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Title: Application of Artificial Intelligence in the Pediatric Oncology

Authors: Mohammad Naderisorki[1,*], Maryam Rezapour[2], Mehdi Naderi Soorki[3]

1. *Pediatrics Hematology & Oncology, Thalassemia Research Center (TRC), Hemoglobinopathy Institute, Mazandaran University of Medical Sciences, Sari, Iran.*
2. *Psychiatrist, Fellowship of Psychosomatic medicine, Mazandaran University of Medical Sciences, Psychiatry and Behavioral Sciences Research center, Addiction institute, Mazandaran University of Medical Sciences, Sari, Iran.*
3. *Research laboratory of intelligent wireless networks (IWiN), Engineering Faculty, Shahid Chamran University of Ahvaz, Ahvaz, Iran.*

*Corresponding Author: Mohammad Naderisorki, Pediatrics Hematology & Oncology, Thalassemia Research Center (TRC), Hemoglobinopathy Institute, Mazandaran University of Medical Sciences, Sari, Iran. Email: dr.naderisorki@gmail.com

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Abstract

Ever since Alan Turing proposed the concept of using computers for intelligent simulation of behavior and critical thinking, artificial intelligence has progressed in various fields. In the field of medicine, artificial intelligence is used in three subfields: machine learning (ML), deep learning (DL) and computer vision. Considering the increasing use of AI in pediatric oncology and cancer treatment, there is a need for studies and research projects specifically focused on pediatric oncology. In the field of oncology, especially childhood malignancies, artificial intelligence can help doctors as a new tool.

Key words: Artificial Intelligence, Neoplasms, Child

Dear Editor

Artificial intelligence (AI) is defined as the ability of a machine to learn and recognize patterns, is the sample of a dataset and apply the findings to make decisions about new data. (٢ ,١)

In 1950, Alan Turing introduced the concept of using computers to simulate intelligent behavior and critical thinking. Since then, John McCarthy has used the term "artificial intelligence" (AI) to refer to the knowledge and engineering of intelligent machines.(٣)

Especially, in the past decade, the popularity of AI has been accelerating in the various fields, including medicine, due to our ability to gather enough sample data in different applications. The AI subfields in the medicine include machine learning (ML), deep learning (DL), and computer vision, depending on the type of application.(٤-٢)

In ML, specific characteristics are used to identify patterns and analyze a specific situation. The machine can then "learn" from that information and apply it to similar but unknown future scenarios. In DL, which is a more advanced form of ML, algorithms are used to create an artificial neural network (ANN) that can learn and make decisions on its own, similar to the human brain (Figure 1). Computer vision is a process in which a computer obtains and understands information from a set of images or videos, and then uses specific patterns to recognize similar cases.(٨-٥)
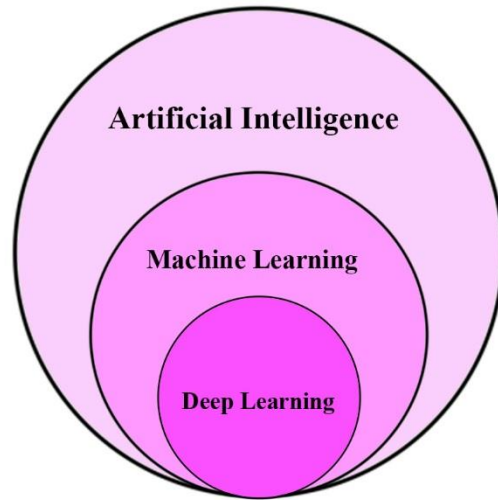

Figure 1. AI refers to computational procedures that imitate human intelligence.

The application of AI in medicine can be divided into three categories based on its purpose:

1-Assisted interpretation, such as computer-aided detection (CAD) or computer-aided diagnosis (CADx) to assist in detection or diagnosis;

2-Additional insight, where AI provides information beyond the understanding of physicians, such as gene prediction and image-based forecasting;

3-Augmented image, including tasks like generating new and high-quality images.(٩)

In the field of oncology, like other branches of medicine, AI has been employed to assist in various areas such as risk prediction, screening, diagnosis, prognosis, initial treatment, response assessment, subsequent treatment, and follow-up. For example, a recently developed tool called molecular Prognostic Score (mPS) can determine the prognosis of breast cancer patients .(١٠)

The use of AI for analyzing a large amount of cancer genomic data or omics data (exome, transcriptome, and epigenome) and data related to the sensitivity of acute myeloid leukemia patients to anti-cancer drugs has led to the identification of specific drug-sensitive genes .(١١)

Currently, more than 20 AI-based applications have been approved by the FDA for clinical oncology and are used in specific areas of cancer treatment .(١٢)

The CONSORT 2010 statement provides minimum guidelines for reporting randomized trials and has been widely used to ensure transparency in evaluating new interventions. With the expansion of AI-based clinical research in medicine, CONSORT-AI has been defined as a standard guideline for AI-based clinical trials in medicine .(١٣)

Pediatric oncology, as a branch of oncology, has both similarities and specific differences compared to adult oncology. Considering the increasing use of AI in pediatric oncology and cancer treatment, there is a need for studies and research projects specifically focused on pediatric oncology.(14)

In AI, having accurate and abundant data is the key to success and establishing proper databases and data classification can be a crucial step in optimizing the use of AI in medicine, especially in pediatric oncology.

In conclusion, it is highly recommended that healthcare providers in pediatric oncology familiarize themselves with AI. This stems from the fact that AI's practical applications in medicine and more specifically in the field of pediatric oncology is going to be a new emerging technology improving the quality of healthcare service in the near future.

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