

Task 3: Ethics in Personalized Medicine

Using AI with data from sources like the Cancer Genomic Atlas offers powerful opportunities for personalized treatment recommendations. However, it also raises serious ethical concerns, particularly around bias and fairness.

Potential Biases:

A key issue is the underrepresentation of certain ethnic groups in the training data. If genomic data is disproportionately collected from majority populations, AI models may learn patterns that are less predictive or even misleading for minority groups. For example, recommended treatments or risk predictions may be less accurate for African, Indigenous, or other underrepresented patients. This can reinforce existing health disparities, leading to unequal access to effective care and worse outcomes for marginalized groups.

Other potential biases include:

- Sampling bias if the dataset overrepresents specific cancer subtypes or stages.
- Measurement bias from inconsistent data quality across sites or populations.
- Historical bias reflecting systemic inequalities in healthcare access or treatment.

Fairness Strategies:

To mitigate these biases, researchers should ensure the training data is as diverse and representative as possible. Proactive efforts to collect genomic data across ethnic groups can help. Techniques such as reweighting or data augmentation can adjust for imbalances during model training.

Transparency is also critical: models should be explainable so clinicians can understand how predictions are made, allowing them to catch potential biases before making treatment decisions. Continuous auditing and monitoring of AI systems in clinical use are essential to identify and address disparities as they arise.

Lastly, collaboration with affected communities can help define fairness objectives and build trust. Ethical AI in medicine should prioritize equitable outcomes, ensuring all patients benefit from technological advances regardless of background.