American Journal of Biomedical Science & Research

www.biomedgrid.com

ISSN: 2642-1747

Short Communication

Future of Precision Medicine: Artificial Intelligence Guided Polypharmacology and Rational Polypharmacy Interventions

Ian Jenkins[1], Jayson Uffens[1], Waldemar Lernhardt[1], Krista Casazza[1] and Jonathan RT Lakey[1,2*]

[1]*GATC Health, 2030 Main Street, Suite 660, Irvine CA 92614*

[2]*Departments of Surgery and Biomedical Engineering, University of California Irvine, Irvine, CA*

***Corresponding author:** Jonathan RT Lakey, 1GATC Health, 2030 Main Street, Suite 660, Irvine CA 92614, Departments of Surgery and Biomedical Engineering, University of California Irvine, Irvine, CA

To Cite This Article: *Ian Jenkins, Jayson Uffens, Waldemar Lernhardt, Krista Casazza and Jonathan RT Lakey *, Future of Precision Medicine: Artificial Intelligence Guided Polypharmacology and Rational Polypharmacy Interventions. Am J Biomed Sci & Res. 2024 21(2) AJBSR. MS.ID.002815,* DOI: 10.34297/AJBSR.2024.21.002815

Received: January 11, 2024; **Published:** January 18, 2024

Keywords: Machine learning, AI, Multi-therapeutic Interventions

Short Communication

For decades, high specificity monotherapy has been the primary treatment for various conditions. However, this approach often falls short in complex cases such as addiction. This multifaceted condition frequently requires a combination of drugs for effective treatment modalities. However, polypharmacy whether prescribed or via self-medication approaches can lead to significant Potential Drug-Drug Interactions (PDIs) and issues like polysubstance abuse [1].

Similarly, treating mental health with serial monotherapy often involves a trial-and-error method, with a three-month lag time and 40% of patients still experiencing symptoms after a year. In addiction treatment, even using ten therapeutic modalities and multiple psychotherapies hasn't adequately addressed systemic deficiencies. Therefore, there's a need for an integrated approach using innovative platforms for simultaneous intervention across multiple targets [2].

The use of augmented intelligence (AI) technology is revolutionizing this field, providing insights and adaptive solutions. AI helps in developing polytherapeutic strategies that consider the diversity in symptoms and treatment responses. GATC Health (Irvine, CA) has developed AI in animal addiction studies, focusing on fentanyl abatement in rats. The AI-designed compounds were part of a multiomic algorithm that targeted specific brain regions involved in addiction. GATC scientists integrated various human datasets, including postmortem analyses, sequencing, and mRNA expression data, processed by Liquid Bioscience into GATC's evolving algorithms to identify key biomarkers. These biomarkers were then used to create effective drug combinations.

By targeting pathways within the addicted brain, the GATC AI platform also helps in optimizing polypharmacy. It selects compounds through in silico screens, focusing on safety and efficacy. AI's predictive capabilities extend to identifying effective combinations for therapy. For example, using novel methods like promotion of thiamine triphosphate generation, GATC's AI predicted optimal therapeutic combinations, later validated in animal models. These advances highlight AI's potential in bridging gaps in current therapeutic strategies. For instance, in experiments with the compounds lead candidate compounds (GATC-C3 and GATC-D3), administered orally in rats led to significant reductions in fentanyl self-administration. GATC-D3 was a high impact novel chemical entity created by the AI to address specific limitations in treating fentanyl addiction.

The journey into this innovative realm is just beginning, with promising early results. The next steps include replicating these animal outcomes in human trials and integrating molecular data to guide treatment outcomes.

References

1. (2023) Continued drug development with the platform will delve deeper into potential application advancements, marking a significant step in realizing AI's full potential in personalized and predictive treatment. This shift represents a revolutionary approach to healthcare, where treatments are not only personalized but also predictive, addressing today's deficits and transforming them into tomorrow's solutions. NIDA. Treatment and Recovery.
2. McLellan AT, Lewis DC, O Brien CP, Kleber HD (2000) Drug dependence, a chronic medical illness: implications for treatment, insurance, and outcomes evaluation. JAMA 284(13): 1689-1695.