein interaction (RPPI) network was generated. This study also provided an insight into the role of Lamp2a protein during SARS-CoV-2 infection.

Identification of potential molecules against COVID-19 main protease through structure-guided virtual screening approach.

Mittal L, Kumari A, Srivastava M, Singh M, Asthana S.

J Biomol Struct Dyn. 2021 Jul;39(10):3662-3680. doi: 10.1080/07391102.2020.1768151.

In this study, researchers utilized the crystal structural information of main protease (Mpro) in APO and complex with inhibitors, N3, and 13b molecules to explore the binding site architecture through Molecular dynamics (MD) simulations. The team identified six potential molecules, Leupeptin Hemisulphate, Pepstatin A, Nelfinavir, Birinapant, Lypressin and Octreotide with a reasonably significant MM-GBSA score.

Molecular Therapy Nucleic Acids

A novel G-quadruplex aptamer-based spike trimeric antigen test for the detection of SARS-CoV-2.

Gupta A, Anand A, Jain N, Goswami S, Anantharaj A, Patil S, Singh R, Kumar A, Shrivastava T, Bhatnagar S, Medigeshi GR, Sharma TK; DBT India Consortium for COVID-19 Research.

Mol Ther Nucleic Acids. 2021 Jun 24;26:321-332. doi: 10.1016/j.omtn.2021.06.014.

Herein, researchers report a 44-mer G-quadruplex-forming DNA aptamer against spike trimer antigen of SARS-CoV-2 using Systematic Evolution of Ligands by Exponential enrichment. The clinical evaluation of S14 aptamer on nasopharyngeal swab specimens displayed a highly discriminatory response between SARS-CoV-2 infected individuals from the non-infected one with a sensitivity and specificity of ~91% and 98%, respectively.



Comparative immunogenicity analysis of intradermal versus intramuscular administration of SARS-CoV-2 RBD epitope peptide-based immunogen in vivo.

Yadav N, Vishwakarma P, Khatri R, Siddqui G, Awasthi A, Ahmed S, Samal S.

Microbes Infect. 2021 May-Jun;23(4-5):104843. doi: 10.1016/j.micinf.2021.

Herein, humoral and cellular responses of a RBD-based peptide immunogen was assessed when administered intradermally (ID) in BALB/c mice and compared with the intramuscular (IM) immunization route. The results showed that ID vaccination is well tolerated and triggered a significant magnitude of humoral antibody responses as similar to IM vaccination. Also, the ID immunization resulted in higher production of IFN- γ and IL-2 as compared to the IM route.



Comparative immunomodulatory evaluation of the receptor binding domain of the SARS-CoV-2 spike protein; a potential vaccine candidate which imparts potent humoral and Th1 type immune response in a mouse model.

Shrivastava T, Singh B, Rizvi ZA, Verma R, Goswami S, Vishwakarma P, Jakhar K, Sonar S, Mani S, Bhattacharyya S, Awasthi A, Surjit M.

Front Immunol. 2021 May 24;12:641447. doi: 10.3389/fimmu.2021.641447.

In this study, scientists report designing and characterizing the SARS-CoV-2 spike protein fragment 330–526 as receptor binding domain 330–526 (RBD330–526) with two native glycosylation sites (N331 and N343) as a potential subunit vaccine candidate. This immunogen was found to be stable up to 72 h and upon immunization in mice, it generated a high titer humoral response, elevated IFN- γ producing CD4⁺ cells, cytotoxic T cells, and robust neutralizing antibodies against live SARS-CoV-2 virus.

Binding mode characterization of 13b in the monomeric and dimeric states of SARS-CoV-2 main protease using molecular dynamics simulations.

Kumari A, Mittal L, Srivastava M, Asthana S.

J Biomol Struct Dyn. 2021 May 24:1-19. doi: 10.1080/07391102.2021.1927844.

The main protease, Mpro/3CLpro, is an attractive target for discovering COVID-19 therapeutics. A comparative analysis of monomer and dimer forms of Mpro was carried out by the team to elucidate the binding site architectural differences in the presence and absence of '13b'. The results gave valuable insights into the inhibition mechanism and the selection of critical residues suitable for the identification of more potent Mpro inhibitors.



THE AMERICAN JOURNAL OF
TROPICAL MEDICINE AND HYGIENE
official Journal of the American Society of
Tropical Medicine and Hygiene

Longitudinal serology of SARS-CoV-2 infected individuals in India: A prospective cohort study.

Thiruvengadam R, Chattopadhyay S, Mehdi F, Desiraju BK, Chaudhuri S, Singh S, Bhartia V, Kshetrapal P, Mouli Natchu UC, Wadhwa N, Sopory S, Wahi M, Pandey AK, Taneja J, Anand N, Sharma N, Sharma P, Saxena S, Sindhu D, Sindhu B, Sharma D, Shrivastava T, Dang A, Batra G, Kang G, Bhatnagar S; DBT India Consortium for COVID 19 Research.

Am J Trop Med Hyg. 2021 May 18;105(1):66-72. doi: 10.4269/ajtmh.21-0164.

Data regarding longitudinal serology in large cohorts from low-income and middle-income countries are few. Herein, the researchers established a prospective cohort of 3,840 SARS-CoV-2-positive individuals according to RT-PCR in the Delhi-National Capital Region of India to document clinical and immunological characteristics during illness and convalescence. They found that the proportion of serological response increased with the severity of COVID-19. This is the first report of longitudinal humoral immune responses to SARS-CoV-2 over a period of 10 weeks in South Asia.

A rapid novel strategy for screening of antibody phage libraries for production, purification, and functional characterization of amber stop codons containing single-chain antibody fragments.

Perween R, Ahmed S, Shrivastava T, Parray HA, Singh B, Pindari KS, Sharma C, Shukla S, Sinha S, Panchal AK, Kumar R.

Biotechnol Prog. 2021 May;37(3):e3136. doi: 10.1002/btpr.3136.

In this study, researchers screened Tomlinson I and J library against receptor binding domain (RBD) of SARS-CoV-2 for isolating high specificity monoclonal antibodies. They used a novel strategy that allowed soluble expression of single-chain antibody fragment (scFvs) and identified a scFv, B8 that binds specifically with nanomolar affinity toward SARS-CoV-2 RBD.



Development of a fast SARS-CoV-2 IgG ELISA, based on receptor-binding domain, and its comparative evaluation using temporally segregated samples from RT-PCR positive individuals.

Mehdi F, Chattopadhyay S, Thiruvengadam R, Yadav S, Kumar M, Sinha SK, Goswami S, Kshetrapal P, Wadhwa N, Chandramouli Natchu U, Sopory S, Koundinya Desiraju B, Pandey AK, Das A, Verma N, Sharma N, Sharma P, Bhartia V, Gosain M, Lodha R, Lamminmäki U, Shrivastava T, Bhatnagar S, Batra G.

Front Microbiol. 2021 Jan 20;11:618097. doi: 10.3389/fmicb.2020.618097.

In this study, researchers describe a rapid and stable RBD-based IgG ELISA test obtained through extensive optimization of the assay components and conditions. The test showed a specificity of 99.79% and a higher sensitivity than parallelly tested commercial ELISAs for SARS-CoV-2-IgG, i.e., Euroimmun and Zydus.



Epidemiology of coronavirus infection in children and their impact on lung health: finding from a birth cohort study.

Kumar P, Mukherjee A, Randev S, Medigeshi GR, Jat KR, Kapil A, Lodha R, Kabra SK.

Pediatr Infect Dis J. 2020 Dec;39(12):e452-e454. doi: 10.1097/INF.0000000000002884.

In this study, researchers report 6.5% coronavirus acute respiratory infection in a birth cohort and the commonest strain was OC43, followed by NL63, HKU1, and 229E. Children with coronavirus acute respiratory infection during infancy had significantly decreased forced expiratory volume in 0.5 seconds, forced expiratory flow between 25% and 75% of forced vital capacity, and peak expiratory flow at 3 years of age.



Journal of Clinical Virology

journal homepage: www.elsevier.com/locate/jcv



Comparative evaluation of SARS-CoV-2 IgG assays in India.

Chaudhuri S, Thiruvengadam R, Chattopadhyay S, Mehdi F, Kshetrapal P, Shrivastava T, Desiraju BK, Batra G, Kang G, Bhatnagar S; DBT India Consortium for COVID-19 Research.

J Clin Virol. 2020 Oct;131:104609. doi: 10.1016/j.jcv.2020.104609.

The researchers compared the performance of three immunoassays, an in-house RBD assay, and two commercial assays, the Diasorin LIAISON SARS-CoV-2 S1/S1 IgG CLIA and the Zydus Kavach assay. The sensitivity of the assays was 84.7, 82.6 and 75.7, respectively, for RBD, LIAISON and Kavach. Kavach and the in-house RBD ELISA showed a specificity of 99.5 % and 100 %, respectively. The RBD and LIAISON were able to correctly identify more positive sera/plasma than Kavach.

Design of a highly thermotolerant, immunogenic SARS-CoV-2 spike fragment.

Malladi SK, Singh R, Pandey S, Gayathri S, Kanjo K, Ahmed S, Khan MS, Kalita P, Girish N, Upadhyaya A, Reddy P, Pramanick I, Bhasin M, Mani S, Bhattacharyya S, Joseph J, Thankamani K, Raj VS, Dutta S, Singh R, Nadig G, Varadarajan R.

J Biol Chem. 2021 Jan-Jun;296:100025. doi: 10.1074/jbc.RA120.016284.

In this study, researchers describe a monomeric, glycan-engineered RBD protein fragment with a high yield, extreme thermotolerance, and satisfactory immunogenicity.



Visual detection of SARS-CoV-2 RNA by conventional PCR-induced generation of DNAzyme sensor.

Anantharaj A, Das SJ, Sharanabasava P, Lodha R, Kabra SK, Sharma TK, Medigeshi GR.

Front Mol Biosci. 2020 Dec 23;7:586254. doi: 10.3389/fmolb.2020.586254.

Herein, the researchers report a simple visual detection assay for SARS-CoV-2 RNA using a conventional thermal cycler by the PCR-induced generation of DNAzyme sensor. The pilot scale validation of RT-PCR DNAzyme-based sensor has shown ~100% sensitivity and specificity in clinical specimens with the Ct-value of fluorescence probe-based real-time PCR.

Identification of an anti-SARS-CoV-2 receptor-binding domain-directed human monoclonal antibody from a naïve semisynthetic library.

Parray HA, Chiranjivi AK, Asthana S, Yadav N, Shrivastava T, Mani S, Sharma C, Vishwakarma P, Das S, Pindari K, Sinha S, Samal S, Ahmed S, Kumar R.

J Biol Chem. 2020 Sep 4;295(36):12814-12821. doi: 10.1074/jbc.AC120.014918.

Herein, the investigators use Human Phage Display technology to search for antibodies targeting the receptor-binding domain (RBD) of SARS-CoV-2. They screened a naïve human semisynthetic phage library against RBD, leading to the identification of a high-affinity single-chain fragment variable region (scFv). The scFv was further engineered into two other antibody formats (scFv-Fc and IgG1). All three antibody formats showed high binding specificity to SARS-CoV-2 RBD and the spike antigens in different assay systems.

Gargle lavage as a viable alternative to swab for detection of SARS-CoV-2.

Mittal A, Gupta A, Kumar S, Surjit M, Singh B, Soneja M, Soni KD, Khan AR, Singh K, Naik S, Kumar A, Aggarwal R, Nischal N, Sinha S, Trikha A, Wig N.

Indian J Med Res. 2020 Jul & Aug;152(1 & 2):77-81. doi: 10.4103/ijmr.IJMR_2987_20.

The objective of this study was to assess if gargle lavage is a viable alternative to swabs for sample collection for the detection of SARS-CoV-2. Majority (72%) of the patients reported moderate-to-severe discomfort with swab collection in comparison to 24 per cent reporting only mild discomfort with gargle collection.

Laboratory surveillance for SARS-CoV-2 in India: Performance of testing & descriptive epidemiology of detected COVID-19, January 22 - April 30, 2020.

Abraham P, Aggarwa N, Babu GR,...., Medigeshi GR,...

Indian J Med Res. 2020 May;151(5):424-437. doi: 10.4103/ijmr.IJMR_1896_20.

In this study, a total of 1,021,518 individuals were tested for SARS-CoV-2. The proportion of positive cases was highest among symptomatic and asymptomatic contacts, 2-3-fold higher than among those with severe acute respiratory infection, or those with an international travel history or healthcare workers. The attack rate (per million) by age was highest among those aged 50-69 yr (63.3) and was lowest among those under 10 yr (6.1). The attack rate was higher among males (41.6) than females (24.3). The secondary attack rate was 6.0 per cent.

The 2019 novel coronavirus disease (COVID-19) pandemic: A review of the current evidence.

Chatterjee P, Nagi N, Agarwal A, Das B, Banerjee S, Sarkar S, Gupta N, Gangakhedkar RR.

Indian J Med Res. 2020 Feb & Mar;151(2 & 3):147-159. doi: 10.4103/ijmr.IJMR_519_20.

In this review, authors summarized the emerging evidences which can help guide the public health response to COVID-19, particularly in India.



RBD decorated PLA nanoparticle admixture with aluminum hydroxide elicit robust and long lasting immune response against SARS-CoV-2.

Meena J, Singhvi P, Srichandan S, Dandotiya J, Verma J, Singh M, Ahuja R, Panwar N, Wani TQ, Khatri R, Siddiqui G, Gupta A, Samal S, Panda AK.

Eur J Pharm Biopharm. 2022 Jul;176:43-53. doi: 10.1016/j.ejpb.2022.05.008.

Nanoparticles-based multivalent antigen display has the capability of mimicking natural virus infection characteristics, making it useful for eliciting potent long-lasting immune response. Herein, the researchers have developed a nanoparticle vaccine with multivalent display of receptor binding domain (RBD) of SARS-CoV-2 expressed in *E. coli*. Results showed that these nanoparticles in combination with aluminum hydroxide generated robust and long-lasting antibody response and provided Th1 and Th2 balanced immune response.

nature
microbiology

Inactivated whole-virion vaccine BBV152/Covaxin elicits robust cellular immune memory to SARS-CoV-2 and variants of concern.

Vikurthi R, Ansari A, Pai AR, Jha SN, Sachan S, Pandit S, Nikam B, Kalia A, Jit BP, Parray HA, Singh S, Kshetrapal P, Wadhwa N, Shrivastava T, Coshic P, Kumar S, Sharma P, Sharma N, Taneja J, Pandey AK, Sharma A, Thiruvengadam R, Grifoni A, Weiskopf D, Sette A, Bhatnagar S, Gupta N.

Nat Microbiol. 2022 Jul;7(7):974-985. doi: 10.1038/s41564-022-01161-5.

In this study, researchers assessed the magnitude, quality and persistence of cellular and humoral memory responses up to 6 months' post vaccination with Covaxin. The findings showed that Covaxin induces robust immune memory to SARS-CoV-2 and variants of concern that persists for at least 6 months after vaccination.



Upregulation of cytokine signalling in platelets increases risk of thrombophilia in severe COVID-19 patients.

Kaur S, Singh A, Kaur J, Verma N, Pandey AK, Das S, Bhattacharyya S, Guchhait P.

Blood Cells Mol Dis. 2022 May;94:102653. doi: 10.1016/j.bcmd.2022.102653.

In this study, researchers have tried to decipher the pathophysiology of thrombophilia in COVID-19, severely ill patients from ICU, and compared with their asymptomatic counterparts. Hyperactivation of platelets in ICU patients was observed. In addition, upregulation of pathways like blood coagulation and hemostasis, and inflammation coexisted in patients. This study suggests that aggravation of thrombosis and hypercoagulation in severe COVID-19 patients.



SARS-CoV-2 infection of human-induced pluripotent stem cells-derived lung lineage cells evokes inflammatory and chemosensory responses by targeting mitochondrial pathways.

Surendran H, Kumar S, Narasimhaiah S, Ananthamurthy A, Varghese PS, D'Souza GA, Medigeshi G, Pal R.

J Cell Physiol. 2022 Apr 23:10.1002/jcp.30755. doi: 10.1002/jcp.30755.

In this study, researchers show that SARS-CoV-2 readily infected and replicated in human-induced pluripotent stem cell-derived proximal airway cells, distal alveolar cells, and lung progenitors.

High failure rate of ChAdOx1-nCoV19 immunization against asymptomatic infection in healthcare workers during a Delta variant surge.

Ujjainiya R, Tyagi A, Sardana V, Naushin S, Bhatheja N, Kumar K, Barman J, Prakash S, Kutum R, Bhaskar AK, Singh P, Chaudhary K, Loomba M, Khanna Y, Walecha C, Ahmed R, Yadav A, Bajaj A, Malik G, Qureshi S, Waghdhare S, Siddiqui S, Trehan KK, Mani M, Dang R, Das P, Dougall P, Mahajan M, Sonar S, Jakhar K, Kumar R, Tiwari M, Mani S, Bhattacharyya S, Budhiraja S, Agrawal A, Dash D, Jha S, Sengupta S.

Nat Commun. 2022 Apr 1;13(1):1726. doi: 10.1038/s41467-022-29404-3.

In this study, based on serial serological studies of an observational cohort of healthcare workers, researchers show that during a SARS-CoV-2 Delta-variant outbreak in Delhi, ChAdOx1-nCoV19 (Covishield) double vaccinated healthcare workers were infected within less than two months. Vaccine effectiveness estimate based on infection rates in an unvaccinated cohort were about 70% and most infections were asymptomatic. The results indicate that Covishield vaccination is unlikely to be completely able to block transmission and provide herd immunity.

eBioMedicine

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α -Ketoglutarate inhibits thrombosis and inflammation by prolyl hydroxylase-2 mediated inactivation of Phospho-Akt.

Shrimali NM, Agarwal S, Kaur S, Bhattacharya S, Bhattacharyya S, Prchal JT, Guchhait P.

EBioMedicine. 2021 Nov;73:103672. doi: 10.1016/j.ebiom.2021.103672.

Researchers investigated the impact of dietary α KG on inflammation and thrombosis in lungs of mice either treated with thrombosis-inducing agent carrageenan or infected with SARS-CoV-2. They observed that in SARS-CoV-2 infected hamsters, dietary α KG had a significant rescue effect on inflamed lungs with significantly reduced leukocyte accumulation, clot formation and viral load.

Randomized, double blind, placebo controlled, clinical trial to study Ashwagandha administration in participants vaccinated against COVID-19 on safety, immunogenicity, and protection with COVID-19 Vaccine-A study protocol.

Chopra A, Chavan-Gautam P, Tillu G, Saluja M, Borse S, Sarmukaddam S, Chaudhuri S, Rao B, Yadav B, Srikanth N, Patwardhan B.

Front Med (Lausanne). 2022 Feb 16;9:761655. doi: 10.3389/fmed.2022.761655.

In this study, the researchers propose to study the safety, immunogenicity and clinical protection offered by a 6-month regimen of Ashwagandha in participants who volunteer to be vaccinated against COVID-19 by Covishield.

BMC Medicine

Studying the post-COVID-19 condition: research challenges, strategies, and importance of Core Outcome Set development.

Munblit D, Nicholson TR, Needham DM, Seylanova N, Parr C, Chen J, Kokorina A, Sigfrid L, Buonsenso D, Bhatnagar S, Thiruvengadam R, Parker AM, Preller J, Avdeev S, Klok FA, Tong A, Diaz JV, Groote W, Schiess N, Akrami A, Simpson F, Olliaro P, Apfelbacher C, Rosa RG, Chevinsky JR, Saydah S, Schmitt J, Guekht A, Gorst SL, Genuneit J, Reyes LF, Asmanov A, O'Hara ME, Scott JT, Michelen M, Stavropoulou C, Warner JO, Herridge M, Williamson PR.

BMC Med. 2022 Feb 4;20(1):50. doi: 10.1186/s12916-021-02222-y.

In this article, authors suggest setting of Core Outcome Set for studying post-COVID-19 condition that should be developed in the shortest time frame possible, for improvement in data quality, harmonisation, and comparability between different geographical locations. A global initiative, involving all relevant partners, including, but not limited to, healthcare professionals, researchers, methodologists, patients, and caregivers is needed.



Humoral cross-reactivity towards SARS-CoV-2 in young children with acute respiratory infection with low-pathogenicity coronaviruses.

Dhochak N, Agrawal T, Shaman H, Khan NA, Kumar P, Kabra SK, Medigeshi GR, Lodha R.

J Clin Virol Plus. 2022 Feb;2(1):100061. doi: 10.1016/j.jcvp.2022.100061.

In this study, researchers collected convalescent sera from a cohort of children (n=42) with proven low-pathogenicity coronavirus infections and tested the sera for antibodies against respective seasonal coronaviruses (OC43, NL63, and 229E) and SARS-CoV-2. The results indicate that the antibodies generated in low-pathogenicity coronavirus infections offer no protection from SARS-CoV-2 infection in young children.



Effect of prophylactic use of intranasal oil formulations in the hamster model of COVID-19.

Rizvi ZA, Tripathy MR, Sharma N, Goswami S, Srikanth N, Sastry JLN, Mani S, Surjit M, Awasthi A, Dikshit M.

Front Pharmacol. 2021 Oct 14;12:746729. doi: 10.3389/fphar.2021.746729.

Herein, the researchers report the prophylactic application of two intranasal formulations provided by the National Medicinal Plant Board (NMPB), Anu oil and til tailya, in the hamster model of SARS-CoV-2 infection. Prophylactic intranasal instillation of these oil formulations exhibited reduced viral load in lungs and resulted in reduced body weight loss and lung-pneumonitis. The results indicate that the prophylactic intranasal application of Anu oil may be useful in limiting both viral load and severity in SARS-CoV2 infection.

Characterization of the NiRAN domain from RNA-dependent RNA polymerase provides insights into a potential therapeutic target against SARS-CoV-2.

Dwivedy A, Mariadasse R, Ahmad M, Chakraborty S, Kar D, Tiwari S, Bhattacharyya S, Sonar S, Mani S, Tailor P, Majumdar T, Jeyakanthan J, Biswal BK.

PLoS Comput Biol. 2021 Sep 13;17(9):e1009384. doi: 10.1371/journal.pcbi.1009384.

Using *in silico* tools, the researchers predict that the Nidovirus RdRp associated nucleotidyl transferase domain (NiRAN) domain of RNA dependent RNA polymerases (RdRp) assumes a kinase or phosphotransferase like fold and binds nucleoside triphosphates at its proposed active site. For the first time ever, using basic biochemical tools, this study shows the presence of a kinase like activity exhibited by the SARS-CoV-2 RdRp. A well-known kinase inhibitor- Sorafenib showed a significant inhibition and dampened viral load in SARS-CoV-2 infected cells.



A cold chain-independent specimen collection and transport medium improves diagnostic sensitivity and minimizes biosafety challenges of COVID-19 molecular diagnosis.

Saini V, Kalra P, Sharma M, Rai C, Saini V, Gautam K, Bhattacharya S, Mani S, Saini K, Kumar S.

Microbiol Spectr. 2021 Dec 22;9(3): e0110821. doi: 10.1128/Spectrum.01108-21.

The scientists report an innovative clinical specimen collection medium, named SupraSens microbial transport medium (SSTM) that allowed a cold chain-independent transport at a wide temperature range (15°C to 40°C) and directly inactivated SARS-CoV-2 (<15 min). SSTM had detection of COVID-19 patients 70% higher than that of VTM. The results show that SSTM maintains the sample integrity at broad temperature range without compromising the sensitivity thereby establishing the feasibility of molecular testing even in the infrastructural constraints of remote, hilly, or rural communities in India and elsewhere.

Global research priorities on COVID-19 for maternal, newborn, child and adolescent health.

COVID-19 Research Prioritization Group on MNCAH.

J Glob Health. 2021 Nov 20;11:04071. doi: 10.7189/jogh.11.04071.

In this study, researchers aimed to identify major research gaps in maternal, newborn, child and adolescent health (MNCAH) to help mitigate the direct and indirect effects of the COVID-19 pandemic. They identified top-ranked 10 research questions (RQs) in each maternal, newborn, and child and adolescent health and 5 in the cross-cutting/health systems area.



Seroprevalence and attainment of herd immunity against SARS CoV-2: A modelling study.

Paul A, Kadnur HB, Ray A, Chatterjee S, Wig N.

J Family Med Prim Care. 2021 Nov;10(11):4030-4035. doi: 10.4103/jfmpc.jfmpc_830_21.

The present study aims to predict the likelihood of and likely time required to attain herd immunity against COVID-19 in New Delhi due to natural infection. An ODE-based mathematical model was constructed by extending the classical SEIR model to predict the seroprevalence rate. This study suggests that natural infection alone, as gauged by serial sero-surveys, may not result in attainment of herd immunity in the state of Delhi.

Computational study of novel inhibitory molecule, 1-(4-((2S,3S)-3-amino-2-hydroxy-4-phenylbutyl)piperazin-1-yl)-3-phenylurea, with high potential to competitively block ATP binding to the RNA dependent RNA polymerase of SARS-CoV-2 virus.

Sharma PP, Kumar S, Srivastava S, Srivastava M, Jee B, Gorobets NY, Kumar D, Kumar M, Asthana S, Zhang P, Poonam, Zoltner M, Rath B.

J Biomol Struct Dyn. 2021 Jun 21:1-19. doi: 10.1080/07391102.2021.1940281.

For coronaviruses, RNA-dependent RNA polymerase (RdRp) is an attractive therapeutic target. In the present study, researchers performed a comprehensive in silico screening for 16,776 potential molecules from established drug libraries. Based on initial assessment, 4042 molecules were obtained suitable as drug candidates, out of which 1-(4-((2S,3S)-3-amino-2-hydroxy-4-phenylbutyl)piperazin-1-yl)-3-phenylurea displayed higher docking score and MM-GBSA binding free energy than the control drug, remdesivir triphosphate.

ACS | Infectious
Diseases

Immunogenicity and protective efficacy of a highly thermotolerant, trimeric SARS-CoV-2 receptor binding domain derivative.

Malladi SK, Patel UR, Rajmani RS, Singh R, Pandey S, Kumar S, Khaleeq S, van Vuren PJ, Riddell S, Goldie S, Gayathri S, Chakraborty D, Kalita P, Pramanick I, Agarwal N, Reddy P, Girish N, Upadhyaya A, Khan MS, Kanjo K, Bhat M, Mani S, Bhattacharyya S, Siddiqui S, Tyagi A, Jha S, Pandey R, Tripathi S, Dutta S, McAuley AJ, Singanallur NB, Vasan SS, Ringe RP, Varadarajan R.

ACS Infect Dis. 2021 Aug 13;7(8):2546-2564. doi: 10.1021/acsinfectdis.

In this study, a trimeric, highly thermotolerant glycan engineered RBD was designed by fusion to a heterologous, poorly immunogenic disulfide linked trimerization domain derived from cartilage matrix protein. The results showed excellent immunogenicity, thermotolerance, and high yield of these immunogens.

Perspectives about modulating host immune system in targeting SARS-CoV-2 in India.

Majumdar S, Verma R, Saha A, Bhattacharyya P, Maji P, Surjit M, Kundu M, Basu J, Saha S.

Front Genet. 2021 Feb 16;12:637362. doi: 10.3389/fgene.2021.637362.

In this review, authors discuss the differences in COVID-19 death/infection ratio between urban and rural India; and the probable role of the immune system, co-morbidities and associated nutritional status in dictating the death rate of COVID-19 patients in rural and urban India. They have also highlighted India's strengths including the resources of medicinal plants, good food habits and the role of information technology in combating COVID-19.

iScience

Th1 skewed immune response of whole virion inactivated SARS CoV 2 vaccine and its safety evaluation.

Ganneru B, Jogdand H, Daram VK, Das D, Molugu NR, Prasad SD, Kannappa SV, Ella KM, Ravikrishnan R, Awasthi A, Jose J, Rao P, Kumar D, Ella R, Abraham P, Yadav PD, Sapkal GN, Shete-Aich A, Desphande G, Mohandas S, Basu A, Gupta N, Vadrevu KM.

iScience. 2021 Apr 23;24(4):102298. doi: 10.1016/j.isci.2021.102298.

Herein, researchers report the development and evaluation of safety and immunogenicity of BBV152 (Covaxin) adjuvanted with aluminum hydroxide gel (Algel), or TLR7/8 agonist chemisorbed Algel. They used a well-characterized SARS-CoV-2 strain and an established Vero cell platform to produce large-scale GMP-grade highly purified inactivated antigen. The results show that Covaxin generated significantly high antigen-binding and neutralizing antibody titers (NAb) with excellent safety profiles.

JAC- Antimicrobial Resistance

The potential impact of the COVID-19 pandemic on global antimicrobial and biocide resistance: an AMR Insights global perspective.

Ansari S, Hays JP, Kemp A, Okechukwu R, Murugaiyan J, Ekwanzala MD, Ruiz Alvarez MJ, Paul-Satyaseela M, Iwu CD, Balleste-Delpierre C, Septimus E, Mugisha L, Fadare J, Chaudhuri S, Chibabhai V, Wadanamby JMRWW, Daoud Z, Xiao Y, Parkunan T, Khalaf Y, M'ikanatha NM, van Dongen MBM; Global AMR Insights Ambassador Network.

JAC Antimicrob Resist. 2021 Apr 8;3(2):dlab038. doi: 10.1093/jacamr/dlab038.

The COVID-19 pandemic presents a serious public health challenge in all countries. Critically ill COVID-19 patients may develop severe complications, which may predispose patients to infection with nosocomial bacterial and/or fungal pathogens, requiring the extensive use of antibiotics. Herein, the authors present a brief overview of the COVID-19 pandemic and associated issues that could influence the pandemic's effect on global AMR.



Wuhan to world: The COVID-19 pandemic.

Kumar A, Singh R, Kaur J, Pandey S, Sharma V, Thakur L, Sati S, Mani S, Asthana S, Sharma TK, Chaudhuri S, Bhattacharyya S, Kumar N.

Front Cell Infect Microbiol. 2021 Mar 30;11:596201. doi: 10.3389/fcimb.2021.596201.

COVID-19 caused by SARS-CoV-2 was first reported in December 2019 in the Wuhan city of China and soon after, the virus and the disease spread to the entire world. SARS-CoV-2 has been observed to be more infectious and caused higher morbidity and mortality worldwide. In the current review, the authors have summarized the available knowledge about the pathogen and the disease, COVID-19.

Severe acute respiratory syndrome coronavirus 2 spike protein based novel epitopes induce potent immune responses in vivo and inhibit viral replication in vitro.

Vishwakarma P, Yadav N, Rizvi ZA, Khan NA, Chiranjivi AK, Mani S, Bansal M, Dwivedi P, Shrivastava T, Kumar R, Awasthi A, Ahmed S, Samal S.

Front Immunol. 2021 Mar 26;12:613045. doi: 10.3389/fimmu.2021.613045.

The researchers report identification of three novel epitopes in the regions N-terminal domain (NTD), receptor-binding domain (RBD), and spike glycoprotein (S2) domains, respectively, by structural and immunoinformatic analysis. The results showed that RBD and S2 directed epitopes were able to efficiently inhibit the replication of SARS-CoV-2 wild-type virus in vitro.



Virus Research

journal homepage: www.elsevier.com/locate/virusres



Tmprss2 specific miRNAs as promising regulators for SARS-CoV-2 entry checkpoint.

Kaur T, Kapila S, Kapila R, Kumar S, Upadhyay D, Kaur M, Sharma C.

Virus Res. 2021 Mar;294:198275. doi: 10.1016/j.virusres.2020.198275.

Tmprss2 is a molecular target which guides cellular infections of SARS-CoV-2 and has been earmarked for interventions against the viral pathologies. In this study, potential Tmprss2 specific miRNAs were computationally screened and identified for early prevention of COVID-19.



Preclinical Animal Models for COVID-19 Research-Making a Wise Choice.

Vishwakarma P, Khatri R, Siddiqui G, Yadav N, Rizvi ZA, Awasthi A, Samal S.

ARC Journal of Immunology and Vaccines. 2020; 5(1): 24-37.

SARS-CoV2 has emerged as one of the global health threats. Availability and selection of an appropriate animal model to study SARS-CoV-2 which will mimic the disease symptoms as seen in humans is a challenge. In this review, the authors discuss the availability of animal models used for coronavirus SARS-CoV and discuss herein the unique advantages or challenges of each animal model for SARS-CoV-2 infection.

The Korean Journal of Public Health

Risk of COVID-19 among the LGBTQ population.

KhanZA, Falak S, Raghav A, Sharma C, Chatteraj A.

*The Korean Journal of Public Health. 2020; 57(1): 20-23,
<https://doi.org/10.17262/KJPH.2020.08.57.1.20>*

As coronavirus is a respiratory disease, the chances and severity of infection increases in the smoking population and the smoking tendency in LGBTQ people are higher than the cisgender adults. Herein, the authors review the COVID-19 risk among the LGBTQ population.

Book Chapters

Chapter “Insights into Molecular Evolution and Increased Transmissibility of SARS-CoV-2” in Book: Uncovering the Science of COVID-19, World Scientific Publishing Co.

R Verma, R Kaur, S K Lal, M Surjit.

DOI: <https://doi.org/10.1142/12779>

The chapter discusses the potential causes and factors that influence viral fitness and host selection leading to the emergence of easily transmissible and highly pathogenic SARS-CoV-2 variants.

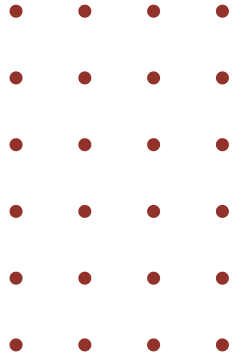
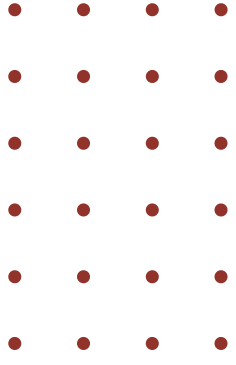
Chapter “Drug repurposing for COVID-19 therapy: Pipeline, current status and challenges” in Book: Drug Repurposing for Emerging Infectious Diseases and Cancer, Springer.

Accepted

R Verma, S Raj, U Berry, CT Ranjith-Kumar, Milan Surjit.

The chapter gives a brief summary of the advantages of the drug re-purposing pipeline followed by an update on the status of drug re-purposing in developing effective anti-viral therapeutics against COVID-19.





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