

# Ethical Analysis: AI Bias in Personalized Cancer Treatment

The use of AI in personalized medicine, particularly with datasets like the Cancer Genomic Atlas (TCGA), offers transformative potential in tailoring cancer treatments. However, ethical concerns-especially regarding bias-must be critically examined to ensure equitable healthcare outcomes.

## Potential Biases:

A major ethical concern in using TCGA for AI-based treatment recommendations is demographic underrepresentation. Many genomic datasets, including TCGA, have a disproportionate number of samples from individuals of European descent. Ethnic groups such as Africans, Hispanics, and Indigenous populations are often underrepresented. This imbalance can lead to AI models that are less accurate-or even harmful-for minority populations, as the model may fail to learn patterns relevant to their unique genetic or environmental factors.

Another bias arises from unequal access to genomic testing. Socioeconomic disparities may result in certain populations being excluded from the datasets entirely, reinforcing health inequalities. Additionally, the presence of historical biases in clinical decision-making embedded in electronic health records (EHRs) may further propagate unfair AI outcomes.

## Fairness Strategies:

To address these concerns, the first step is ensuring diversity in training data. Data collection efforts should actively include diverse populations through global collaborations and community engagement initiatives. This enhances the generalizability and fairness of AI recommendations.

Secondly, developers should implement bias detection and auditing tools during model development. These tools assess whether model predictions vary across subgroups and flag potential disparities.

Explainability techniques like SHAP or LIME can also help clinicians and patients understand why a recommendation was made, promoting transparency and trust.

Finally, involving ethicists, patients, and diverse healthcare professionals in AI system design can ensure that human values and equity are embedded from the outset.

# **Ethical Analysis: AI Bias in Personalized Cancer Treatment**

By addressing bias and promoting fairness, AI can truly support ethical and inclusive personalized medicine.