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Editorial: Using physical & genomics markers for smart therapy via expert systems with computer learning

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Editorial on the Research Topic
Using physical & genomics markers for smart therapy via expert systems with computer learning

Cancer diagnosis, prognosis, and treatment stand as pivotal factors in enhancing patient outcomes. Recent advances in AI, deep learning, and genomics are reshaping cancer research (Bhinder et al., 2021; Luchini et al., 2022). The integration of physical and genomics markers is essential for smart therapy. This is achieved through expert systems with computer learning (Chen et al., 2022; Deng et al., 2022; Ma et al., 2022; Chen et al., 2023; Sidorenkov et al., 2023).

Research in this domain has spotlighted predictive modeling and cancer biomarkers, demonstrating the application of machine learning in predicting malignancy and metastasis across various cancers, including lung and colorectal cancers (Ma et al., 2022; Wang et al., 2022; Mu et al., 2023). Furthermore, the emergence of novel combined models, integrating deep learning-pathomics and radiomics, holds promise in predicting postoperative outcomes in cancer patients (Wang et al., 2022).

Machine learning and whole-evidence analysis have facilitated comprehensive evaluation in cancer research. Studies focusing on lung cancer screening and hepatocellular carcinoma prognosis have enhanced screening and prognostic accuracy (Deng et al., 2022; Sidorenkov et al., 2023). Additionally, deep learning-based systems have demonstrated expert-level accuracy in delineating head and neck lymph node levels, contributing to advancements in radiotherapy research (Weissmann et al., 2023).

The investigation of cancer stem cells and their involvement in tumorigenesis has gained significant attention. Studies in this field have delved into the exploration of prognostic long non-coding RNAs (lncRNAs) and the development of deep learning models for early cancer diagnosis. These efforts underscore the critical importance of integrating both physical and genomic markers in treatment planning (Al Mamun et al., 2021).

In a stride toward addressing technical challenges in single-cell RNA-Seq data analysis, Huang et al. pioneered a novel approach integrating low-rank matrix completion for missing value imputation. Their work not only enhanced the accuracy of intratumor heterogeneity analysis but also laid a foundation for precise interpretations within the intricate landscape of cancer biology.

A pivotal study by Zhou et al. illuminated the significance of an immune-related prognostic signature in predicting the clinical outcomes and tumor immunity of stomach adenocarcinomas (STAD). Their findings underscored the pivotal role of immune cell infiltration, unveiling distinctive clusters of "hot" and "cold" tumors with divergent clinical trajectories, while identifying key genes, such as PEG10, DKK1, and RGS1, as critical prognostic markers.

Genes exert a significant impact not only on cancer but also on the development of various other diseases. Chuang et al. delved into the genetic nuances of diabetic retinopathy, shedding light on the influence of genetic variants of the lncRNA LINC00673 on disease susceptibility. Their exploration unveiled associations between specific LINC00673 single nucleotide polymorphisms (SNPs) and the development of non-proliferative diabetic retinopathy (NPDR), providing crucial insights into the genetic underpinnings of this complex ocular condition.

In parallel, Hsieh and Li harnessed the potential of image recognition techniques to rectify data imbalances in genetic disease research, spotlighting the transformative role of Synthetic Minority Oversampling Technique (SMOTE) in restoring data integrity within human biobanks. Their study streamlined data processing and facilitated more robust analysis and interpretation of genetic datasets.

In summary, these groundbreaking studies demonstrate the transformative potential of integrating physical and genomic markers into intelligent therapy systems, fortified by cutting-edge computational technologies. By fostering a collaborative and interdisciplinary approach that promotes scientific excellence, societal inclusivity, and ethical healthcare practices, we pave the way for a future where personalized medicine is not just a vision but a tangible reality accessible to all.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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