technologies and federated learning methods, additional management rules are needed to clearly define who is in charge of the data, who can use the data, and how responsibilities are divided. Patients with rare neurological disorders are already few in number, and the cases are very precious. Therefore, finding a balance between data openness and personal privacy is particularly important.

Artificial intelligence is becoming an important assistant in integrating multi-omics data. It can identify disease characteristics from a large amount of information and also assist in early diagnosis and classification. Currently, some studies have classified neurodegenerative diseases using integrated omics data, and the results are better than traditional methods. However, in the field of rare diseases, the application of artificial intelligence still faces many difficulties. For example, the number of cases is small, the data is complex, and the genomic structure is diverse, which may lead to incorrect judgments. To ensure the reliability of results in clinical applications, high-quality training data, understandable models, and repeated external validation are needed. In the future, if artificial intelligence can be combined with multi-omics, imaging, and wearable device data, it may form a continuously optimized diagnostic and treatment system. But this requires not only technological progress but also meeting requirements in ethics, law, and personnel training.

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Conflict of Interest Disclosure

The author affirms that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

References

Airoldi M., Remori V., and Fasano M., 2025, Statistical methods for multi-omics analysis in neurodevelopmental disorders: from high dimensionality to mechanistic insight, Biomolecules, 15(10): 1401.
https://doi.org/10.3390/biom15101401

Assadourian A.A., and Martinez-Agosto J.A., 2025, Precision diagnostic and therapeutic interventions in rare genetic neurodevelopmental disorders, Pediatric Research, 98: 2491-2502.
https://doi.org/10.1038/s41390-025-04611-y

Bakare O., 2025, AI-driven multi-omics integration for precision medicine in complex disease diagnosis and treatment, International Journal of Research Publication and Reviews, 13(2): 30-45.
https://doi.org/10.55248/gengpi.6.0125.0650

Bedja-Iacona L., Forget A., Boisseau C., Marouillat S., Chudinova A., Veyrat-Durebex C., Guissart C., Lumbroso S., Raoul C., Andres C., Blasco H., Couratier P., Corcia P., Verschueren A., Mouzat K., and Vourc'h P., 2025, Improving ALS molecular diagnosis through functional assays: reassessment of a SOD1 variant of uncertain significance, International Journal of Molecular Sciences, 26(15): 7414.
https://doi.org/10.3390/ijms26157414

Çapan Ö.Y., 2025, Navigating uncertainty: assessing variants of uncertain significance in the *CDKL5* gene for developmental and epileptic encephalopathy using in silico prediction tools and computational analysis, Journal of Molecular Neuroscience, 75(1): 19.
https://doi.org/10.1007/s12031-024-02299-z

Chang Y., Huang Y., and Lai P., 2025, Genetic testing for diagnosing neurodevelopmental disorders and epilepsy: a systematic review and meta-analysis, Systematic Reviews, 14(1): 155.
https://doi.org/10.1186/s13643-025-02896-y

Gaouzi Z., Belkhayat A., Takki Z., Lachraf H., Diawara I., and Kriouile Y., 2025, Unraveling genetic etiologies in complex pediatric neurological diseases: a genetic investigation using whole exome sequencing, PLOS One, 20(5):e0324177.
https://doi.org/10.1371/journal.pone.0324177

García-Criado F., Hurtado-García L., Rojano E., Esteban-Martos Á., Pérez-García J., Seoane P., and Ranea J., 2025, Integrative transcriptomic and network-based analysis of neuromuscular diseases, International Journal of Molecular Sciences, 26(19): 9376.
https://doi.org/10.3390/ijms26199376

Gątarek P., and Kałużna-Czaplińska J., 2025, Zastosowanie technik chromatograficznych w badaniach metabolitów w schorzeniach związanych Z ośrodkowym układem nerwowym, Wiadomości Chemiczne, 79(1): 3-17.
https://doi.org/10.53584/wiadchem.2025.1.1

Guo L.Q., and Wu J.Y., 2025, Central mechanisms of inflammatory cytokines in the initiation and progression of metabolic syndrome, International Journal of Molecular Medical Science, 15(6): 263-273.
https://doi.org/10.5376/ijmms.2025.15.0027