Document details

‹ Back to results | 1 of 1

Export Download Print E-mail Save to PDF Add to List More... ›

Full Text View at Publisher

Sains Malaysiana
Volume 49, Issue 3, March 2020, Pages 537-544

Computational quest for finding potential Ebola VP40 inhibitors : A molecular docking study (Article) (Open Access)

[Pencarian Pengiraan untuk Mencari Potensi Perencat Ebola VP40: Suatu Kajian Mengedok Molekul]

Yussoff, M.A.M.[a], Hamid, A.A.A.[a,c], Hamid, S.A.[b], Halim, K.B.A.[a,c]

[a]Department of Biotechnology, Kulliyyah of Science, International Islamic University Malaysia, Kuantan, Pahang Darul Makmur, 25200, Malaysia
[b]Department of Chemistry, Kulliyyah of Science, International Islamic University Malaysia, Kuantan, Pahang Darul Makmur, 25200, Malaysia
[c]Research Unit for Bioinformatics and Computational Biology, Kulliyyah of Science, International Islamic University Malaysia, Kuantan, Pahang Darul Makmur, 25200, Malaysia

Abstract

View references (53)

Interaction of Ebola virus matrix protein VP40 with RNA is crucial in the early infection stage to facilitate the transcription of the viral gene. Thus, VP40 is a promising target to inhibit the Ebola virus from spreading. This study aims to identify and optimize ligands that can potentially block the VP40-RNA binding site. A total of 42 compounds from previously studied ligands from the literature were simulated against the RNA binding site using Autodock Vina. The top ten ligands were used as templates for similarity search in ZINC database followed by structured-based virtual screening. Then, the ADME properties of the top compounds were predicted computationally using SwissADME server. Our results showed that Q-96 (ZINC ID: 1338855) is the best docked compound with binding free energy of -7.5 kcal/ mol. The compound also has satisfactory ADME properties prediction with good lipophilicity value, moderate water solubility and high gastrointestinal absorption. Besides, this ligand does not violate any drug likeness rules as well as no PAINS and Brenk alerts, indicate it has the properties as a drug. Thus, it is worth to carry out further investigations on this structure more in silico as well as in vitro and in vivo levels towards finding the treatment for Ebola virus disease.

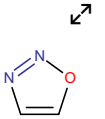
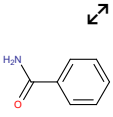
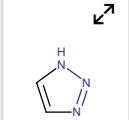
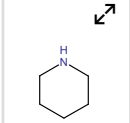
SciVal Topic Prominence

Topic: Ebola Hemorrhagic Fever | Marburgvirus | Ebolavirus

Prominence percentile: 99.664

Chemistry database information

Substances





phosphatidylinositol 4,5-bisphosphate

Author keywords

ADME | Ebola virus | Molecular docking: VP40 matrix protein

Indexed keywords

GEOBASE Subject Index: bioinformatics | disease treatment | drug | Ebola virus disease | inhibitor | ligand | RNA

Species Index: Ebola virus

Funding details

Funding text #1

This work was supported by the Ministry of Higher Education (MOHE), Malaysia and International Islamic

Funding text #2

University, Malaysia under grant FRGS15-207-0448, FRGS15-208-0449 and PRIGS18-062-0062.

ISSN: 01266039
Source Type: Journal
Original language: English
DOI: 10.17576/jsm-2020-4903-08
Document Type: Article
Publisher: Penerbit Universiti Kebangsaan Malaysia

References (53)

View in search results format >

All | Export | Print | E-mail | Save to PDF | Create bibliography

1 Abazari, D., Moghtadaei, M., Behvarmanesh, A., Ghannadi, B., Aghaei, M., Behruznia, M., Rigi, G.
Molecular docking based screening of predicted potential inhibitors for VP40 from Ebola virus
(2015) *Bioinformation*, 11, pp. 243-247. Cited 10 times.

2 Adu-Gyamfi, E., Digman, M.A., Gratton, E., Stahelin, R.V.
Investigation of Ebola VP40 assembly and oligomerization in live cells using number and brightness analysis (Open Access)

(2012) *Biophysical Journal*, 102 (11), pp. 2517-2525. Cited 43 times.
doi: 10.1016/j.bpj.2012.04.022

View at Publisher

3 Adu-Gyamfi, E., Johnson, E.A., Fraser, M.E., Scott, J.L., Soni, S.P., Jones, K.R., Digman, M.A., (...), Stahelina, R.V.
Host cell plasma membrane phosphatidylserine regulates the assembly and budding of Ebola virus (Open Access)

(2015) *Journal of Virology*, 89 (18), pp. 9440-9453. Cited 40 times.
http://jvi.asm.org/content/89/18/9440.full.pdf
doi: 10.1128/JVI.01087-15

View at Publisher

4 Akers, M.J.
Excipient-drug interactions in parenteral formulations

(2002) *Journal of Pharmaceutical Sciences*, 91 (11), pp. 2283-2300. Cited 147 times.
www.interscience.wiley.com/jpages/0022-3549
doi: 10.1002/jps.10154

View at Publisher

5 Arnott, J.A., Planey, S.L.
The influence of lipophilicity in drug discovery and design

(2012) *Expert Opinion on Drug Discovery*, 7 (10), pp. 863-875. Cited 190 times.
doi: 10.1517/17460441.2012.714363

View at Publisher

6 Baell, J.B., Holloway, G.A.
New substructure filters for removal of pan assay interference compounds (PAINS) from screening libraries and for their exclusion in bioassays

(2010) *Journal of Medicinal Chemistry*, 53 (7), pp. 2719-2740. Cited 1613 times.
doi: 10.1021/jm901137j

View at Publisher

7 Booth, T.F., Rabb, M.J., Beniac, D.R.
How do filovirus filaments bend without breaking?

(2013) *Trends in Microbiology*, 21 (11), pp. 583-593. Cited 27 times.
doi: 10.1016/j.tim.2013.08.001

View at Publisher

8 Bornholdt, Z.A., Noda, T., Abelson, D.M., Halfmann, P., Wood, M.R., Kawaoka, Y., Saphire, E.O.
Structural rearrangement of ebola virus vp40 begets multiple functions in the virus life cycle (Open Access)

(2013) *Cell*, 154 (4), pp. 763-774. Cited 127 times.
doi: 10.1016/j.cell.2013.07.015

View at Publisher

9 Brenk, R., Schipani, A., James, D., Krasowski, A., Gilbert, I.H., Frearson, J., Wyatt, P.G.
Lessons learnt from assembling screening libraries for drug discovery for neglected diseases

(2008) *ChemMedChem*, 3 (3), pp. 435-444. Cited 150 times.
http://www3.interscience.wiley.com/cgi-bin/fulltext/117858270/PDFSTART
doi: 10.1002/cmdc.200700139

View at Publisher

10 Castro-Alvarez, A., Costa, A.M., Vilarrasa, J.
The Performance of several docking programs at reproducing protein-macrolide-like crystal structures (Open Access)

(2017) *Molecules*, 22 (1), art. no. 136. Cited 22 times.
http://www.mdpi.com/1420-3049/22/1/136/pdf
doi: 10.3390/molecules22010136

View at Publisher

11 Clark, D.E.
What has polar surface area ever done for drug discovery?

(2011) *Future Medicinal Chemistry*, 3 (4), pp. 469-484. Cited 27 times.
doi: 10.4155/fmc.11.1

View at Publisher

12 Daina, A., Michielin, O., Zoete, V.

SwissADME: A free web tool to evaluate pharmacokinetics, drug-likeness and medicinal chemistry friendliness of small molecules (Open Access)

(2017) *Scientific Reports*, 7, art. no. 42717. Cited 792 times.
www.nature.com/srep/index.html
doi: 10.1038/srep42717

View at Publisher

13 Del Vecchio, K., Frick, C.T., Gc, J.B., Oda, S.-I., Gerstman, B.S., Saphire, E.O., Chapagain, P.P., (...), Stahelin, R.V.

A cationic, C-terminal patch and structural rearrangements in Ebola virus matrix VP40 protein control its interactions with phosphatidylserine (Open Access)

(2018) *Journal of Biological Chemistry*, 293 (9), pp. 3335-3349. Cited 12 times.
http://www.jbc.org/content/293/9/3335.full.pdf
doi: 10.1074/jbc.M117.816280

View at Publisher

14 Egan, W.J., Merz Jr., K.M., Baldwin, J.J.

Prediction of drug absorption using multivariate statistics

(2000) *Journal of Medicinal Chemistry*, 43 (21), pp. 3867-3877. Cited 482 times.
doi: 10.1021/jm000292e

View at Publisher

15 Fabozzi, G., Nabel, C.S., Dolan, M.A., Sullivan, N.J.

Ebolavirus proteins suppress the effects of small interfering RNA by direct interaction with the mammalian RNA interference pathway (Open Access)

(2011) *Journal of Virology*, 85 (6), pp. 2512-2523. Cited 98 times.
http://jvi.asm.org/cgi/reprint/85/6/2512
doi: 10.1128/JVI.01160-10

View at Publisher

16 Feldmann, H., Geisbert, T.W.

Ebola haemorrhagic fever

(2011) *The Lancet*, 377 (9768), pp. 849-862. Cited 814 times.
http://www.journals.elsevier.com/the-lancet/
doi: 10.1016/S0140-6736(10)60667-8

View at Publisher

17 GC, J.B., Gerstman, B.S., Chapagain, P.P.

Membrane association and localization dynamics of the Ebola virus matrix protein VP40 (Open Access)

(2017) *Biochimica et Biophysica Acta - Biomembranes*, 1859 (10), pp. 2012-2020. Cited 10 times.
www.elsevier.com/locate/bbamem
doi: 10.1016/j.bbamem.2017.07.007

View at Publisher

18 Ghose, A.K., Viswanadhan, V.N., Wendoloski, J.J.

A knowledge-based approach in designing combinatorial or medicinal chemistry libraries for drug discovery. 1. A qualitative and quantitative characterization of known drug databases

(1999) *Journal of Combinatorial Chemistry*, 1 (1), pp. 55-68. Cited 1008 times.
http://pubs.acs.org/journal/jcchff
doi: 10.1021/cc9800071

View at Publisher

19 Gleeson, M.P.
Generation of a set of simple, interpretable ADMET rules of thumb

(2008) *Journal of Medicinal Chemistry*, 51 (4), pp. 817-834. Cited 576 times.
doi: 10.1021/jm701122q

View at Publisher

20 Gomis-Rüth, F.X., Dessen, A., Timmins, J., Bracher, A., Kolesnikowa, L., Becker, S., Klenk, H.-D., (...), Weissenhorn, W.
The matrix protein VP40 from Ebola virus octamerizes into pore-like structures with specific RNA binding properties (Open Access)

(2003) *Structure*, 11 (4), pp. 423-433. Cited 108 times.
http://www.journals.elsevier.com/structure/
doi: 10.1016/S0969-2126(03)00050-9

View at Publisher

21 Gonzalez, J.P., Wauquier, N., Vincent, T.
Revisiting Ebola, a quiet river in the heart of Africa

(2018) *Medecine et Sante Tropicales*, 28 (1), pp. 12-17. Cited 2 times.
http://www.jle.com/fr/revues/mst/e-docs/revisiting_ebola_a_quiet_river_in_the_heart_of_africa_311685/article.phtml?tab=download&pj_key=doc_attach_37841
doi: 10.1684/mst.2018.0751

View at Publisher

22 Gupta, U., Agashe, H.B., Asthana, A., Jain, N.K.
Dendrimers: Novel polymeric nanoarchitectures for solubility enhancement

(2006) *Biomacromolecules*, 7 (3), pp. 649-658. Cited 304 times.
doi: 10.1021/bm050802s

View at Publisher

23 Hoenen, T., Volchkov, V., Kolesnikova, L., Mittler, E., Timmins, J., Ottmann, M., Reynard, O., (...), Weissenhorn, W.
VP40 octamers are essential for Ebola virus replication (Open Access)

(2005) *Journal of Virology*, 79 (3), pp. 1898-1905. Cited 76 times.
doi: 10.1128/JVI.79.3.1898-1905.2005

View at Publisher

24 Jasenosky, L.D., Neumann, G., Lukashevich, I., Kawaoka, Y.
Ebola virus VP40-induced particle formation and association with the lipid bilayer (Open Access)

(2001) *Journal of Virology*, 75 (11), pp. 5205-5214. Cited 214 times.
doi: 10.1128/JVI.75.11.5205-5214.2001

View at Publisher

25 Johnson, K.A., Taghon, G.J.F., Scott, J.L., Stahelin, R.V.
The Ebola Virus matrix protein, VP40, requires phosphatidylinositol 4,5-bisphosphate (PI(4,5)P 2) for extensive oligomerization at the plasma membrane and viral egress (Open Access)

(2016) *Scientific Reports*, 6, art. no. 19125. Cited 32 times.
www.nature.com/srep/index.html
doi: 10.1038/srep19125

View at Publisher

26 Karthick, V., Nagasundaram, N., Doss, C.G.P., Chakraborty, C., Siva, R., Lu, A., Zhang, G., (...), Zhu, H.
Virtual screening of the inhibitors targeting at the viral protein 40 of Ebola virus (Open Access)

(2016) *Infectious Diseases of Poverty*, 5 (1), art. no. 12. Cited 20 times.
http://www.idpjournal.com/
doi: 10.1186/s40249-016-0105-1

View at Publisher

27 Li, H., Leung, K.-S., Wong, M.-H., Ballester, P.J.
USR-VS: a web server for large-scale prospective virtual screening using ultrafast shape recognition techniques (Open Access)

(2016) *Nucleic acids research*, 44 (W1), pp. W436-W441. Cited 16 times.
doi: 10.1093/nar/gkw320

View at Publisher

28 Lipinski, C.
Poor aqueous solubility - An industry wide problem in drug discovery

(2002) *American Pharmaceutical Review*, 5 (3), pp. 82-85. Cited 617 times.

29 Lipinski, C.A., Lombardo, F., Dominy, B.W., Feeney, P.J.
Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings

(2001) *Advanced Drug Delivery Reviews*, 46 (1-3), pp. 3-26. Cited 6087 times.
www.elsevier.com/locate/drugdeliv
doi: 10.1016/S0169-409X(00)00129-0

View at Publisher

30 Alam El-Din, H., Loutfy, S., Fathy, N., Elberry, M., Mayla, A., Kassem, S., Naqvi, A.
Molecular docking based screening of compounds against VP40 from Ebola virus
(2016) *Bioinformation*, 12, pp. 192-196. Cited 6 times.
M A H M

31 Martin, B., Canard, B., Decroly, E.
Filovirus proteins for antiviral drug discovery: Structure/function bases of the replication cycle

(2017) *Antiviral Research*, 141, pp. 48-61. Cited 19 times.
www.elsevier.com/locate/antiviral
doi: 10.1016/j.antiviral.2017.02.004

View at Publisher

32 Martin, B., Hoenen, T., Canard, B., Decroly, E.
Filovirus proteins for antiviral drug discovery: A structure/function analysis of surface glycoproteins and virus entry

(2016) *Antiviral Research*, 135, pp. 1-14. Cited 20 times.
www.elsevier.com/locate/antiviral
doi: 10.1016/j.antiviral.2016.09.001

View at Publisher

33 Mirza, M.U., Ikram, N.
Integrated computational approach for virtual hit identification against ebola viral proteins VP35 and VP40 (Open Access)

(2016) *International Journal of Molecular Sciences*, 17 (11), art. no. 1748. Cited 19 times.
http://www.mdpi.com/1422-0067/17/11/1748/pdf
doi: 10.3390/ijms17111748

View at Publisher

34 Muegge, I., Heald, S.L., Brittelli, D.
Simple selection criteria for drug-like chemical matter

(2001) *Journal of Medicinal Chemistry*, 44 (12), pp. 1841-1846. Cited 240 times.
doi: 10.1021/jm015507e

View at Publisher

35 Olejnik, J., Ryabchikova, E., Corley, R.B., Mühlberger, E.
Intracellular events and cell fate in filovirus infection (Open Access)

(2011) *Viruses*, 3 (8), pp. 1501-1531. Cited 52 times.
http://www.mdpi.com/1999-4915/3/8/1501/pdf
doi: 10.3390/v3081501

View at Publisher

36 Raj, U., Varadwaj, P.K.
Flavonoids as Multi-target Inhibitors for Proteins Associated with Ebola Virus: In Silico Discovery Using Virtual Screening and Molecular Docking Studies

(2016) *Interdisciplinary Sciences: Computational Life Sciences*, 8 (2), pp. 132-141. Cited 37 times.
http://www.springer.com/life+sciences/systems+biology+and+bioinformatics/journal/12539
doi: 10.1007/s12539-015-0109-8

View at Publisher

37 Ruigrok, R.W.H., Schoehn, G., Dessen, A., Forest, E., Volchkov, V., Dolnik, O., Klenk, H.-D., (...), Weissenhorn, W.
Structural characterization and membrane binding properties of the matrix protein VP40 of Ebola virus

(2000) *Journal of Molecular Biology*, 300 (1), pp. 103-112. Cited 116 times.
https://www.journals.elsevier.com/journal-of-molecular-biology
doi: 10.1006/jmbi.2000.3822

View at Publisher

38 Schreyer, A.M., Blundell, T.
USRCAT: Real-time ultrafast shape recognition with pharmacophoric constraints (Open Access)

(2012) *Journal of Cheminformatics*, 4 (11), art. no. 27. Cited 35 times.
http://www.jcheminf.com/content/pdf/1758-2946-4-27.pdf
doi: 10.1186/1758-2946-4-27

View at Publisher

39 Serajuddin, A.T.M.
Salt formation to improve drug solubility

(2007) *Advanced Drug Delivery Reviews*, 59 (7), pp. 603-616. Cited 820 times.
doi: 10.1016/j.addr.2007.05.010

View at Publisher

40 Setlur, A.S., Naik, S.Y., Skariyachan, S.
Herbal Lead as Ideal Bioactive Compounds Against Probable Drug Targets of Ebola Virus in Comparison with Known Chemical Analogue: A Computational Drug Discovery Perspective

(2017) *Interdisciplinary Sciences: Computational Life Sciences*, 9 (2), pp. 254-277. Cited 17 times.
http://www.springer.com/life+sciences/systems+biology+and+bioinformatics/journal/12539
doi: 10.1007/s12539-016-0149-8

View at Publisher

41 Shah, R., Panda, P.K., Patel, P., Mumbai, N., Farm, A., Road, G.D.
Pharmacophore based virtual screening and molecular docking studies of inherited compounds against Ebola virus receptop proteins
(2015) *World J. Pharm. Pharm. Sci.*, 4, pp. 1268-1282. Cited 10 times.

42 Strickley, R.G.
Solubilizing Excipients in Oral and Injectable Formulations

(2004) *Pharmaceutical Research*, 21 (2), pp. 201-230. Cited 976 times.
doi: 10.1023/B:PHAM.0000016235.32639.23

View at Publisher

43 Tamilvanan, T., Hopper, W.
High-throughput virtual screening and docking studies of matrix protein VP40 of Ebola virus
(2013) *Bioinformation*, 9, pp. 286-292. Cited 13 times.

44 Taylor, R.D., Maccoss, M., Lawson, A.D.G.
Rings in drugs

(2014) *Journal of Medicinal Chemistry*, 57 (14), pp. 5845-5859. Cited 685 times.
http://pubs.acs.org/jmc
doi: 10.1021/jm4017625

View at Publisher

45 Trott, O., Olson, A.J.
Software news and update AutoDock Vina: Improving the speed and accuracy of docking with a new scoring function, efficient optimization, and multithreading

(2010) *Journal of Computational Chemistry*, 31 (2), pp. 455-461. Cited 8781 times.
http://www3.interscience.wiley.com/cgi-bin/fulltext/122439542/PDFSTART

46 Van de Waterbeemd, H., Smith, D.A., Beaumont, K., Walker, D.K.
Property-based design: Optimization of drug absorption and pharmacokinetics

(2001) *Journal of Medicinal Chemistry*, 44 (9), pp. 1313-1333. Cited 474 times.
doi: 10.1021/jm000407e

View at Publisher

47 Veber, D.F., Johnson, S.R., Cheng, H.-Y., Smith, B.R., Ward, K.W., Kopple, K.D.
Molecular properties that influence the oral bioavailability of drug candidates

(2002) *Journal of Medicinal Chemistry*, 45 (12), pp. 2615-2623. Cited 2915 times.
doi: 10.1021/jm020017n

View at Publisher

48 Vyas, A., Saraf, S., Saraf, S.
Cyclodextrin based novel drug delivery systems

(2008) *Journal of Inclusion Phenomena and Macrocyclic Chemistry*, 62 (1-2), pp. 23-42. Cited 254 times.
doi: 10.1007/s10847-008-9456-y

View at Publisher

49 (2019) *Ebola Situation Reports: Democratic Republic of the Congo*. Cited 12 times.
WHO |

50 (2017) *Ebola Virus Disease*. Cited 21 times.
WHO |

51 Yang, J., Roy, A., Zhang, Y.
Protein-ligand binding site recognition using complementary binding-specific substructure comparison and sequence profile alignment (Open Access)

(2013) *Bioinformatics*, 29 (20), pp. 2588-2595. Cited 324 times.
doi: 10.1093/bioinformatics/btt447

View at Publisher

52 Yang, J., Roy, A., Zhang, Y.
BioLiP: A semi-manually curated database for biologically relevant ligand-protein interactions (Open Access)

(2013) *Nucleic Acids Research*, 41 (D1), pp. D1096-D1103. Cited 225 times.
doi: 10.1093/nar/gks966

View at Publisher

53 Yuan, S.
Possible FDA-approved drugs to treat Ebola virus infection (Open Access)

(2015) *Infectious Diseases of Poverty*, 4 (1), art. no. 23. Cited 17 times.
http://www.idpjournal.com/
doi: 10.1186/s40249-015-0055-z

View at Publisher

Halim, K.B.A.; Department of Biotechnology, Kulliyyah of Science, International Islamic University Malaysia, Kuantan, Pahang Darul Makmur, Malaysia; email:kbariyyah@iium.edu.my

Back to results | 1 of 1

Top of page