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Inaugural Editorial of the Inspire Health First Issue Publication

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Recent advances in molecular science, AI, and health informatics are transforming how complex diseases are understood, predicted, and managed. For accurate diagnosis and prognosis, multimodal and integrative frameworks that integrate imaging, clinical, genomic, and environmental data are frequently used [1]. Interdisciplinary approaches that incorporate molecular mechanisms, imaging data, environmental influences, and behavioral patterns in addition to isolated clinical observations are necessary to address contemporary health challenges. More all-encompassing approaches to illness prevention, early detection, and tailored intervention across various populations are made possible by this convergence.

Oxidative stress plays a major role in the development and course of many chronic and degenerative diseases at the molecular level. The antioxidant qualities of polyphenols, especially flavonoids, are well known. They are derived from phenolic hydroxyl groups linked to aromatic rings that have the ability to chelate pro-oxidant metal ions and neutralize reactive oxygen species. Through optimized molecular architecture that promotes metal ion binding via hydroxyl and carbonyl groups, flavonoids' antioxidant capacity can be further increased. Improving metal chelation potency not only strengthens free radical scavenging but also limits metal-catalyzed oxidative reactions. This emphasizes the importance of structure–function relationships in the design of effective antioxidant compounds [2-3].

Data-driven approaches have become more popular in addressing global infectious diseases like tuberculosis concurrently with molecular approaches. Tuberculosis (TB) is still a major public health burden even though it is mostly preventable and treatable, especially in areas with limited resources [4]. The broader biological, socioeconomic, and environmental factors that affect disease transmission may not be fully captured by traditional diagnostic and predictive frameworks, which frequently place a strong emphasis on clinical indicators. By using machine learning models to leverage non-clinical determinants, TB prediction can be improved, allowing for earlier intervention and more focused public health responses in vulnerable communities [5].

Additionally, AI has shown great promise in the early detection of non-communicable diseases, especially thanks to developments in deep learning. When it comes to the early detection of lung, breast, and skin cancers, where prompt diagnosis is essential for enhancing survival outcomes, multimodal deep learning frameworks that combine medical imaging with complementary data sources have demonstrated strong performance [6-7]. Similar to this, deep learning methods like convolutional neural networks and vision transformers have made it possible to accurately detect and classify diabetic retinopathy from fundus images in ophthalmology, particularly when

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combined through feature fusion strategies [8]. AI-based systems provide scalable, affordable screening tools that can increase access to early diagnosis while reducing the workload of specialists.

In the digital age, children's and teenagers' mental health has become more important than their physical health [9–10]. A higher risk of mental health issues in young people has been linked to increased exposure to online environments, especially excessive internet use and gaming. Machine learning is being used more and more to support mental health interventions, identify early warning indicators, and analyze behavioral patterns [11]. Bibliometric analyses of this research domain reveal rapidly expanding scholarly attention to children's mental health and online gaming disorder [9-11].

These research directions demonstrate the revolutionary potential of combining multimodal data analysis, machine learning, and molecular design in contemporary healthcare. From molecular bioactivity and disease prediction to sophisticated diagnostic technologies and bibliometric analyses of new mental health issues, the following collection of contributions in this first journal issue highlights various but related fields.

The first contribution examines flavonoids as bioactive substances that, due to their molecular structures, have antimicrobial, anti-inflammatory, and cardioprotective properties. Using molecular modeling, it finds that myricetin is the most stable and efficient metal chelator and antioxidant, highlighting the function of π-electron systems and catechol groups in lowering metal toxicity and oxidative stress. For improved antioxidant defense in conditions like cancer and chronic kidney disease, a combination treatment involving flavonoids and allicin is suggested.

In the second contribution, non-clinical factors like socioeconomic and environmental data are integrated with machine learning to predict tuberculosis in Nigeria's Niger Delta. RIPPER demonstrated the best balance among the three classifiers examined, underscoring the significance of incorporating risk factors beyond clinical symptoms for precise TB prediction.

A multimodal deep learning framework that combines imaging and biomarker data for the early detection of skin, breast, and lung cancers is presented in the third contribution. Through explainability tools like SHAP and GradCAM, it enhances accuracy and interpretability using CNNs and fully connected networks with an attention-based fusion, exhibiting robust performance across various datasets.

A bibliometric analysis of studies on children's mental health and online gaming disorder is provided in the fourth contribution, which highlights important themes, significant authors, and leading nations like the US. With deep learning models demonstrating promise in assessing behavioral indicators like sleep quality, it highlights the potential of machine learning to predict gaming disorders and evaluate related mental health issues.

In order to detect diabetic retinopathy from fundus images, the fifth contribution presents a hybrid deep learning model that combines CNN (AlexNet) and Vision Transformer (Swin Transformer) features. Using a Random Forest classifier, this fusion approach achieved 98.2% accuracy when tested on the APTOS 2019 dataset, outperforming standalone models and providing a potent tool for early diagnosis and prevention of vision loss.

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Conflicts of Interest

The author declares no conflicts of interest.

Ethical Approval and Consent to Participate

Not applicable.

List of Contributions

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