In order of Importance, list of 10 best papers of the applicant highlighting the important discoveries/contributions described in them briefly (Max. 1 MB)

S.No.	Details of publications	
1	Parashar D, Paingankar MS, Kumar S, Gokhale MD, Sudeep AB, Shinde SB, Arankalle VA. Administration of E2 and NS1 siRNAs inhibit chikungunya virus replication in vitro and protects mice infected with the virus. PLoS Negl Trop Dis. 2013;7(9):e2405. Published 2013 Sep 5. doi:10.1371/journal.pntd.0002405	The efficacy of the siRNAs against ns1 and E2 genes of Chikungunya virus (CHIKV) both *in vitro* and *in vivo* have been evaluated. Four siRNAs each, targeting the E2 and ns1 genes were designed and evaluated for efficiency in inhibiting CHIKV growth *in vitro* and *in vivo*. Two siRNAs were effective in controlling CHIKV replication *in vitro*. CHIKV replication was completely inhibited in the virus-infected mice when administered 72 hours post infection. The combination of two siRNAs exhibited additive effect leading to early and complete inhibition of virus replication. These findings suggest that RNAi capable of inhibiting CHIKV growth might constitute a new therapeutic strategy for controlling CHIKV infection and transmission. ***<u>Patent granted</u>***: "RNAi agent for inhibition of Chikungunya virus" -United States Patent (No. US 9574195, Grant date: 21st Feb 2017). -Chinese Patent (No. ZL201480037556.6, Grant date: 22nd Oct 2019). -European Patent (No. EP 3017046, Grant date: 11th Sep 2019). -Australian patent (No. 2014285701, Grant date: 15th July 2021). -Indian patent (No. 371495, Grant date: 08th July 2021).
2	Jeengar MK, Kurakula M, Patil P, More A, Sistla R, **Parashar D***. Effect of Cationic Lipid Nanoparticle Loaded siRNA with Stearylamine against Chikungunya Virus. Molecules.	In this study, nanodelivery systems (hybrid polymeric/solid lipid nanoparticles) using cationic lipids (stearylamine, C9 lipid, and dioctadecylamine) and polymers (branched PEI-g-PEG -PEG) were prepared, characterized, and complexed with siRNA.

	2022;27(4):1170. Published 2022 Feb 9. doi:10.3390/molecules27041170.	The four developed delivery systems (F1, F2, F3, and F4) were assessed for stability and potential toxicities against CHIKV. In comparison to the other nanodelivery systems, F4 containing stearylamine (Octadecylamine; ODA), with an induced optimum cationic charge of 45.7 mV in the range of 152.1 nm, allowed maximum siRNA complexation, better stability, and higher transfection, with strong inhibition against the E2 and NS1 genes of CHIKV. The study concludes that cationic lipid-like ODA with ease of synthesis and characterization showed maximum complexation by structural condensation of siRNA owing to high transfection alone. Synergistic inhibition of CHIKV along with siRNA was demonstrated in both *in vitro* and *in vivo* models. Therefore, ODA-based cationic lipid nanoparticles can be explored as safe, potent, and efficient nonviral vectors overcoming siRNA in vivo complexities against chikungunya.
3	Tagore R, Alagarasu K, Patil P, Pyreddy S, Polash SA, Kakade M, Shukla R, **Parashar D***. Targeted *in vitro* gene silencing of E2 and nsP1 genes of chikungunya virus by biocompatible zeolitic imidazolate framework. Front Bioeng Biotechnol. 2022;10:1003448. Published 2022 Dec 14. doi:10.3389/fbioe.2022.1003448	Small interfering RNA (siRNA) mediated gene silencing of CHIKV structural and non-structural genes serves as a potential antiviral strategy. The therapeutic efficiency of siRNA can be improved by using an efficient delivery system. Metal-organic framework biocomposits have demonstrated an exceptional capability in protecting and efficiently delivering nucleic acids into cells. In the present study, carbonated ZIF called ZIF-C has been utilized to deliver siRNAs targeted against E2 and nsP1 genes of CHIKV to achieve a reduction in viral replication and infectivity. Cellular transfection studies of E2 and nsP1 genes targeting free siRNAs and ZIF-C encapsulated siRNAs in CHIKV infected Vero CCL-81 cells were performed. Our results reveal a significant reduction of infectious virus titre, viral RNA levels and percent of infected cells in cultures transfected with ZIF-C encapsulated siRNA compared to cells transfected with free siRNA. The results suggest that delivery of siRNA through ZIF-C

		enhances the antiviral activity of CHIKV E2 and nsP1 genes directed siRNAs.
4	Alagarasu K, Punekar M, Patil P, Kasabe B, Kakade M, Davuluri KS, Cherian S, **Parashar D***. Effect of carpaine, a major alkaloid from *Carica papaya* leaves, on dengue virus-2 infection and replication-an in-vitro and in-silico study [published online ahead of print, 2023 Jan 1]. Phytother Res. 2023;10.1002/ptr.7715. doi:10.1002/ptr.7715.	This study suggests the anti-DENV property of carpaine post infection. The anti-DENV activity was confirmed by different assays which measure infectious virus titre, viral RNA copy number, and viral protein expression. The *in-silico* observation of stable binding of carpaine with NS5 RdRp suggests that carpaine might interfere with the functioning of viral replication. To conclude, the present study provides *in-vitro* and *in-silico* evidence of anti-DENV activity of carpaine against DENV-2.
5	Panda K, Alagarasu K, Patil P, Agrawal M, More A, Kumar NV, Mainkar PS, **Parashar D***, Cherian S. In Vitro Antiviral Activity of α-Mangostin against Dengue Virus Serotype-2 (DENV-2). Molecules. 2021;26(10):3016. Published 2021 May 19. doi:10.3390/molecules26103016.	In this study, natural compounds were screened for their antiviral activity against DENV by *in vitro* cell line-based assay. α-Mangostin, a xanthanoid, was observed to exert antiviral activity against DENV-2 under pre-, co- and post-treatment testing conditions. A complete inhibition of DENV-2 was observed at 8 µM under the co-treatment condition. The possible inhibitory mechanism of α-Mangostin was also determined by docking studies. The molecular docking experiments indicate that α-Mangostin can interact with multiple DENV protein targets such as the NS5 methyltransferase, NS2B-NS3 protease and the glycoprotein E. The *in vitro* and *in silico* findings suggest that α-Mangostin possesses the ability to suppress DENV-2 production at different stages of its replication cycle and might act as a prophylactic/therapeutic agent against DENV-2.
6	Patil P, Agrawal M, Almelkar S, Jeengar MK, More A, Alagarasu K, Kumar NV, Mainkar PS, **Parashar D***, Cherian S. *In vitro* and *in vivo* studies reveal α-Mangostin, a xanthonoid from Garcinia mangostana, as a promising natural antiviral compound against chikungunya virus. Virol J. 2021;18(1):47. Published 2021 Feb 28. doi:10.1186/s12985-021-01517-z.	As diverse natural phenolic compounds have been shown to possess antiviral activities, the antiviral activity of α-Mangostin, a xanthanoid, against CHIKV infection have been explored. The *in vitro* prophylactic and therapeutic effects of α-Mangostin on CHIKV replication in Vero E6 cells were investigated. The molecular mechanism of inhibitory action was further proposed using *in silico* molecular docking studies. *In vitro* studies revealed that

		8 μM α-Mangostin completely inhibited CHIKV infectivity under the cotreatment condition. CHIKV replication was also inhibited in virus-infected mice. **This is the first *in vivo* study which clearly showed that α-Mangostin is effective *in vivo* by significantly reducing virus replication in serum and muscles.** Molecular docking indicated that α-Mangostin can efficiently interact with the E2–E1 heterodimeric glycoprotein and the ADP-ribose binding cavity of the nsP3 macrodomain. The findings suggest that α-Mangostin can inhibit CHIKV infection and replication through possible interaction with multiple CHIKV target proteins and might act as a prophylactic/therapeutic agent against CHIKV.
7	Kasabe B, Ahire G, Patil P, Punekar M, Davuluri KS, Kakade M, Alagarasu K, **Parashar D***, Cherian S. Drug repurposing approach against chikungunya virus: an *in vitro* and *in silico* study. Front Cell Infect Microbiol. 2023;13:1132538. Published 2023 Apr 27. doi:10.3389/fcimb.2023.1132538	Anti CHIKV activity of fourteen FDA-approved drugs was investigated by *in vitro* and *in silico* approaches. The findings showed that nine compounds, viz., temsirolimus, 2-fluoroadenine, doxorubicin, felbinac, emetine, lomibuvir, enalaprilat, metyrapone and resveratrol exhibit anti chikungunya activity. Furthermore, *in silico* molecular docking studies performed by targeting CHIKV structural and non-structural proteins revealed that these drugs can bind to structural protein targets such as envelope protein, and capsid, and nonstructural proteins NSP2, NSP3 and NSP4 (RdRp). Findings from *in vitro* and *in silico* studies reveal that these drugs can suppress the infection and replication of CHIKV and further *in vivo* studies followed by clinical trials are warranted.
8	Davuluri KS, Ghanghav R, Ahire G, Kakade M, Cherian S, Alagarasu K and Parashar D*. Repurposed drugs in combinations exert additive anti-chikungunya virus activity: an in-vitro study. Virol J. 2024;21(1):5. Published 2024 Jan 4. doi:10.1186/s12985-023-02271-0	The effect of different combinations of six effective drugs (2-fluoroadenine, emetine, lomibuvir, enalaprilat, metyrapone and resveratrol) at their non-toxic concentrations against CHIKV under post infection treatment conditions in Vero cells have been explored. The results revealed that the combination of 2-fluoroadenine with either metyrapone or emetine or enalaprilat exerted inhibitory

		activity against CHIKV under post-infection treatment conditions. The effect of these drug combinations was additive in nature compared to the effect of the individual drugs. The results suggest an additive anti-viral effect of these drug combinations against CHIKV. The findings could serve as an outline for the development of an innovative therapeutic approach in the future to treat CHIKV-infected patients.
9	Shukla S, Kakade M, Cherian S, Alagarasu K, Parashar D*. Arctigenin from Arctium lappa L. inhibits chikungunya virus by affecting its entry and replication, Phytomedicine (2024), doi:https://doi.org/10.1016/j.phymed.2024.155491	The antiviral activity of Arctigenin, a phenylpropanoid lignan from the seeds of Arctium Lappa L., have been investigated against dengue and chikungunya virus. Arctigenin had no effects on DENV. Various time and temperature dependent assays revealed that Arctigenin significantly reduced CHIKV RNA copy number and infectious virus particles in cell cultures. In-silico docking results revealed the interaction of the compound with E1 protein and nsp3 macrodomain of CHIKV. This study demonstrates the in-vitro anti-CHIKV potential of Arctigenin and suggests that the compound might affect CHIKV entry and replication.
10	Davuluri K, Shukla S, Kakade M, Cherian S, Alagarasu K, Parashar D*. Explorations on the antiviral potential of Zinc and Magnesium salts against chikungunya virus: Implications for therapeutics. Front. Cell. Infect. Microbiol., 04 June 2024; 14 https://doi.org/10.3389/fcimb.2024.1335189	This study explored the antiviral potential of zinc sulphate, zinc acetate, and magnesium sulphate against CHIKV infection. Different time- and temperature-dependent assays revealed the therapeutic antiviral activity of zinc and magnesium salts against CHIKV. A minimum exposure of 4 hours and treatment initiation within 1 to 2 hours of infection are required for inhibition of CHIKV. Entry assays revealed that zinc salt affected virus-entry. Entry bypass assays suggested that both salts affected post entry stages of CHIKV. In infected C57BL6 mice orally fed with zinc and magnesium salts, a reduction in viral RNA copy number was observed. The study results suggest zinc salts exert anti-CHIKV activity at entry and post entry stages of the virus life cycle, while magnesium salt affect CHIKV at post entry stages. Overall, the

		study highlights the significant antiviral potential of zinc sulphate, zinc acetate, and magnesium sulphate against CHIKV, which can be exploited in designing potential therapeutic strategies for early treatment of chikungunya patients, thereby reducing the virus-associated persistent arthritis.