Artificial Intelligence in Cancer Control Actions: Solution or Problem?

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Inteligência Artificial nas Ações de Controle do Câncer: Solução ou Problema?

Inteligencia Artificial en Acciones de Control del Cáncer: ¿Solución o Problema?

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Artificial Intelligence (AI) has sparked significant attention in healthcare as it promises to speed up diagnoses, customize treatments and expand access. Machine learning and deep learning-based tools have already shown the ability to identify complex molecular patterns in oncology, foresee recurrence risks and help therapeutic decisions. However, despite its disruptive potential, the adoption of AI in cancer control actions raises ethical, technical and regulatory issues. Within this scenario, it is necessary to reflect critically: is AI a solution or a new challenge to prevent and control cancer?

The last three years have witnessed a rising number of articles in the literature promising a real digital revolution.

Predictive AI, which enables anticipatory analyses, is the focus of great promises to speed up the breakthrough of oncologic treatments. The deep learning-based models analyzed by Aziz et al.[1] illustrate well the current paradox.

Although these models offer high-performance molecular triage, their ability to generalize is limited as they were developed using physicochemical data that were decontextualized from population, environmental, and institutional variables. This compromises its actual clinical applicability, especially in other than the original clinical settings where they were originally created. The lack of robust external validation makes findings little reliable when applied out of the original scope as Butt et al.[2] have pointed out, calling for caution before being incorporated into caring routines.

The use of generative AI brings up some innovative possibilities. Open science associated with big data analysis broadens even more this potential. When AI is utilized for big data, the core challenge is imputation of primary data and systems validation. Chen et al.[3] highlight that, even in well-developed infrastructure countries, the availability of structured clinical data have to deal with legal, ethical and operational hurdles. Many models are seen as "black boxes", revealing the poor transparency in algorithm decision-taking and making results interpretation by health professionals difficult. The reduced applicability may raise clinical mistrust, restricted shared decision-making and deepen existing inequalities of access to oncologic care.

Tools as ChatGPT-4o and Watson for Oncology (WFO) brougtht important advances with clear communication of medical information, but have to deal with considerable challenges yet. When utilized to improve natural language-based systems, they can be even greater. Kinikoglu and Isik[4] emphasize that the static nature of the knowledge bases utilized make AI susceptible to outdating, providing potentially dated recommendations. More concerning still, as Ebner et al.[5] have concluded, is the possibility of these tools to offer unreliable or scientific unsupported information, jeopardizing the applicability in clinical settings.

One of the major benefits of AI is associated with precision medicine. Much has been invested in science to implement a customized and patient-centered medicine with oncology target therapies. The current platforms utilized and cited in the literature as WFO, although very useful and promising, are limited. Kim et al.[6] showed that the performance for metastatic lung cancer is satisfactory, but fails in the initial stages of the disease for not reflecting relevant clinical nuances, revealing a structural limitation of the current AI: the difficulty in interpreting contextual and subjective variables that are critical in precision oncology as unspecified symptoms, patient's preferences and detailed functional status.

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The limitations of regional adaptation aggravate even more this scenario. Liu et al.[7], while evaluating WFO in China, revealed that more than one third of the recommendations were incompatible with local clinical practice as the use of medications not recognized by the system and physiological characteristics of the population that made AI-based standard conducts unfeasible.

Paradoxically, countries where experts are scarce and health professionals are overloaded, demand more technological support, which require extended sensitiveness of these tools to local social realities. Still, structural issues as unclear regulatory framework, lack of specific guidelines for AI clinical use and legal accountability are pivotal to ensure safe practices and a critical step for robust incorporation in cancer prevention and control.

Although challenging, the already palpable benefits of AI in oncology are not to be neglected. Further to telemedicine, telerehabilitation and remote monitoring, supporting tools for clinical decision-making and automated examination triage and prioritization of patients have brought positive impacts for the efficacy of the services and reduction of delays in diagnoses. Bongurala et al.[8] showed how AI application including advanced imaging systems, drug discovery and clinical decision support systems enhance precision, personalization and efficiency.

A systematic literature review conducted by Keshavarz et al.[9] reported how AI can be better than isolated clinical radiological models with prediction of response to treatment, global survival and time until progression of hepatocarcinoma.

AI offers support for decision-making, individualized treatment and integration of patient generated results which can optimize and bring science and clinical practice information closer, improving results and reducing costs. Customized treatments associated with remote monitoring are being used to manage research and clinical practice faster, which allows changes of therapeutic decision and potential improvement of their quality of life.

The most promising pathway to use this technology is to abide to critical, ethical and scientific-supported parameters. AI is here to help human beings in their activities of the daily life. To be a true revolution, it is necessary to expand the creation of traceable, explicable, externally validated models with representative data of various populations and clinical realities.

AI in oncology per se is neither a solution nor a problem. It is a powerful tool whose worth is contingent upon how it is developed, validated and integrated to clinical practice. Its use with caution requires methodological rigor, transparency, constant updating and sensitiveness to human and institutional complexities involved in cancer prevention and oncologic care. Only then AI can stop being a potential risk to become an actual ally against cancer.

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