From Biosensors Towards Artificial Intelligence: A New Era in Toxoplasmosis Diagnostics and Therapeutics

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Abstract : Toxoplasmosis is a global parasitic disease caused by the protozoan Toxoplasma gondii (T. gondii), with a high infection rate that affects one-third of the human population, and results in severe implications in pregnant women, neonates and immunocompromised patients. Anti-parasitic treatments and schemes available against toxoplasmosis have barely evolved over the last two decades. The current anti-T. gondii therapeutics are not potent or effective in eradicating the tissue cysts produced by the parasite and have adverse side effects on body physiology, especially in immunocompromised patients. This work aims to highlight new trends in Toxoplasma gondii diagnosis by providing a comprehensive overview of the field, summarizing recent findings, and discussing the technological advancements in toxoplasma diagnosis and treatment. Prospective therapeutics utilizing trends in molecular biophysics, such as biosensors, epigenetics and artificial intelligence (AI) might provide solutions for disease management and prevention. These insights will provide tools to identify research gaps and proffer novel planning options for disease control.

Keywords : toxoplamosis, diagnosis, therapeutics, biosensors, AI
Conference Title : ICMIP 2025 : International Conference on Microbial Immunology and Parasitology
Conference Location : Tokyo, Japan
Conference Dates : February 25-26, 2025