Title:
Role of artificial intelligence in optimizing treatment decision-making and patient management in oncology

Full Name:
Anand Praveen Kumar A

Name of the Institution:
Stanley Medical College

State:
Tamil Nadu

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
1. Improve Personalized Medicine: Develop AI-driven personalized treatment plans tailored to individual patient characteristics, tumor biology, and treatment outcomes.
2. Enhance Predictive Analytics: Create AI-powered predictive models to forecast patient outcomes, identify high-risk patients, and optimize treatment strategies.
3. Streamline Clinical Decision-Making: Provide clinicians with AI-driven insights and recommendations to support informed decision-making and improve patient care.
4. Improve Patient Outcomes: Ultimately, improve cancer treatment outcomes, reduce mortality rates, and enhance quality of life for patients.
5. Advance Cancer Research: Facilitate cancer research by providing AI-driven insights, identifying new research directions, and accelerating the discovery of novel treatments.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Areas in Clinical Oncology that are Data-Intensive, Complex, and Multimodal
1. Cancer Diagnosis: Analyzing medical images, lab results, and genetic data to diagnose cancer accurately.
2. Treatment Planning: Developing personalized treatment plans based on patient characteristics, tumor biology, and treatment outcomes.
3. Disease Monitoring: Tracking patient response to treatment, detecting recurrence, and identifying potential complications.
4. Survivorship Care: Managing long-term side effects, monitoring secondary cancers, and providing supportive care.
Stakeholders of a Patient Journey and Data Sources
1. Patients: Medical history, genetic data, lifestyle information, and patient-reported outcomes.
2. Clinicians: Electronic health records (EHRs), clinical notes, and treatment plans.
3. Researchers: Clinical trial data, genomic data, and research publications.
4. Payers: Claims data, insurance information, and healthcare utilization patterns.
Clinical Decision-Making and Patient Impact Enabled by AI
1. Personalized Medicine: AI-driven analysis of genomic data, medical images, and clinical information to develop tailored treatment plans.
2. Predictive Analytics: AI-powered predictive models to forecast patient outcomes, identify high-risk patients, and optimize treatment strategies.
3. Clinical Trial Matching: AI-driven matching of patients with relevant clinical trials based on their genetic profiles, medical histories, and treatment outcomes.
4. Survivorship Care Planning: AI-generated care plans to manage long-term side effects, monitor for secondary cancers, and provide supportive care.
Model Improvement and Continuous Learning

1. Data Feedback Loops: Establish feedback mechanisms to update AI models with new data, ensuring continuous learning and improvement.
2. Human-in-the-Loop: Involve clinicians and researchers in the AI development process to provide expert feedback and validate model performance.
3. Model Validation and Testing: Regularly validate and test AI models using diverse datasets to ensure accuracy, reliability, and generalizability.
4. Explainability and Transparency: Develop explainable AI models that provide transparent insights into decision-making processes, enabling clinicians to trust and refine the models.

Systems for Continuous Improvement of AI Models

1. Data Governance: Establish data governance frameworks to ensure data quality, security, and compliance.
2. Model Monitoring: Implement model monitoring systems to track performance, detect drift, and alert clinicians to potential issues.
3. Collaborative Platforms: Develop collaborative platforms for clinicians, researchers, and data scientists to share knowledge, validate models, and drive innovation.
4. Continuous Learning Frameworks: Establish frameworks for continuous learning, enabling AI models to adapt to new data, technologies, and clinical practices.

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State:
Karnataka

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
In cancer, artificial intelligence (AI) helps with the analysis of intricate data to facilitate individualized treatment regimens and effective patient care, which eventually enhances clinical results and the standard of care.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
A) The clinical data is intensive and multimodal from different sources, visualizing methods, biomarkers, and interventions, which makes it complex and multisystem. However, the crucial areas across are:
1. Radiomics and Imaging-based Oncology- Linkages made with the application of molecular imaging of the CT, MRI, and PET
2. Precision oncology and genomics- Genomics, transcriptomics and epigenetic
3. The third Analyzing and the fourth the Immunotherapy and Tumor Microenvironment Analysis- are methods that combine proteomics, metabolomics, and genomics.
4. Digital histopathology slides analysis with AI, correlation of Histological features with genetic and imaging information. Cancer grading and prognosis prediction are done using deep learning.
5. Multi-site clinical trials, patient-reported outcomes, and EHR integration, the longitudinal data for treatment optimization and survival prediction
6. AI-driven treatment adaptation is executed by reality-driven tumor development and the joining of the genetic and imaging data with the radiation theme.
7. The exomes are the ones to combine when it comes to the performing function of their proteins in signal transmission. The circulating tumor DNA (ctDNA) throughout the body besides.

B)
1.Key Stakeholders
Patients & Caregivers: Get care and share feelings
Healthcare Providers: Oncologists, radiologists, nurses, pharmacists, primary care physicians
Hospitals & Clinics: Cure patient and save his/her record
Research & Regulatory Bodies: Clinical trial sponsors, FDA, NCI, ethics committees
Tech & Data Companies: AI firms, EHR vendors, health information exchanges
Government & Public Health: WHO, CDC, policymakers shaping cancer care
2. Key Data Sources
Diagnostic Data Imaging: (CT, MRI, PET), pathology, genomics
Clinical & Treatment Data: EHRs, prescriptions, treatment plans
Patient-Generated Data: Wearables, symptom tracking, PROs
Research & Trial Data: Multi-omics, clinical studies, registries
Socioeconomic Data: Reason of poverty, life skills and qualities
Post-Treatment Data: Follow-ups, survivorship programs, recurrence monitoring Good coordination of the various data sources is very important for personalized cancer care and the patient is guaranteed of an improved outcome.

C)
1.AI-powered imaging analysis (CT, MRI, and PET) has higher diagnostic accuracy and can discover malignancies at earlier stages.
2.Another fantastic example of AI being beneficial in the health field is AI-powered precision medicine. Here, clinicians use AI-powered combined clinical data, biomarkers, and genetics to design personalized therapy.
3.Optimal Cancer Treatment Models: AI-driven drug discovery and personalized medicine models can predict immunotherapy effectiveness and other cancer therapeutic responses.
4.Automated Radiologic / Pathologic Imaging: AI with radiomics and histology helps in cancer prognosis and relevant to cancer types.
5.Matching Patients to Clinical Trials: AI extracts insights from clinical trials thus enables them to use this data to compare patients to studies and (clinical trial) data to guide therapy (decision support).

D)
1. Data-Driven Imitation - The real-world evidence, the latest patient data, and the hospital-wide federated learning is a better AI model.
2. Clinician Feedback Loops- The oncologists make real-time verifications of the AI predictions through real-time monitoring, offer modifications, and in the process, they improve model accuracy.
3. Explainability & Bias Reduction- The AI model takes an initiative to detect the biases and then integrate interpretable outputs. Besides, it conforms to the changing regulatory requirements.
4. Automated Updates- The continuous AI versioning, retraining techniques, and self-learning pipelines ensure the ongoing optimization.
5. Robust Governance- Cloud-based integration, secure data-sharing protocols, and ethical AI committees are the key elements for the progress of long-cutting edge technologies.

References
1. Wang, J., Zeng, Z., Li, Z. *et al*. The clinical application of artificial intelligence in cancer precision treatment. *J Transl Med* 23, 120 (2025). https://doi.org/10.1186/s12967-025-06139-5.
2. Chang L, Liu J, Zhu J, Guo S, Wang Y, Zhou Z, *et al.* Advancing precision medicine: the transformative role of artificial intelligence in immunogenomics, radiomics, and pathomics for biomarker discovery and immunotherapy optimization. *Cancer Biol Med*. 2025; 22(1): 33-47. doi: 10.20892/j. issn.2095-3941.2024.0376.

3. Huan Yang, Minglei Yang, Jiani Chen, Guocong Yao, Quan Zou, Linpei Jia, Multimodal deep learning approaches for precision oncology: a comprehensive review, Briefings in Bioinformatics, Volume 26, Issue 1, January 2025, bbae699, https://doi.org/10.1093/bib/bbae699

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Objective of your solution:(Briefly define the primary outcome of your solution to this challenge):
Primary Outcomes
1. Improved Patient Outcomes: Enhanced treatment efficacy, improved survival rates, and better quality of life for cancer patients.
2. Increased Patient Satisfaction: Higher patient satisfaction with personalized care, improved communication, and better coordination among healthcare providers.
3. Enhanced Clinician Productivity: Improved clinician productivity, reduced burnout, and increased time for high-value tasks.
4. Optimized Clinical Workflows: Streamlined clinical workflows, reduced administrative burdens, and improved efficiency.
5. Better Utilization of Genomic Data: Effective use of genomic data to inform treatment decisions, improving treatment efficacy and reducing unnecessary treatments.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Data-Intensive, Complex, and Multimodal Areas in Clinical Oncology
1. Genomic analysis: Analyzing genomic data from next-generation sequencing (NGS) to identify genetic mutations and inform personalized treatment plans. Data sources: Genomic sequencing data, genetic variant databases. Complexity: High-dimensional data, complex algorithms for variant detection and interpretation
2. Imaging analysis: Analyzing medical images from modalities like MRI, CT, and PET to diagnose and monitor cancer progression. Data sources: Medical images, imaging protocols. Complexity: Large image datasets, complex algorithms for image processing and analysis
3. Electronic Health Records (EHRs): Analyzing EHRs to identify patterns and correlations between patient demographics, medical history, and treatment outcomes. Data sources: EHRs, claims data. Complexity: Large, heterogeneous datasets, complex algorithms for data extraction and analysis.
4. Clinical trials data: Analyzing data from clinical trials to identify effective treatment regimens and predict patient responses. Data sources: Clinical trials databases, trial protocols. Complexity: Complex data structures, high-dimensional data, complex algorithms for data analysis and modeling.
5. Patient-reported outcomes: Analyzing patient-reported outcomes, such as quality of life and symptom severity, to inform personalized care plans. Data sources: Patient-reported outcome measures (PROMs), patient surveys. Complexity: Complex data structures, high-dimensional data, complex algorithms for data analysis and modeling.
Stakeholders of a Patient Journey and Data Sources
1. Patients: Patients provide self-reported data, such as symptoms, quality of life, and treatment adherence. Data sources: Patient-reported outcome measures (PROMs), patient surveys.
2. Clinicians: Clinicians provide clinical data, such as diagnoses, treatments, and outcomes. Data sources: Electronic Health Records (EHRs), claims data

3. EHRs: EHRs provide comprehensive patient data, including medical history, medications, and lab results. Data sources: EHRs, claims data.
4. Imaging modalities: Imaging modalities, such as MRI and CT, provide medical images for analysis. Data sources: Medical images, imaging protocols.
5. Genomic testing: Genomic testing provides genetic data, such as mutations and variations. Data sources: Genomic sequencing data, genetic variant databases.
6. Clinical trials databases: Clinical trials databases provide data on treatment outcomes, adverse events, and patient demographics. Data sources: Clinical trials databases, trial protocols.
7. Patient advocacy groups: Patient advocacy groups provide data on patient experiences, preferences, and outcomes. Data sources: Patient-reported outcome measures (PROMs), patient surveys.

Clinical Decision-Making and Patient Impact Enabled by AI Implementation

1. Personalized treatment planning: AI can analyze genomic data, medical images, and clinical data to identify effective treatment regimens tailored to individual patients. Impact: Improved treatment outcomes reduced adverse events.
2. Predictive analytics: AI can predict patient outcomes, such as response to treatment, progression-free survival, and overall survival. Impact: Improved patient stratification, optimized treatment planning.
3. Early detection and diagnosis: AI can analyze medical images and genomic data to detect cancer at an early stage, improving treatment outcomes and survival rates. Impact: Improved survival rates, reduced morbidity.
4. Streamlined clinical workflows: AI can automate routine tasks, such as data entry and report generation, freeing up clinicians to focus on high-value tasks. Impact: Improved clinician productivity, reduced burnout.
5. Improved patient engagement: AI can provide personalized patient education, support, and empowerment, improving patient satisfaction and outcomes. Impact: Improved patient satisfaction, improved health outcomes.

Continuous Improvement of AI Models

1. Data curation and updating: Regularly update and curate data sources to ensure accuracy, completeness, and relevance. Impact: Improved model accuracy, reduced bias.
2. Model retraining and validation: Retrain and validate AI models regularly to ensure they remain accurate and effective. Impact: Improved model performance, reduced drift.
3. Human-in-the-loop feedback: Incorporate human feedback and oversight into AI decision-making processes to ensure accuracy and relevance. Impact: Improved model accuracy, reduced errors.
4. Explainability and transparency: Develop explainable and transparent AI models that provide insights into decision-making processes. Impact: Improved trust reduced regulatory risk.
5. Collaboration and knowledge sharing: Foster collaboration and knowledge sharing among clinicians, researchers, and AI developers to ensure AI models remain state-of-the-art and effective. Impact: Improved model performance, reduced knowledge gaps.

Systems for Continuous Improvement of AI Models

1. Data governance frameworks: Establish data governance frameworks to ensure data quality, security, and compliance.
2. Model development and validation pipelines: Develop and validate AI models using standardized pipelines that ensure reproducibility and accuracy.
3. Human-in-the-loop feedback mechanisms: Establish mechanisms for human feedback and oversight, such as clinician review and validation of AI-generated reports.
4. Continuous learning and updating: Implement continuous learning and updating mechanisms, such as online learning and transfer learning, to ensure AI models remain accurate and effective.
5. Audit trails and logging mechanisms: Establish audit trails and logging mechanisms to track AI decision-making processes and ensure transparency and accountability.

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State:
Karnataka

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Primary Outcome of AI-Driven Oncology Solutions
1. Improved Clinical Outcomes:
a) Enhanced accuracy in treatment selection (e.g., matching targeted therapies to tumor genomics).
b) Reduced time-to-diagnosis and treatment initiation through automated analysis of imaging/lab data.
2. Personalized Care:
a) Tailored treatment plans based on multimodal data (genomic, imaging, clinical history).
b) Dynamic adaptation of therapies using real-time patient monitoring (e.g., wearable devices).
3. Operational Efficiency:
a) Streamlined workflows (e.g., AI-assisted EHR documentation, automated triage).
b) Reduced clinician burnout by minimizing administrative burdens.
4. Equitable Access:
a) Mitigation of biases via diverse training data, ensuring fair recommendations across demographics.
b) Scalable solutions for low-resource settings (e.g., AI-guided telemedicine).
5. Accelerated research via AI-driven insights from real-world data.
6. Cost savings through optimized resource allocation and reduced trial-and-error treatments.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Data-Intensive, Complex, & Multimodal Areas in Clinical Oncology
1. Genomic/Proteomic Data: Tumor sequencing, biomarker analysis (e.g., PD-L1, BRCA).
2. Medical Imaging: Radiomics (CT/MRI/PET scans), pathology slides (digital histopathology).
3. Clinical Records: EHRs (diagnoses, treatments, outcomes), longitudinal patient histories.
4. Real-World Data: Wearables (symptom tracking), patient-reported outcomes, social determinants of health.
5. Treatment Planning: Drug interactions, radiation dosimetry, immunotherapy response prediction.
Stakeholders & Data Sources in the Patient Journey
1. Stakeholders:
a) Patients, oncologists, surgeons, radiologists, pathologists, nurses, palliative care teams, pharmacists, payers, clinical trial coordinators.
2. Data Sources:
a) Clinical: Electronic health records, imaging archives, lab reports, genomic databases (e.g., The Cancer Genome Atlas).
b) External: Clinical trial repositories (e.g., ClinicalTrials.gov), population health datasets, wearable devices.
c) Operational: Hospital billing systems, patient portals.
AI-Driven Clinical Decision-Making & Patient Impact
1. Precision Treatment:
a) Match tumors to therapies using genomic-clinical data integration (e.g., IBM Watson for Oncology).
b) Predict drug resistance/toxicity (e.g., Machine Learning models for chemotherapy adverse events).
2. Early Detection:
a) AI-enhanced imaging analysis (e.g., lung nodule detection on CT scans).
b) Risk stratification for screening (e.g., mammography prioritization).
3. Workflow Optimization:
a) Automate administrative tasks (e.g., Electronic Heath Record documentation via Natural Language Processing).
b) Triage urgent cases (e.g., flagging deteriorating patients via vital signs).

4. Patient Empowerment:
a) Chatbots for symptom monitoring (e.g., Babylon Health).
b) Personalized survivorship plans (e.g., recurrence risk calculators).

AI Model Improvement Systems

1. Continuous Learning:
a) Feedback loops from clinician input (e.g., MDT reviews correcting model errors).
b) Real-world performance data (e.g., tracking treatment outcomes post-AI recommendations).
2. Retraining Frameworks:
a) Regular updates using new datasets (e.g., updated NCCN guidelines, trial results).
b) Learning across institutions to enhance generalizability.
3. Quality Assurance:
a) Bias audits (e.g., ensuring equity across ethnic/age groups).
4. Collaborative Ecosystems:
a) Partnerships with research consortia (e.g., AACR Project GENIE) for data sharing.

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Karnataka

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
AI is a catalyst for next-generation oncology, delivering data-driven, precise, and equitable care. Ongoing investment in AI infrastructure, clinician collaboration, and ethical governance will be key to realizing its full potential in improving patient outcomes.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

Key Data-Intensive Areas in Oncology:

1. Medical Imaging (CT, MRI, pathology slides)
2. Genomic & Molecular Profiling
3. Electronic Health Records (EHR)
4. Treatment Planning & Monitoring
5. Clinical Trials & Research Data

These areas generate large volumes of structured and unstructured data requiring advanced AI models to extract actionable insights.

Stakeholders & Data Sources:

1. Stakeholders: Patients, oncologists, radiologists, pathologists, geneticists, nurses, researchers, payers, and administrators.
2. Data Sources: EHR systems, PACS imaging archives, genomic databases, pathology labs, patient wearables, clinical trials, and insurance claims.

AI-Enabled Clinical Decisions & Impact:

1. Early Detection through image analysis
2. Prognostic Modeling for survival and recurrence
3. Personalized Therapy Recommendations
4. Real-Time Monitoring & Alerts
5. Clinical Trial Matching

Patient Impact: Faster diagnosis, improved treatment outcomes, fewer side effects, enhanced care personalization, and reduced disparities.

Continuous Improvement of AI Models:

1. Retraining New Data
2. Human-in-the-Loop Feedback
3. Federated & Transfer Learning
4. Monitoring & Model Governance
5. Data Pipelines and MLOps Systems

These systems ensure that AI models remain accurate, unbiased, and clinically relevant over time.

Full Name:
Athira Vincent

Name of the Institution:
Regional Cancer Center

State:
Kerala

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
To develop a self-learning AI platform that supports accurate cancer diagnosis, personalized treatment, and real-time patient monitoring through multimodal data integration and continuous clinician-guided improvement.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

ONCOBOT AI: GUIDING TREATMENT, GUARDING HOPE.

1. A self-learning AI platform which can effectively decentralize the multimodal, data intensive aspects in oncology care such as histopathological examination, radiology, genomics and molecular and patient assessment.
2. The application can be launched as a pilot program in few selected apex centers in our country.
3. The platform is fed retrospective data, from the patients of the center for over the last 5 years, which includes the demographics, disease specific details, including the histopathological slides, images and reports, NGS reports, staging, treatment plan and toxicities, response to therapy, survival, post treatment complications.
4. Once it learns from the data, another set of unlabeled data is fed for validation of its ability to diagnose, predict and implement treatment and monitor response, predict toxicities and early relapses.
5. This can be then implemented in clinical practice.
6. Each step of the way, for instance, interpreting the biopsy, the image is uploaded to ONCOBOT and it gives a report which is then approved by the pathologist, radiologist following a CT/MRI.
7. An override command is given if there is an error in the AI generated report. The model learns from each error it makes and hence it is a self-improving model.
8. Treatment plan is formulated by the bot once the work up is completed. The plan is then approved by a multidisciplinary tumor board. The ethical concerns of an AI generated plan or report can be partially negated with approval from a qualified professional.
9. The model can predict toxicities that can develop complications to watch for. Patients can be given access to a user friendly chatbot, which can regularly monitor them including daily counts and biochemistry and advise hospital visit when experiencing any difficulty. It can be linked to wearables (like apple watch) to monitor basic vitals of patient and refer them for further care if necessary.

Full Name:
Vishwanath M

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Madras Medical College

State:
Tamil Nadu

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
To harness the hidden stories within clinical oncology data—scattered across scans, biopsies, prescriptions, and patient emotions—and translate them into timely, tailored decisions that elevate care. This proposal envisions a future where intelligence isn't artificial, but amplified—a future where patterns invisible to the eye become pathways to healing, and where each decision, though powered by machines, is grounded in the human experience of cancer.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Cancer care is a maze—of bloodwork, biopsies, PET scans, treatment cycles, and emotions. What if we had a compass? Not just one forged in data, but in wisdom that learns and grows? Artificial Intelligence, when thoughtfully woven into oncology, becomes exactly that. It thrives where complexity overwhelms in genomic profiling, radiology interpretation, therapy response prediction, and risk stratification. These are not just data points, they are signals from the body, waiting to be understood. The patient's journey is not walked alone; it involves oncologists, radiologists, nurses, nutritionists, caregivers, insurers, and most importantly, the patient themselves. Each brings a piece of the story, from EHRs and imaging archives to wearable trackers and clinical notes. AI becomes the thread that ties these fragments into a narrative of precision care. With AI, decisions evolve—from "what works generally" to "what works best for this person." It helps identify who needs chemo, who doesn't. Who is responding silently. Who might relapse. It enables faster decisions, fewer errors, and deeper personalization. And like a good student, the model learns. With each new case, feedback loop, and real-world outcome, it sharpens. Systems like federated learning and real-time model auditing ensure safety, privacy, and relevance. In essence, AI in oncology isn't about replacing the clinician. It's about freeing their intuition—so they can see more, decide better, and care deeper. Because in cancer care, time is precious. And clarity? Even more so.

Full Name:
Prabhu Pandian

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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Improved cancer patient outcomes through AI-powered personalized treatment plans, efficient care coordination, and continuous model refinement.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

Data-Intensive & Complex Areas in Clinical Oncology

1. Diagnostic Imaging: Radiology (MRI, CT, PET), pathology (digital histopathology).
2. Genomics & Biomarkers: Tumor sequencing, liquid biopsies, proteomics.
3. Electronic Health Records (EHR): Clinical notes, lab results, treatment histories.
4. Real-World Data (RWD): Patient-reported outcomes, longitudinal follow-ups.

Stakeholders: Oncologists, radiologists, pathologists, surgeons, pharmacists, patients, caregivers

Data Sources: EHRs, genomic databases (TCGA), imaging archives (PACS), clinical trials.

AI-Driven Clinical Decision Making & Patient Impact.

1. Precision Treatment: AI predicts drug responses, recommends targeted therapies, and identifies clinical trial matches.
2. Early Intervention: Detects recurrence risk from imaging/genomic patterns, enabling proactive care.
3. Workflow Efficiency: Automates tumor segmentation, biomarker extraction, reducing diagnostic delays.
4. Patient-Centric Care: AI chatbots provide personalized education, symptom monitoring, and adherence support.

Continuous AI Model Improvement: An Innovative Approach

1. Federated Learning with Blockchain: Hospitals collaboratively train models on decentralized data without sharing raw records, ensuring privacy while improving accuracy.
2. Dynamic Feedback Loops: Clinician-in-the-Loop AI: Doctors flag incorrect predictions, triggering model retraining.
3. Patient-Reported Outcomes (PROs) Integration: AI adjusts recommendations based on real-time symptom trends.
4. Synthetic Data Augmentation: Generative AI creates synthetic oncology datasets to enhance rare cancer model robustness.
5. Automated Bias Detection: AI audits itself for demographic disparities, ensuring equitable decision-making

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Ananya Ghosh

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West Bengal

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Clinical Oncology is a multifaceted and data-driven field that encompasses various areas such as genomics, proteomics, medical imaging, clinical trials, electronic health records (EHRs), and drug development. Key participants include patients, oncologists, multidisciplinary teams, healthcare administrators, and pharmaceutical companies. Data is sourced from genomic databases, imaging repositories, EHRs, clinical trial information, and wearable devices. The use of AI in clinical decision-making and its effects on patients involve risk evaluation, tailored treatment plans, predictive analytics, real-time assistance, and improved diagnostic accuracy. The ongoing enhancement of AI models requires incorporating feedback from clinical results, updating new data, and fostering collaboration across disciplines.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

Areas in Clinical Oncology That Are Data-Intensive, Complex, and Multimodal

1. Genomics and Proteomics: Analyzing extensive omics data to discover mutations, biomarkers, and potential therapeutic targets.
2. Medical Imaging: Evaluating radiological images (such as CT, MRI, and PET scans) for tumor identification, staging, and monitoring.
3. Clinical Trials: Overseeing patient recruitment, tracking outcomes, and analyzing trial data.
4. Electronic Health Records (EHRs): Consolidating patient histories, laboratory results, and treatment plans.
5. Drug Discovery: Anticipating drug responses and finding new uses for existing medications.

Stakeholders and Data Sources in a Patient Journey

Stakeholders:

1. Patients and their caregivers.
2. Oncologists, radiologists, pathologists, and surgeons.
3. Multidisciplinary teams (MDTs) that include genetic counselors and palliative care experts.
4. Healthcare administrators and policymakers.
5. Pharmaceutical companies and researchers.

Data Sources:

1. Genomic and proteomic databases.
2. Imaging archives.
3. EHRs and patient registries.
4. Clinical trial data.
5. Wearable technology and patient-reported outcomes.

AI-Enabled Clinical Decision-Making and Patient Impact

Decision-Making:

1. Risk assessment and personalized treatment strategies.
2. Predictive analytics for disease progression and treatment efficacy.
3. Real-time support during surgical procedures and interventions.

Patient Impact:

1. Enhanced diagnostic precision and early detection.
2. Customized therapies based on genetic and molecular characteristics.
3. Increased patient involvement through AI-driven virtual assistants.
4. Lower treatment costs and reduced side effects.

Ongoing Enhancement of AI Models

1. Improvement Mechanisms: Integrating feedback from clinical outcomes.
2. Regularly updating with new datasets and medical research.
3. Utilizing federated learning to train models across various institutions while maintaining data privacy.
4. Continuous Improvement Systems: Establishing AI governance frameworks to oversee performance and ethical standards.
5. Implementing strong validation processes to ensure model accuracy.
6. Promoting interdisciplinary collaboration for refining algorithms.

Full Name:
Joseph Joy

Name of the Institution:
CMC Vellore

State:

Tamil Nadu

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Primary Outcomes of These AI-Driven Solutions in Oncology:
1. Improved diagnostic accuracy through enhanced interpretation of imaging and pathology.
2. Personalized treatment decisions, leading to better alignment with tumor biology and patient profiles.
3. Early prediction and management of toxicities, improving patient safety and quality of life.
4. Streamlined workflows and reduced clinician burden through automation and decision support.
5. Enhanced patient outcomes, including better response rates, reduced complications, and more efficient use of healthcare resources.
6. Continuous learning systems that refine care quality over time using real-world clinical data.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
AI in Oncology: Enhancing Treatment Decision-Making and Patient Management. Artificial Intelligence (AI) is transforming oncology by helping clinicians make more informed, timely, and personalized treatment decisions through analysis of complex, multimodal datasets.
1. High-Impact Areas in Oncology: Imaging interpretation (radiology, pathology). Genomic and molecular profiling. Electronic health records (EHRs) with longitudinal data. Real-time treatment response monitoring and toxicity tracking.
2. Stakeholders and Data Sources: Clinicians, oncologists, radiologists, pathologists, surgeons. Allied health: Nurses, palliative care, tumor boards. Patients: Providing real-world data via apps and wearables. Data sources: EHRs, diagnostic labs, clinical trials, registries.
3. Clinical Decision-Making and Patient Impact: Early diagnosis through pattern recognition. Personalized therapy selection based on predictive modeling (e.g., chemo/immunotherapy response). AI-assisted RECIST assessments and toxicity predictions. Workflow efficiency through automated triaging, summarization, and alerts.
4. Continuous Model Improvement: Clinician feedback loops for outcome-based model refinement. Real-world data integration for adaptive learning. Federated learning to maintain data privacy across centers. Governance via clinical oversight, audit trails, and bias control.
AI promises to transform oncology care, provided robust systems are in place for ethical implementation, continuous learning, and active collaboration among all stakeholders.

Full Name:
Baghath Singh L A

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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Applications of AI in oncology with special emphasis on decision making and what the future holds for AI and oncology.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Medical oncology grapples with multifaceted challenges where artificial intelligence (AI) offers transformative potential.

1. Personalized treatment planning is inherently complex due to interpatient variability and tumor heterogeneity. Each cancer harbors unique genetic mutations, epigenetic alterations, and microenvironmental factors, demanding tailored therapies. AI excels here by analyzing genomic sequencing, proteomic data, and clinical histories to pinpoint actionable biomarkers, recommending precise interventions like targeted kinase inhibitors or checkpoint immunotherapies.
2. Early cancer detection is equally daunting, as subtle radiographic or molecular signals often evade human scrutiny. AI-powered convolutional neural networks enhance imaging analysis—MRI, CT, or PET scans—detecting micro-lesions with superior accuracy. Similarly, AI-driven liquid biopsies identify circulating tumor DNA or exosomes, enabling non-invasive diagnosis of cancers like pancreatic or lung at nascent stages.
3. Drug discovery, another intricate domain, involves navigating vast chemical spaces to identify novel compounds. AI accelerates this by modeling protein-drug interactions, predicting toxicity, and repurposing drugs for resistant cancers, slashing development timelines from decades to years.
4. AI's Influence on Decision-Making: AI reshapes decision-making by synthesizing multidimensional data into clinically relevant insights, empowering oncologists with precision and speed. It integrates electronic health records, pathology slides, and real-time genomic databases to forecast treatment outcomes, such as response rates to chemotherapy versus immunotherapy. By mining global trial data and literature, AI contextualizes decisions, reducing cognitive bias and variability in care. Critically, AI functions as a decision-support tool, not an autonomous arbiter, preserving the oncologist's judgment while minimizing errors in high-stakes settings like metastatic disease management.
How AI Can Improve Itself in Coming Years AI's future in oncology hinges on iterative refinement.
1. Access to curated, diverse datasets—spanning ethnicities, cancer subtypes, and socioeconomic contexts—will bolster model robustness.
2. Self-improving algorithms, like adaptive deep learning, will incorporate real-world feedback, recalibrating predictions as new therapies or resistance mechanisms emerge.
3. Explainable AI frameworks will demystify outputs, fostering clinician trust by detailing how conclusions are drawn.
4. Federated learning will enable collaborative training across institutions without compromising patient privacy, enriching AI's knowledge base.
5. Multimodal integration—fusing genomics, radiomics, and wearable sensor data—will yield comprehensive patient models, refining prognostic accuracy.
These advancements will position AI as a cornerstone of precision oncology, optimizing outcomes.

Full Name:
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Name of the Institution:
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State:
Kerala

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
To develop an AI powered data-driven framework for Indian Oncology integrating multi-modal patient data, to enable precise, personalized and content-aware clinical decision support and thereby impact patient outcomes. The system will be scalable, explainable and continuously improving through federated learning.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

India's oncology ecosystem generates fragmented multimodal data siloed within organizations. The diversity, vastness and complexity of this data preclude utilization of the same for precise clinical decision making. However, this also provides an opportunity to utilize data driven AI intelligence for analysis and interpretation. The solution begins with:
1. Structured frameworks for data capture and handling.
2. Key stakeholders include community health workers, PHC and CHC health workers, primary physicians, oncologists, radiologists, pathologists and most importantly the patient and their families.
3. Key data sources will include clinical notes (electronic and handwritten), diagnostic lab reports, pathology whole slide images (WSI), radiology DICOM images, molecular and genetic reports along with patient reported outcomes and cancer-related outcomes from various registries. AI can enable structured data capture across diverse settings.
4. Data pipeline with Agentic AI with Computer vision models based on CNN can convert handwritten clinical notes to structured data and SNOMED-CT /ICD trained NLP models can extract structured data from electronic health records, diagnostic reports and reported outcomes. WSI and DICOM images can be processed for deep learning models. FHIR APIs can be utilized for inter-operability.
5. Multi-tenant cloud storage can ensure each institution's data security and privacy.
6. Data-driven insights can be generated with various Machine Learning/Deep Learning (ML/DL) models.
7. Explainability can be achieved by applying SHAP and LIME to the models.
The impact of these insights on clinical decision making will enhance patient outcomes by providing precise, context aware (trained on Indian dataset for Indian patients) and personalized cancer care irrespective of the healthcare setting. These models can also be trained to provide patient engagement and support, an essential component of cancer care. Continuous AI improvement has to leverage federated learning – a framework where each healthcare institution locally trains data models, preserving data privacy, while contributing to a shared national model.

Full Name:
Dr Himanshu Batra

Name of the Institution:
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State:
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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
It's the need of the hour to adopt evolving AI for patient management and decision making in oncology. AI based app will ensure smooth, rapid and personalised treatment and follow up of the patients by integrating extremely vast and rapidly evolving data and saving time and cost in the long run helping patients and oncologists both.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
There is a need to adopt AI in daily clinical practice in oncology, but AI should be supplementary not replacing the clinical judgement. There is need to make a simplified and integrated AI based oncology app in India which connects patient data, oncologists and hospitals.
1. AI can help in genomic and molecular profiling, mutational analysis and personalizing the treatment with use of risk stratification models and according to clinical significant mutations, deciding treatment according to the standard guidelines and with options that show promising results in various recent trials. (Increasing number of patient burden and with growing number of trials.

2. AI can segregate according to patient need and data and can help to avoid medicolegal issues and also help in matching with ongoing trials so that patient can get the best possible treatment)
3. AI app will help oncologists integrate complete data of patients into simplified and compact form including imaging records, histopathology reports, ongoing treatment providing ease in follow up and requiring the continuation of further treatment in their rural home areas and sending them reminders for follow up increasing the patient compliance.
4. AI driven radiomics, for early cancer detection, use algorithms to assess radiomics CT features helping in early-stage diagnosis of cancer. This AI app can also help for research and forming Indian guidelines due to large database availability over the time. This can also help in forming cancer registries in every state.
5. AI based app can improve with regular updates after gathering data over time and by data submitted in the app itself. To improve the models, we can update with the latest guidelines and also the successful results of various trials as soon as they are published thus promoting continuous learning.

Full Name:
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State:
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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Areas such as diagnostic imaging, treatment planning, risk stratification, and real-time patient monitoring require high precision and data synthesis beyond human capacity. The primary objective of my solution, that is utilizing artificial intelligence (AI) guided patient specific dosage algorithms, is the optimization of chemotherapy dosage, especially immuno-oncological therapy (IOT). This is made possible by the delivery of precise doses after taking into account the patient's genetic makeup, demography, and response assessment. This will lead to the maximization of the utilizability of IOTs and other expensive targeted therapies, make them cost-effective and economical for the patients, especially in LMICs. This is a significant issue in developing countries worldwide. The accessibility and affordability of immunotherapy in oncology care remain significant barriers to effective cancer treatment worldwide. For instance, the annual cost of immunotherapy drugs like Tecentriq (Atezolizumab) can exceed $100,000, posing a financial strain.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
This proposal includes the development and implementation of artificial intelligence (AI) driven personalized dosing algorithm as a novel strategy for drug dosing by tailoring treatment to individualized patient biology and responses.
1. AI is a powerful tool for analyzing large datasets, the capability required for computing complex data sets like complex genetic data, individualized biochemical and demographic parameters, body habitus, and the precise response to therapy.
2. Utilizing the large data analysis capability of machine learning (ML) algorithms can help us predict the adequate and exact dosing requirements of drugs like IOT for an individual patient. This approach is dramatically different from the conventional fixed dosing or weight- based- dosing models used frequently in the clinical settings. Utilizing this response and patient characteristic guided approach, the appropriate and lowest possible economical dose can be chosen for a patient. This has immense

potential for improving the affordability and access to the expensive IOTs, which is extremely important in LMICs.
3. The development of algorithms like this is complex and requires extensive computing power. This will require adequate expenditure by pharma companies in R&D on AI in oncology. Further feedback required for the fine tweaking of the dosage results for positive and negative reinforcement of the ML models can be done by experienced physicians. This will require the training of physicians in basic AI and ML, along with data analysis.
In conclusion, AI-driven personalized dosing algorithms can lead to revolution in drug dosing calculation. This will make treatment plans more patient - centric, economical, and precise. This will require collaborative efforts amongst physicians, IT analysts, pharma enterprises, and large AI models. This holds great promise for a good return on investment as it will be beneficial for making these expensive drugs more accessible to more patients, hence benefitting the pharma industry, LMICs, and in deed the humanity.

Full Name:
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Name of the Institution:
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State:
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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
AI will transform oncology into a proactive, patient-centric discipline where every decision is informed by real-time data, global knowledge, and iterative learning ultimately delivering the right treatment to the right patient at the right time.
Next Steps: Prioritize use-case-specific pilots (e.g., AI for immuno-oncology monitoring) while building the technical and governance infrastructure for scale.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Identify areas in clinical oncology that are data intensive, complex and multimodal
1. Radiomics and Imaging Analysis
Data Types: MRI, CT, PET-CT, ultrasound, digital pathology (WSI - Whole Slide Imaging)
2. Genomics and Molecular Profiling
Data Types: Whole-exome sequencing, RNA-seq, single-cell sequencing, epigenomics, proteomics
3. Clinical Decision Support Systems (CDSS)
Data Types: EHRs (Electronic Health Records), lab results, treatment histories, patient-reported
4. Digital Pathology & Computational Histopathology
Data Types: Whole-slide images (WSI), immunohistochemistry (IHC), multiplexed imaging (e.g., CODEX)
5. Real-World Data (RWD) & Real-World Evidence (RWE)
Data Types: Claims data, registries, wearable devices, social determinants of health
6. Immunotherapy Response Prediction
Data Types: TCR/BCR sequencing, immune checkpoint expression, microbiome data
7. Radiation Oncology & Treatment Planning
Data Types: DICOM-RT (dose distributions), radiomics, patient anatomy model
8. Liquid Biopsy & Early Detection
Data Types: ctDNA, exosomes, circulating tumor cells (CTCs)

9. Drug Repurposing & Combination Therapy Optimization
Data Types: High-throughput screening, drug interaction networks, pharmacogenomics

Stakeholders in the Oncology Patient Journey:

1. Patients & Caregivers
2. Primary Care Physicians (PCPs) & General Practitioners (GPs)
3. Oncologists (Medical, Radiation, Surgical)
4. Pathologists & Radiologists
5. Nurses & Oncology Care Coordinators
6. Pharmacists
7. Clinical Trial Teams
8. Hospitals & Cancer Centers
9. Payers (Insurance Companies, Medicare)

Q: What kind of clinical decision making, patient impact can be enabled upon AI implementation on the data?

1. Early Detection & Diagnosis
Imaging AI: Google, LYNA (L.N metastasis detection in breast cancer)
Liquid Biopsy AI: GRAIL Galleri test
2. Precision Treatment Selection
IBM Watson for Oncology
Tempus xT
3. Dynamic Treatment Adaptation:
DeepMind™ AlphaFold
Varian™ Ethos
4. Prognosis & Survivorship:
Prognostica
ArteraAI
Operational & Workflow Efficiency
Nuance DAX (AI-powered clinical documentation).
Trials.ai (automated patient-trial matching)

Q. How will the above models improve itself? What systems can be put in place for continuous improvement of AI models?

1. Feedback Loops for Model Refinement
Human-in-the-Loop (HITL) Validation
Real-World Performance Monitoring
Patient-Reported Feedback
2. Data Pipeline Enhancements
Continuous Data Ingestion
Federated Learning
Synthetic Data Generation
Infrastructure for Continuous Improvement