Submission Topic: Role of AI in optimizing treatment decision-making and patient management in oncology

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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Precision oncology has the potential to revolutionize cancer care through individualized treatment strategies. To realize its full potential, multidisciplinary collaboration, infrastructure enhancement, education, and streamlined workflows like molecular tumor boards are essential. By overcoming practical barriers and adopting structured workflows, healthcare systems can integrate precision oncology into standard clinical practice, leading to improved outcomes for cancer patients.

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 Oncology Where Precision Approach Can Be Applied
1. Oncology Subspecialty Precision Application:
Lung Cancer: *EGFR, ALK, ROS1, KRAS, MET*, and *RET* mutation-targeted therapies
Breast Cancer: Hormone receptor status, HER2 amplification, *PIK3CA* mutation, *BRCA1/2* testing
Colorectal Cancer: *RAS/RAF* mutation analysis, MSI testing, HER2 expression
Melanoma: *BRAF* V600E mutation testing
Prostate Cancer: *BRCA1/2* testing guiding PARP inhibitor use
Barriers in Uptake of Precision Oncology in Clinical Practice Barrier Details.
1. High Cost and Limited Access
2. Genomic testing and targeted drugs are expensive and not widely available
3. Lack of Infrastructure
4. Limited availability of high-quality labs, bioinformatics platforms, and data sharing
5. Limited Clinician Familiarity
6. Oncologists may not be trained in interpreting genomic reports or using tools
7. Delayed Turnaround Time, long waiting times for test results, which can delay treatment initiation
8. Insurance/Reimbursement Issues: Lack of coverage for genomic tests and targeted agents Low
9. Awareness Among Patients: Patients may not know the relevance of genetic testing Ethical and Legal Issues
10. Privacy, consent, and secondary data use concerns
Practical Solutions to Overcome These Barriers Barrier
1. Cost and access: Government and philanthropic funding for subsidized testing; Public-private partnerships Infrastructure gaps Investment in regional molecular labs; Cloud-based bioinformatics support
2. Knowledge gap: Regular CME programs and online certifications in precision oncology Delays in testing Fast-track pathways for high-priority cases; In-house sequencing facilities
Workflow for Molecular Tumor Board (MTB) and Patient Care Coordination
1. Medical Oncologist - Pathologist - Molecular Biologist/Bioinformatician - Genetic Counselor - Clinical Pharmacologist - Nurse Navigator - Radiologist (as needed)
2. Standard Operating Workflow Step   Action Case Identification   Patient with advanced, rare, or treatment-refractory cancer referred to MTB Genomic Testing, Tumor tissue/blood sent for NGS, IHC, FISH, or PCR Pre-MTB Data Curation   Bioinformatics team analyzes data, prepares a

summary report MTB Meeting Case discussed; actionable mutations matched with clinical trials or targeted therapies