

Do Multi-omics present a reasonable way of increasing the Precision of Psychiatric Medication?

Yes, multi-omics currently offers a promising but still early route to more precise psychiatric medication, with encouraging proof-of-concept but limited routine clinical use so far.

Multi-omics refers to combining genomics, epigenomics, transcriptomics, proteomics, metabolomics, microbiomics and clinical data to better match drugs and doses to each individual.

How Multi-omics Could Increase Precision

Moving beyond trial-and-error

- Reviews argue that pharmaco-multiomics can shift psychiatry away from the prevailing trial-and-error prescribing by explaining 15–30% of variability in treatment response through genetic variants and other omics layers, enabling prediction of efficacy and adverse reactions. (Dhieb & Bastaki, 2025)- Integrating multiple omics layers is expected to “revolutionize personalized treatment strategies” and move care from one-size-fits-all to patient-centered models. (Dhieb & Bastaki, 2025; Stolfi et al., 2024)**Concrete gains in prediction**
- A machine-learning model combining plasma metabolites with selected SNPs predicted response to combination antidepressant therapy with ~77% accuracy (AUC 0.86), clearly outperforming clinical data alone (~51%). (Joyce et al., 2021)- Reviews emphasize that integrating genomics with other omics and clinical data via machine learning should improve medication selection and dosing decisions. (Bellanca et al., 2026; Bousman et al., 2023)### Examples of Proposed Benefits

Aspect	Multi-omics contribution	Papers
Predict drug response	Multi-omics signatures and AI models to classify responders/non-responders. (Joyce et al., 2021)	(Lin et al., 2020)
Mechanism-based subgroups	Metabolomics and other omics identify biochemical pathways (e.g., amino acids, energy, immune) that may define treatment-relevant biotypes. (Cavaleri et al., 2026)	(Kohshour et al., 2025)

FIGURE 1 Potential ways multi-omics sharpens medication choice

Current Limitations and Challenges

- Many metabolomic and other omics biomarkers are **promising but preliminary**; none are ready for routine prescribing, and no study has yet proven that adding metabolomics to usual care improves outcomes cost-effectively. (Cavaleri et al., 2026)- Multi-omics datasets are expensive, technically demanding, and complex to analyze; data integration and interpretation are major obstacles. (Sathyanarayanan et al., 2023; Dhieb & Bastaki, 2025)- Reviews stress lack of replication, heterogeneous findings, and the gap between research signatures and practical tools for diagnosis or treatment stratification. (Kohshour et al., 2025; Khatami et al., 2026)## Overall Assessment

Multi-omics clearly offers a **reasonable and increasingly evidence-based path** toward more precise psychiatric medication: it improves prediction in research settings and helps uncover mechanisms and subgroups that single-omics or clinical data alone miss. However, most applications are still in the discovery/validation phase; routine prescribing based on multi-omics remains rare, limited by cost, complexity, and incomplete clinical validation.

These search results were found and analyzed using Consensus, an AI-powered search engine for research. Try it at <https://consensus.app>. © 2026 Consensus NLP, Inc. Personal, non-commercial use only; redistribution requires copyright holders' consent.

References

- Bellanca, C. M., Squassina, A., Manchia, M., Paribello, P., Fadda, P., Bernardini, R., Cantarella, G., & Pisanu, C. (2026). From pharmacokinetic genes to polygenic scores and multi-omic integration: advances toward precision psychiatry. *Expert Opinion on Drug Metabolism & Toxicology*, *22*, 105 - 122. <https://doi.org/10.1080/17425255.2026.2639520>
- Bousman, C. A., Maruf, A., Marques, D. F., Brown, L. C., & Müller, D. (2023). The emergence, implementation, and future growth of pharmacogenomics in psychiatry: a narrative review. *Psychological Medicine*, *53*, 7983 - 7993. <https://doi.org/10.1017/s0033291723002817>
- Cavaleri, D., Bassetti, C., Cucchi, G., De Fazio, P., De Filippis, R., Albert, U., Pellegrini, L., Carrà, G., & Bartoli, F. (2026). Metabolomics biomarkers for precision psychiatry. *Frontiers in Psychiatry*, *17*. <https://doi.org/10.3389/fpsyt.2026.1736206>
- Dhieb, D., & Bastaki, K. (2025). Pharmaco-Multiomics: A New Frontier in Precision Psychiatry. *International Journal of Molecular Sciences*, *26*. <https://doi.org/10.3390/ijms26031082>
- Joyce, J. B., Grant, C., Liu, D., Mahmoudiandehkordi, S., Kaddurah-Daouk, R., Skime, M., Biernacka, J., Frye, M., Mayes, T., Carmody, T., Croarkin, P., Wang, L., Weinshilboum, R., Bobo, W., Trivedi, M., & Athreya, A. P. (2021). Multi-omics driven predictions of response to acute phase combination antidepressant therapy: a machine learning approach with cross-trial replication. *Translational Psychiatry*, *11*. <https://doi.org/10.1038/s41398-021-01632-z>
- Khatami, S. H., Anoosheh, S., Khodaparast, M., Maghsoudloonejad, A., Dadgostar, E., Asadi, A., Kaveh, M., & Haghighi, M. M. (2026). Multi-omics biomarkers in psychiatric disorders diagnosis and stratification.. *Clinica chimica acta; international journal of clinical chemistry*, 120887. <https://doi.org/10.1016/j.cca.2026.120887>
- Kohshour, O. M., Navarro-Flores, A., Heilbronner, U., & Schulze, T. G. (2025). Multi-omics approaches to major psychiatric disorders. *Neuropsychiatrie*, *40*, 23 - 30. <https://doi.org/10.1007/s40211-025-00564-0>
- Lin, E., Lin, C.-H., & Lane, H. (2020). Precision Psychiatry Applications with Pharmacogenomics: Artificial Intelligence and Machine Learning Approaches. *International Journal of Molecular Sciences*, *21*. <https://doi.org/10.3390/ijms21030969>
- Sathyanarayanan, A., Mueller, T. T., Moni, M. A., Schueler, K., Baune, B. T., Lio', P., Mehta, D., Baune, B. T., Dierssen, M., Ebert, B., Fabbri, C., Fusar-Poli, P., Gennarelli, M., Harmer, C., Howes, O., Janzing, J., Maron, E., Mehta, D., Minelli, A., . . . Xicota, L. (2023). Multi-omics data integration methods and their applications in psychiatric disorders.. *European neuropsychopharmacology : the journal of the European College of Neuropsychopharmacology*, *69*, 26-46. <https://doi.org/10.1016/j.euroneuro.2023.01.001>
- Stolfi, F., Abreu, H., Sinella, R., Nembrini, S., Centonze, S., Landra, V., Brasso, C., Cappellano, G., Rocca, P., & Chiocchetti, A. (2024). Omics approaches open new horizons in major depressive disorder: from biomarkers to precision medicine. *Frontiers in Psychiatry*, *15*. <https://doi.org/10.3389/fpsyt.2024.1422939>