IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, August 2023

From Data to Drugs a Review: Harnessing AI for Accelerated Pharmaceutical Development

V. R. Gawade[1*], K. S. Apar[2], R. D. Mapari[3], H. S. Lahane[4], Dr.V R. Pawar[5]
JGVVSS Suyash College of Pharmacy, Warud, Bk. M.S, India

Abstract: *Drug development accelerates discovery. AI changed medication development. AI accelerates pharmaceutical research from data analysis to medicine development. To fulfil global healthcare requirements, pharmaceutical development must be speedy. AI accelerates and improves medication development decisions. AI impacts medication discovery. AI validates medications quicker. AI-based virtual screening and drug discovery may quickly find therapeutic candidates with high target molecule affinity. Predictive modelling accelerates drug discovery. The review examines preclinical AI development. AI evaluates huge biological and chemical databases for medication safety and effectiveness. AI-driven in silico toxicity and safety evaluations reduce risks and enhance preclinical research. AI may improve pharmaceutical formulation and delivery. AI enhances clinical trial design and recruiting. Real-time data analysis and clinical trial monitoring provide unmatched insights into medication effectiveness and safety, expediting decision-making and trial length. Predictive AI may improve trial results and drug development. The research examines AI's involvement in regulatory and commercial approval. AI-prepared data speeds acceptance. AI improves post-marketing pharmacovigilance and safety. Market entry and health economics are explored. AI in pharmaceutical research faces data quality, integration, ethical, and regulatory issues. Discussed are pharmaceutical AI implementation options. Finally, AI will change pharmaceuticals. Precision and personalised medicine using AI suggests patient-specific therapy. AI may expedite pharmaceutical development and improve patient outcomes, highlighting the need for ongoing research and cooperation to employ AI in global healthcare.*

Keywords: Pharmaceutical development, AI, drug discovery, preclinical, clinical trials, regulatory approval Pharmaceutical development, AI, drug discovery, preclinical, clinical trials, regulatory approval.

REFERENCES

[1]. Aliper, A., Plis, S., Artemov, A., Ulloa, A., Mamoshina, P., &Zhavoronkov, A. (2016). Deep Learning Applications for Predicting Pharmacological Properties of Drugs and Drug Repurposing Using Transcriptomic Data. Molecular Pharmaceutics, 13(7), 2524–2530.

[2]. Angermueller, C., Pärnamaa, T., Parts, L., &Stegle, O. (2016). Deep Learning for Computational Biology. Molecular Systems Biology, 12(7), 878.

[3]. Bahdanau, D., Cho, K., &Bengio, Y. (2015). Neural Machine Translation by Jointly Learning to Align and Translate. International Conference on Learning Representations (ICLR).

[4]. Ching, T., Himmelstein, D. S., Beaulieu-Jones, B. K., Kalinin, A. A., Do, B. T., Way, G. P., ...& Altman, R. B. (2018). Opportunities and obstacles for deep learning in biology and medicine. Journal of The Royal Society Interface, 15(141), 20170387.

[5]. Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., &Thrun, S. (2017). Dermatologist-level classification of skin cancer with deep neural networks. Nature, 542(7639), 115-118.

[6]. Gao, M., Yin, J., Hipp, J. D., &Jie, C. (2019). Deep Learning for Drug-Induced Liver Injury. Trends in Pharmacological Sciences, 40(7), 452-461.

[7]. Gawehn, E., Hiss, J. A., Schneider, G. (2016). Deep Learning in Drug Discovery. Molecular Informatics, 35(1), 3-14.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, August 2023

[8]. Hughes, T. B., Swamidass, S. J., &Balasubramanian, S. (2016). Chemical Functionality Extraction from Patent Text using Convolutional Neural Networks. Journal of Chemical Information and Modeling, 56(10), 1894-1904.

[9]. Huynh, T. H. N., Bouchachia, A., &Zary, S. (2016). A Deep Learning Approach for Cancer Detection and Relevant Gene Identification. IEEE International Conference on Bioinformatics and Biomedicine (BIBM).

[10]. Johnson, A. E., Pollard, T. J., Shen, L., Lehman, L. H., Feng, M., Ghassemi, M., ...&Celi, L. A. (2016). MIMIC-III, a freely accessible critical care database. Scientific Data, 3, 160035.

[11]. LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. Nature, 521(7553), 436-444.

[12]. Ma, J., Sheridan, R. P., Liaw, A., Dahl, G. E., &Svetnik, V. (2015). Deep Neural Nets as a Method for Quantitative Structure–Activity Relationships. Journal of Chemical Information and Modeling, 55(2), 263-274.

[13]. Menden, M. P., Wang, D., Mason, M. J., Szalai, B., Bulusu, K. C., Guan, Y., ...&Buetow, K. H. (2019). Community assessment to advance computational prediction of cancer drug combinations in a pharmacogenomic screen. Nature Communications, 10(1), 2674.

[14]. Min, S., Lee, B., & Yoon, S. (2017). Deep learning in bioinformatics. Briefings in Bioinformatics, 18(5), 851-869.

[15]. Ronneberger, O., Fischer, P., &Brox, T. (2015). U-Net: Convolutional Networks for Biomedical Image Segmentation. Medical Image Computing and Computer-Assisted Intervention (MICCAI).

[16]. Ruusuvuori, P., Gao, M., Damera, R., Dhandapani, V., &Vähäkangas, K. (2018). Comparison of Convolutional Neural Networks and Recursive Neural Tensor Networks in Pharmacological Toxicity Prediction. Journal of Chemical Information and Modeling, 58(5), 1003-1013.

[17]. Schwab, P., Kristensen, T. B., &Sætrom, P. (2019). Neural network-based scoring function for improved peptide-MHC class I binding prediction. BMC Bioinformatics, 20(1), 79.

[18]. Schuster, M., &Paliwal, K. K. (1997). Bidirectional recurrent neural networks. IEEE Transactions on Signal Processing, 45(11), 2673-2681.

[19]. Singh, A., & Gupta, R. (2019). Role of artificial intelligence in pharmaceutical industry. Pharmaceutical Regulatory Affairs: Open Access, 8(1), 1-3.

[20]. Stokes, J. M., Yang, K., Swanson, K., Jin, W., Cubillos-Ruiz, A., Donghia, N. M., ...& Collins, J. J. (2020). A deep learning approach to antibiotic discovery. Cell, 180(4), 688-702.

[21]. Terry, M. A., & Roberts, A. S. (2017). Clinical trial optimization: computational intelligence improves study success. Applied Clinical Trials, 26(6), 20-27.

[22]. Tian, L., Wang, Y., Zhu, R., Diao, L., Zhang, Y., Lu, H., ...&Xie, L. (2020). Integrative analysis of single-cell RNA-seq and CRISPR screen data by Boltzmann machine learning to predict regulatory relationships. Nature Communications, 11(1), 1-12.

[23]. Wang, S., Sun, S., Li, Z., Zhang, R., Xu, J., Liu, Z., ...& Huang, Y. (2019). Deep learning provides a new computed tomography-based prognostic biomarker for recurrence prediction in high-grade serous ovarian cancer. Radiotherapy and Oncology, 132, 171-177.

[24]. Wu, J., Zhang, Y., Wu, Q., & Liu, Q. (2019). Deep Learning in Drug Discovery. Chinese Journal of Chemical Physics, 32(5), 565-570.

[25]. Xu, Y., Ding, J., Weng, S., Li, Z., Sun, S., Wang, L., ...& Cheng, S. (2019). Extracting a biologically relevant chemical space for drug discovery. Journal of Chemical Information and Modeling, 59(2), 609-615.