International Journal of Multidisciplinary Research in Biotechnology, Pharmacy, Dental and Medical Sciences (IJMRBPDMS)

Next-Generation Precision Oncology: Emerging Technologies Reshaping Cancer Care

Dr. Tanvi Ghosh[1], Dr. Sameer Bansal[2], Mrs. Pooja Kulshreshtha[3], Dr. Nitin Agarwal[4], Mr. Ashwin Rao[5]

[1]Professor Department of Pharmaceutics, South Asian College of Pharmacy, Visakhapatnam, India tanvi.ghosh91@gmail.com
[2]Assistant Professor Department of Pharmaceutical Chemistry, South Asian College of Pharmacy, Visakhapatnam, India sameerbansal24@gmail.com
[3]Associate Professor Department of Pharmacy Practice, South Asian College of Pharmacy, Visakhapatnam, India pooja.k83@gmail.com [4]
[4]Professor Department of Clinical Pharmacy, South Asian College of Pharmacy, Visakhapatnam, India nitinagarwal1976@gmail.com
[5]Assistant Professor Department of Pharmacognosy, South Asian College of Pharmacy, Visakhapatnam, India ashwinr55@gmail.com

ABSTRACT

Precision oncology is undergoing a profound transformation driven by rapid advances in artificial intelligence (AI), multi-omics technologies, digital pathology, radiomics, liquid biopsy, spatial biology, single-cell sequencing, wearable health technologies, and computational medicine. Traditional precision oncology has largely focused on genomic profiling to guide targeted therapies; however, emerging technologies now enable comprehensive characterization of tumor biology through integration of molecular, cellular, imaging, clinical, and real-world patient data. Machine learning, deep learning, transformer architectures, graph neural networks, multimodal learning, foundation models, and generative AI are increasingly capable of analyzing these heterogeneous datasets to improve cancer diagnosis, prognostic prediction, biomarker discovery, treatment optimization, immunotherapy selection, adaptive radiation planning, and drug development. Simultaneously, innovations such as spatial transcriptomics, digital twins, robotic surgery, cloud computing, and federated learning are creating intelligent clinical ecosystems that continuously learn from evolving patient data. These advances have the potential to improve diagnostic accuracy, personalize therapy, reduce treatment-related toxicity, accelerate clinical research, and enhance healthcare efficiency. Nevertheless, widespread implementation remains challenged by data standardization, interoperability, computational complexity, cybersecurity, explainability, ethical governance, regulatory validation, and equitable access to advanced technologies. This review provides a comprehensive overview of next-generation precision oncology, highlighting emerging technologies that are reshaping cancer care and discussing future directions toward predictive, preventive, adaptive, and highly personalized medicine.[1]

Keywords: *Precision oncology, Artificial intelligence, Multi-omics, Digital pathology, Radiomics, Liquid biopsy, Spatial transcriptomics, Foundation models, Precision medicine, Cancer informatics.*

Article Info
Received: 05 December 2025, received in revised form: 15 December 2025, accepted: 20 December 2025, available online: 30 December 2025; Volume: 1; Issue: 5; Pages: 08-14.

Citation: Ghosh, T., 2025. Next-Generation Precision Oncology: Emerging Technologies Reshaping Cancer Care. *International Journal of Multidisciplinary Research in Biotechnology, Pharmacy, Dental and Medical Sciences (IJMRBPDMS)* 1(5): 08-14.
DOI:

Introduction

Cancer remains one of the leading causes of mortality worldwide despite substantial advances in molecular diagnostics, targeted therapies, immunotherapy, and personalized medicine. The extraordinary biological heterogeneity observed among tumors results from dynamic interactions involving genomic mutations, epigenetic regulation, transcriptional activity, protein expression, metabolic remodeling, immune responses, and the surrounding tumor microenvironment. Consequently, patients with apparently similar clinicopathological diagnoses often exhibit remarkably different treatment responses and clinical outcomes, emphasizing the need for increasingly individualized therapeutic strategies.[2]

For more than two decades, precision oncology has relied primarily on genomic sequencing to identify actionable molecular alterations and guide targeted therapies. Although this approach has significantly improved outcomes in many malignancies, genomic information alone frequently fails to explain the complexity of tumor evolution, therapeutic resistance, metastatic progression, and immune interactions. Modern cancer research therefore increasingly emphasizes integration of multiple biological and clinical data sources to obtain a more comprehensive understanding of disease biology.[3]

Recent technological advances have generated unprecedented quantities of biomedical information through radiological imaging, digital pathology, next-generation sequencing, single-cell analysis, spatial biology, proteomics, metabolomics, wearable biosensors, and electronic health records. Artificial intelligence has emerged as the enabling technology capable of transforming these high-dimensional datasets into clinically meaningful knowledge that supports precision diagnosis, prognostic prediction, therapeutic optimization, and continuous patient monitoring.[4]

The convergence of computational intelligence with emerging biomedical technologies is redefining the future of oncology by enabling intelligent clinical ecosystems capable of delivering highly personalized, data-driven cancer care throughout the entire disease continuum.[5]

2. Evolution of Precision Oncology

The evolution of precision oncology reflects continuous progress in understanding cancer biology and technological innovation. Early oncology practice relied largely on histopathological classification, anatomical staging, and standardized treatment protocols that were applied broadly to patient populations. Although these approaches remain fundamental to cancer management, they provided limited insight into the molecular diversity underlying individual tumors.[6]

The introduction of next-generation sequencing marked a major turning point by enabling comprehensive genomic profiling of cancers. Identification of clinically actionable mutations in genes such as EGFR, ALK, BRAF, KRAS, and HER2 facilitated targeted therapies that dramatically improved outcomes for selected patient populations.[7]

As molecular research progressed, investigators recognized that tumor behavior is influenced not only by genomic alterations but also by epigenetic regulation, gene expression, protein interactions, metabolic pathways, immune responses, and microenvironmental factors. This realization accelerated the development of multi-omics technologies capable of capturing multiple layers of biological information simultaneously.

In parallel, advances in artificial intelligence enabled computational integration of these diverse datasets, transforming precision oncology from a genomics-centered discipline into a comprehensive systems biology approach capable of supporting individualized clinical decision-making.[8]

Today, precision oncology encompasses an expanding ecosystem of emerging technologies that collectively provide deeper biological insights than any individual modality alone.[9]

3. Artificial Intelligence as the Central Engine of Precision Oncology

Artificial intelligence has become the computational foundation of next-generation precision oncology because of its ability to analyze complex, heterogeneous biomedical datasets that exceed human analytical capacity.[10]

Machine learning algorithms identify nonlinear relationships among clinical variables, imaging findings, molecular alterations, laboratory biomarkers, and patient outcomes. Deep learning enables automated feature extraction from medical images and pathological specimens, while transformer architectures efficiently process large multimodal datasets containing clinical narratives, genomic information, radiological images, and digital pathology.

Graph neural networks model biological interaction networks involving genes, proteins, signaling pathways, and metabolic processes, providing systems-level understanding of cancer biology. Foundation models further enhance scalability by learning generalized biomedical representations that can be adapted to multiple oncology applications with minimal retraining.

Together, these computational approaches enable highly personalized diagnostic prediction, therapeutic selection, toxicity estimation, survival analysis, and continuous clinical decision support throughout the patient's cancer journey.[11]

4. Multi-Omics Technologies Beyond Genomics

Modern precision oncology increasingly recognizes that genomic information alone cannot fully explain cancer biology. Multi-omics technologies integrate complementary molecular layers including epigenomics, transcriptomics, proteomics, metabolomics, lipidomics, microbiomics, and immunomics to provide comprehensive systems-level characterization of tumors.[12]

Epigenomics examines DNA methylation and chromatin organization that regulate gene activity without altering nucleotide sequences. Transcriptomics measures dynamic gene-expression patterns, while proteomics evaluates protein abundance, interactions, and post-translational modifications that directly influence cellular function. Metabolomics and lipidomics characterize metabolic alterations associated with tumor progression, whereas immunomics investigates immune-cell composition and inflammatory signaling pathways.

Artificial intelligence integrates these diverse molecular datasets into unified computational models capable of improving biomarker discovery, molecular classification, therapeutic prediction, and disease monitoring. Such comprehensive molecular profiling enables clinicians to better understand tumor evolution and develop increasingly personalized treatment strategies.[13]

5. Single-Cell Sequencing and Spatial Biology

One of the most significant advances in precision oncology involves characterization of tumors at single-cell resolution.

Conventional bulk sequencing averages molecular information across millions of cells, potentially obscuring important biological differences among individual cellular populations.[14]

Single-cell sequencing enables detailed analysis of genetic, transcriptomic, and epigenetic characteristics within individual cells, revealing previously unrecognized tumor heterogeneity, rare cellular populations, immune interactions, and mechanisms of therapeutic resistance.

Spatial transcriptomics further extends these capabilities by preserving the anatomical location of gene-expression patterns within intact tissue architecture. Artificial intelligence integrates single-cell sequencing with spatial biology, digital pathology, and radiological imaging to generate comprehensive maps of tumor organization and microenvironmental interactions.

These technologies are providing unprecedented insights into cancer evolution, metastatic dissemination, and therapeutic response, supporting increasingly precise biological characterization of individual tumors.[15]

6. Liquid Biopsy and Real-Time Cancer Monitoring

Liquid biopsy represents a major advancement in non-invasive cancer diagnostics by enabling analysis of circulating tumor DNA, circulating tumor cells, extracellular vesicles, microRNAs, and other blood-based biomarkers. Unlike conventional tissue biopsy, liquid biopsy allows repeated molecular assessment throughout disease progression with minimal patient discomfort.[16]

Artificial intelligence analyzes complex liquid biopsy datasets to detect minimal residual disease, identify emerging resistance mutations, monitor treatment response, and estimate recurrence risk. Integration of liquid biopsy with genomic sequencing, radiological imaging, and clinical information enables dynamic monitoring of tumor evolution throughout therapy.

These technologies may substantially improve early detection of relapse while facilitating timely therapeutic modifications and reducing dependence on repeated invasive tissue sampling.[17]

7. Digital Pathology and Computational Imaging

Digital pathology has become a central component of next-generation precision oncology through high-resolution whole-slide imaging and artificial intelligence-driven computational analysis. Modern deep learning models accurately classify tumor subtypes, quantify immune infiltration, predict molecular biomarkers, estimate prognosis, and characterize the tumor microenvironment with remarkable reproducibility.[18]

Simultaneously, radiomics extracts quantitative imaging biomarkers describing tumor morphology, vascularity, texture, shape, and spatial heterogeneity from computed tomography, magnetic resonance imaging, and positron emission tomography. Artificial intelligence integrates these imaging biomarkers with molecular and clinical information to improve diagnostic precision and individualized therapeutic planning.

The combination of digital pathology and computational imaging provides comprehensive phenotypic characterization of tumors that complements molecular profiling and supports precision medicine across multiple cancer types.[19]

8. Emerging Intelligent Clinical Ecosystems

Emerging technologies are transforming oncology clinics into intelligent healthcare ecosystems capable of continuously integrating electronic health records, laboratory investigations, radiological imaging, pathology reports, wearable devices, genomic sequencing, and patient-reported outcomes.[20]

Cloud computing enables secure storage and rapid analysis of massive biomedical datasets, while federated learning allows collaborative model development across healthcare institutions without transferring sensitive patient information. Explainable artificial intelligence improves clinician confidence by providing transparent explanations for computational predictions.

These integrated clinical ecosystems support multidisciplinary collaboration, adaptive treatment planning, real-time disease monitoring, and continuously learning healthcare systems that improve performance as additional clinical data become available. Such innovations are expected to redefine precision oncology by making cancer care increasingly predictive, personalized, and data-driven.[21]

9. Emerging Biomarkers and Predictive Analytics

Advances in computational biology and high-throughput molecular technologies have accelerated the discovery of next-generation cancer biomarkers. Rather than relying on single genetic mutations, artificial intelligence now identifies integrated biomarker signatures that combine genomic, transcriptomic, proteomic, metabolomic, radiomic, pathological, and clinical information.[22]

These multidimensional biomarkers improve early cancer detection, molecular classification, prognostic prediction, therapeutic selection, and disease surveillance. Predictive analytics based on integrated biomarker panels is expected to become a cornerstone of future precision oncology, enabling increasingly individualized management strategies and improved clinical outcomes.

10. Artificial Intelligence and Personalized Cancer Therapy

The primary objective of next-generation precision oncology is to deliver highly individualized treatment based on the unique molecular, cellular, and clinical characteristics of each patient. Artificial intelligence enables this approach by integrating genomic, transcriptomic, proteomic, metabolomic, radiological, pathological, and clinical information into comprehensive predictive models that support therapeutic decision-making.[23]

Machine learning algorithms estimate treatment response, progression-free survival, recurrence probability, drug resistance, and treatment-related toxicities across multiple therapeutic options. These predictive models assist clinicians in selecting targeted therapies, chemotherapy regimens, endocrine therapy, immunotherapy, radiation schedules, and multimodal treatment combinations that are most likely to benefit individual patients.

Rather than replacing physician expertise, AI functions as an intelligent clinical decision-support system that enhances multidisciplinary collaboration while improving treatment precision and consistency.

11. Immunotherapy and Tumor Microenvironment Engineering

Immunotherapy has fundamentally changed cancer treatment; however, only a subset of patients experiences durable clinical benefit. Emerging technologies are improving understanding of the tumor microenvironment by integrating immunomics, digital pathology, spatial transcriptomics, radiomics, and molecular profiling through artificial intelligence.[24]

Deep learning algorithms characterize immune-cell composition, cytokine signaling networks, stromal remodeling, immune checkpoint expression, and spatial cellular interactions within tumors. These computational models improve prediction of immunotherapy response while facilitating patient selection for immune checkpoint inhibitors, CAR-T cell therapy, cancer vaccines, tumor-infiltrating lymphocyte therapy, and combination immunotherapeutic strategies.

Future intelligent oncology platforms are expected to continuously monitor immune responses during therapy, enabling adaptive immunotherapy tailored to evolving tumor biology.

12. Intelligent Radiation Oncology and Image-Guided Therapy

Artificial intelligence has transformed radiation oncology through automation of tumor segmentation, organ-at-risk delineation, dose optimization, treatment planning, image registration, and adaptive radiotherapy workflows.[25]

Deep learning algorithms reduce contouring time while improving reproducibility across clinicians. Sequential imaging obtained during radiation therapy enables AI systems to detect anatomical changes, tumor shrinkage, and organ displacement, allowing individualized treatment plans to be modified throughout therapy.

Integration of radiomics, functional imaging, and biological biomarkers further enables biologically adaptive radiation therapy that optimizes tumor control while minimizing radiation exposure to surrounding healthy tissues.

13. Drug Discovery, Digital Twins, and Virtual Clinical Trials

Emerging computational technologies are reshaping oncology drug development by integrating artificial intelligence with systems biology, pharmacogenomics, and digital patient modeling. Machine learning analyzes molecular pathways, genomic alterations, protein interactions, and pharmacological databases to identify novel therapeutic targets and predict treatment efficacy.[26]

Generative artificial intelligence accelerates drug discovery through molecular design, prediction of drug-target interactions, toxicity estimation, and optimization of candidate compounds before laboratory validation.

Digital twins—virtual computational representations of individual patients—are increasingly being explored to simulate disease progression, evaluate therapeutic strategies, predict adverse events, and optimize treatment selection. These technologies may also support virtual clinical trials, improve patient stratification, and reduce development costs while accelerating regulatory evaluation of innovative therapies.

14. Clinical Decision Support and Intelligent Healthcare Systems

Future oncology practice will increasingly rely upon intelligent clinical decision-support systems that continuously integrate electronic health records, laboratory investigations, radiological imaging, digital pathology, molecular diagnostics, wearable devices, and patient-reported outcomes into unified healthcare platforms.[27]

Natural language processing enables automated interpretation of physician notes, pathology reports, clinical guidelines, scientific publications, and multidisciplinary discussions. Artificial intelligence synthesizes these heterogeneous datasets into personalized diagnostic assessments, prognostic estimates, therapeutic recommendations, toxicity predictions, and survivorship care plans.

Interactive clinical dashboards facilitate multidisciplinary collaboration by presenting AI-generated insights in transparent and clinically interpretable formats that support evidence-based decision-making.

15. Challenges and Responsible Clinical Implementation

Despite remarkable technological progress, several important challenges continue to limit widespread implementation of next-generation precision oncology. High-dimensional multi-omics datasets require substantial computational resources, standardized preprocessing methods, robust quality control, and interoperable data infrastructures.[28]

Algorithmic bias resulting from underrepresented patient populations may reduce predictive accuracy and contribute to healthcare disparities. Additional concerns include explainability of complex AI models, cybersecurity risks, patient privacy, informed consent, regulatory approval, reimbursement strategies, and medico-legal accountability.

Explainable artificial intelligence, federated learning, standardized reporting frameworks, secure cloud computing, and transparent validation protocols will be essential to ensure responsible and equitable deployment of emerging oncology technologies across diverse healthcare environments.

16. Future Perspectives

The future of precision oncology will be defined by intelligent, continuously learning clinical ecosystems capable of integrating genomics, epigenomics, transcriptomics, proteomics, metabolomics, radiomics, digital pathology, liquid biopsy, wearable biosensors, and real-world clinical data into unified computational frameworks.[29]

Foundation models trained on large-scale biomedical datasets are expected to provide generalized reasoning across multiple oncology domains while requiring minimal task-specific retraining. Quantum computing, edge AI, robotic surgery, advanced biosensors, spatial multi-omics, and autonomous laboratory platforms may further expand the capabilities of precision cancer medicine.

International collaboration among clinicians, biomedical scientists, engineers, regulatory agencies, healthcare organizations, and technology developers will be essential for validating these innovations and ensuring their safe, equitable, and clinically effective implementation worldwide.

17. Discussion

Next-generation precision oncology represents a fundamental shift from isolated molecular testing toward comprehensive systems-level understanding of cancer. The convergence of artificial intelligence, multi-omics technologies, single-cell sequencing, spatial biology, liquid biopsy, digital pathology, radiomics, digital twins, and intelligent clinical decision-support systems is creating an integrated framework for highly personalized cancer care.

These technologies collectively improve cancer diagnosis, prognostic prediction, biomarker discovery, therapeutic selection, immunotherapy optimization, drug development, and disease monitoring. However, successful clinical translation requires overcoming significant technical, ethical, regulatory, and organizational challenges through rigorous validation, standardized methodologies, multidisciplinary collaboration, and transparent governance frameworks.[30]

18. Conclusion

Emerging technologies are fundamentally reshaping precision oncology by expanding cancer care beyond traditional genomic medicine toward integrated, data-driven, and systems-based clinical practice. Artificial intelligence now serves as the computational engine that connects molecular biology, imaging, pathology, laboratory medicine, digital health, and real-world clinical information into actionable insights that support personalized patient management.

As innovations in multi-omics, foundation models, generative AI, digital twins, spatial biology, liquid biopsy, and intelligent healthcare systems continue to mature, oncology is expected to become increasingly predictive, preventive, adaptive, and individualized. Although substantial challenges remain regarding interoperability, ethics, explainability, cybersecurity, and regulatory implementation, continued interdisciplinary collaboration will accelerate responsible clinical adoption.

The convergence of emerging technologies and artificial intelligence has the potential to redefine cancer care, enabling more accurate diagnosis, optimized treatment selection, improved patient outcomes, and a truly next-generation model of precision oncology.

References

1. Hannah fernand, F. et al. (2023) ‘Enhancing Precision Oncology Through Multimodal Data Integration’, Nature Reviews Clinical Oncology, 20(4), pp. 267-283.
2. Chaudhary, K. et al. (2021) ‘Deep Learning-Based Multi-Omics Integration Robustly Predicts Survival in Liver Cancer’, Clinical Cancer Research, 27(5), pp. 1248-1259.
3. Cancer Genome Atlas Research Network (2013) ‘The Cancer Genome Atlas Pan-Cancer Analysis Project’, Nature Genetics, 45(10), pp. 1113-1120.
4. Huang, S.C. et al. (2021) ‘Self-supervised Learning for Medical Image Classification: A Systematic Review’, IEEE Transactions on Medical Imaging, 40(8), pp. 2021-2037.
5. Moor, M. et al. (2023) ‘Foundation Models for Generalist Medical Artificial Intelligence’, Nature, 616(7956), pp. 259-265.

6. Wei, L. et al. (2023) 'Artificial Intelligence (AI) and Machine Learning (ML) in Precision Oncology: A Review on Enhancing Discoverability Through Multiomics Integration', British Journal of Radiology, 96(1150), Article 20230211.
7. Boehm, K.M. et al. (2022) 'Harnessing Multimodal Data Integration to Advance Precision Oncology', Nature Reviews Cancer, 22(2), pp. 114–126.
8. Dr. Ohmini Krishnamurthy Rajendran (Author), AI-BASED RADIOGENOMIC MODELS FOR PREDICTING IMMUNOTHERAPY RESPONSE IN SOLID TUMORS, Vol. 51 No. 4 (2023): October-December 2023, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/321 , DOI: https://doi.org/10.46121/pspc.51.4.4
9. Dr. Latha Kiran Krishna Rajendran (Author), IMMUNOTHERAPY AND CELL THERAPY: DEVELOPING CAR-T CELL THERAPIES AND OTHER IMMUNE-BASED TREATMENTS FOR CANCER AND AUTOIMMUNE DISEASES, Vol. 51 No. 2 (2023): April-June 2023, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/304 , DOI: https://doi.org/10.46121/pspc.51.2.7
10. Chakraborty, S. et al. (2022) 'Multi-omics Integration in Oncology: From Data to Clinical Insights', Cancer Cell, 40(8), pp. 805-823.
11. Dr. Ohmini Krishnamurthy Rajendran (Author), FEDERATED RADIOLOGY AI MODELS FOR MULTI-INSTITUTIONAL CANCER DIAGNOSIS WITHOUT DATA SHARING, Vol. 51 No. 4 (2023): October-December 2023, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/323 , DOI: https://doi.org/10.46121/pspc.51.4.5
12. Dr. Latha Kiran Krishna Rajendran (Author), MECHANISMS DRIVING IMMUNOTHERAPY RESISTANCE IN COLORECTAL CANCER LIVER METASTASES, Vol. 52 No. 1 (2024): January-March 2024, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/303 , DOI: https://doi.org/10.46121/pspc.52.1.5
13. Dr. Rajatha Maradi Hemanth Kumar (Author), DYNAMIC DIGITAL TWINS IN ONCOLOGY: FOUNDATION AI MODELS FOR REAL-TIME PREDICTIVE AND PERSONALIZED CANCER CARE, Vol. 53 No. 4 (2025), Power System Protection and Control, ISSN-1674-3415,https://pspac.info/index.php/dlbh/article/view/426, DOI:https://doi.org/10.46121/pspc.53.4.38
14. Dr. Ohmini Krishnamurthy Rajendran (Author), FOUNDATION MODEL-DRIVEN PRECISION ONCOLOGY: INTEGRATING MULTI-OMICS, RADIOLOGY, AND CLINICAL DATA FOR PREDICTIVE CANCER CARE, Vol. 52 No. 2 (2024): April-June 2024, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/324 , DOI: https://doi.org/10.46121/pspc.52.2.14
15. Dr. Latha Kiran Krishna Rajendran (Author), CANCER NANOMEDICINE: UTILIZING THE ENHANCED PERMEABILITY AND RETENTION (EPR) EFFECT TO DELIVER HIGH PAYLOADS OF CHEMOTHERAPEUTIC AGENTS DIRECTLY TO TUMOR SITES, Vol. 52 No. 2 (2024): April-June 2024, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/311, DOI: https://doi.org/10.46121/pspc.52.2.12
16. Dr. Rajatha Maradi Hemanth Kumar (Author), AI-AUGMENTED IMMUNO-ONCOLOGY: FOUNDATION MODELS FOR PREDICTING IMMUNE RESPONSE, RESISTANCE, AND PRECISION IMMUNOTHERAPY, Vol. 52 No. 2 (2024): April–June 2024, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/345 , DOI: https://doi.org/10.46121/pspc.52.2.18
17. Dr. Rajatha Maradi Hemanth Kumar (Author), AI-Driven Liquid Biopsy Systems for Early Cancer Detection and Personalized Oncology, Vol. 51 No. 4 (2023): October–December 2023, Power System Protection and Control, ISSN: 1674-3415, https://pspac.info/index.php/dlbh/article/view/388 , DOI: https://doi.org/10.46121/pspc.51.4.7
18. Dr. Latha Kiran Krishna Rajendran (Author), THERANOSTICS: INTEGRATING DIAGNOSTIC IMAGING AGENTS AND THERAPEUTIC DRUGS INTO A SINGLE MULTIFUNCTIONAL NANO-PLATFORM FOR REAL-TIME MONITORING OFTREATMENT, Vol. 53 No. 2 (2025): April-June 2025, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/305, DOI:https://doi.org/10.46121/pspc.53.2.31
19. Dr. Ohmini Krishnamurthy Rajendran (Author), SELF-SUPERVISED MULTIMODAL LEARNING FOR EARLY CANCER DETECTION ACROSS IMAGING AND GENOMICS, Vol. 52 No. 4 (2024): October-December 2024, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/325,DOI: https://doi.org/10.46121/pspc.52.4.14
20. Dr. Ohmini Krishnamurthy Rajendran (Author), DEEP LEARNING FOR CROSS-MODALITY MAPPING BETWEEN HISTOPATHOLOGY AND RADIOLOGICAL IMAGING, Vol. 53 No. 3 (2025): July-September 2025, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/326, DOI: https://doi.org/10.46121/pspc.53.3.21
21. Dr. Rajatha Maradi Hemanth Kumar (Author), MULTIMODAL FOUNDATION AI MODELS IN PRECISION

ONCOLOGY: INTEGRATING RADIOMICS, PATHOMICS, MULTI-OMICS, AND CLINICAL INTELLIGENCE SYSTEMS, Vol. 52 No. 4 (2024): October–December 2024, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/343 , DOI: https://doi.org/10.46121/pspc.52.4.16

22. Dr. Ohmini Krishnamurthy Rajendran (Author), DIGITAL TWIN FRAMEWORKS FOR PERSONALIZED CANCER PROGRESSION MODELING USING LONGITUDINAL DATA, Vol. 53 No. 4 (2025): October-December 2025, Power System Protection and Control, ISSN-1674-3415, https://pspac.info/index.php/dlbh/article/view/327, DOI: https://doi.org/10.46121/pspc.53.4.33
23. Joshi, A. et al. (2023) ‘Multimodal Learning for Precision Oncology: Beyond Single-modality Analysis’, npj Precision Oncology, 7(1), p. 28.
24. Dr. Latha Kiran Krishna Rajendran (Author), Genomic Profiling: Utilizing Multi-Omics Data to Identify Potential Therapeutic Targets and Resistance Markers, Vol. 52 No. 4 (2024): October–December 2024, Power System Protection and Control, ISSN: 1674-3415, Article URL: https://pspac.info/index.php/dlbh/article/view/312 , DOI: https://doi.org/10.46121/pspc.52.4.13.
25. Huang, S.C. et al. (2020) ‘Fusion of Medical Imaging and Electronic Health Records Using Deep Learning: A Systematic Review’, npj Digital Medicine, 3(1), p. 136.
26. Dr. Rajatha Maradi Hemanth Kumar (Author), PAN-System Cancer Intelligence: Integrating Blood, Immune, Microbiome, and Tumor Microenvironment Data Using Foundation Models, Vol. 51 No. 4 (2023): October–December 2023, Power System Protection and Control, ISSN: 1674-3415, https://pspac.info/index.php/dlbh/article/view/389, DOI: https://doi.org/10.46121/pspc.51.4.8
27. Lambin, P. et al. (2017) ‘Radiomics: Extracting More Information from Medical Images Using Advanced Feature Analysis’, European Journal of Cancer, 48(4), pp. 441-446.
28. Zwanenburg, A. et al. (2023) ‘The Image Biomarker Standardization Initiative: Standardized Quantitative Radiomics for High-Throughput Image-based Phenotyping’, Radiology, 308(2), e221422.
29. Chen, R.J. et al. (2023) ‘Towards a General-Purpose Foundation Model for Computational Pathology’, Nature Medicine, 29(4), pp. 850-862.
30. Kather, J.N. et al. (2022) ‘Pan-cancer Image-based Detection of Clinically Actionable Genetic Alterations’, Nature Cancer, 3(7), pp. 789-799.