Prominence of Artificial Intelligence in cancer therapy

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Abstract. A wonderful art of utilizing AI in health care to alleviate the effects of chronic diseases and to go hand in hand with the physicians for effective diagnosis has become the need of the day. There is a boom in the global market on the role of AI, especially in the Health Industry to the extent of 8 billion US dollars by 2026. This has accelerated to this extent due to better Machine Learning algorithms, cost effective hardware and availability of 5G.

Saving time, quick personalized monitoring, minimal invasive methods, multi tasking and less human errors due to high precision are the insights deployed by AI technology. This article deals with the insights of AI exclusively in the diagnosis and the treatment of various types of cancers.

Keywords: Algorithms, Personalized monitoring, Biomarkers, Patient outcome

1 Introduction

Proficiency in Information Technology has brought forth a huge impact in refining the domain of Artificial Intelligence (AI). The streamlined processes in health care, with respect to smarter diagnosis and superior clinical judgment has become the key for serving the society in a better manner. Hence, irrespective of the profession we choose, learning skills in AI contributes a cutting edge to our career.In 'Science Daily' in the year 2009, emphasis was made on the first robot scientist named 'Eve', that used advanced AI combined with innovative data mining to make an intelligent approach towards drug discovery. Initially, Eve was assigned work at the University of Wales for searching compounds to treat third world diseases like malaria and schistosomiasis. The insilico methods and the quantitative structure activity methods created have revolutionized the pharmaceutical industry.The incidence rates in cancer have been predicted to drastically increase globally. The understanding in tumor biology at molecular level has transformed the cancer treatment paradigms. Despite many breakthroughs likesequencing technology and biomarker – driven clinical trials, treating malignancy is still reductionistic. Hence, Machine Learning Tools and Artificial Intelligence Tools have become instrumental in shaping step wise processes of cancer and decrease the mortality rate.Proficiency in Information Technology has brought forth a huge impact in refining the domain of Artificial Intelligence (AI). The streamlined processes in health care, with respect to smarter diagnosis and superior clinical judgment has become the key for serving the society in a better manner.

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2 Significance of AI in cancerusing AI-Powered Algorithms

The following sequence of protocol is necessary for drug design and development in various types of malignancy where AI – powered algorithms go hand in hand and have become the need of the day [2],[3].

2.1 Rapid detection and diagnosis

To distinguish cancerous cell from a normal cell in a quicker way by scrutinizing medical images like mammograms, CT as well as MRI scans.

To scan the genetic data and pick out the mutations linked with enhanced risk of causing cancer.

Assess blood and other parameters for prompt speedy detection of cancer biomarkers

2.2 Preference in Treatment

Choosing a suitable mode of cancer treatment for each individual according to the patient's distinctive characteristics like their molecular description, type of tumor, stage and intensity of the disease.

Predicting and calculating the response of a patient towards a particular mode of treatment

Exploring and developing personalized treatment plans for individual patient's needs and preferences.

Forecasting survival rate, recurrence rate with the help of algorithms for prediction of patient outcome.

2.3 Development of novel chemical entities against cancer

(i) For identification of newer targets and receptors for cancer (ii) For prediction of pharmacokinetic and pharmacodynamic profile of anti cancer drugs and novel LEAD molecules

(iii) To design novel efficacious agents for combating numerous types of malignancy.

2.4 Other prominent areas influenced by AI

(i) Genomics – Large data sets of genomic data are utilized to predict newer cancer genes and types of mutations. Targeted therapy could be developed due to the above assessment.

(ii) Radiomics: Quantitative medical images from MRI and CT scans can be elaborately understood which helps in the staging, diagnosis and the treatment of cancer.

(iii) Immunotherapy: To bring forth effective immunotherapy treatment for cancer. Eg: AI can be utilized to identify the prominent T cell receptors that target the malignant cells.

(iv) Conduct of Clinical trials: for efficient and effective study of trials in patients who are likely to be benefited from it [4], [5].

2.5 AI based cancer oriented care and support

Clinicians are being supported with robotic surgery systems that enhance precision and perfection. AI-powered visual assistants help in reviewing the medical records and planning the treatment. Cancer patients and their families are provided relevant information through AI-powered chatbots. In case of residents in remote areas, there is provision of telemedicine platforms. Education on personalized cancer treatment has been easily achieved using AI-powered tools

3 Applications of AI in the field of oncology

Information from the National Lung Screening Trial (NLST) has introduced 'SYBIL', a learning model that explores data and predicts the risk of lung cancer in the next 6 years. Robot assisted bronchoscopy technique helps in earlier detection and hence better outcomes are achieved. [6], [7]. Pancreatic canceris the deadliest type as it is located well inside the abdomen and hard to get the sample for a biopsy. But, AI tool is able to diagnose at an early stage in almost 50% of the population.AI based models are used in routine for breast cancer imaging. Multi parametric MRI is of utmost utility in prostate cancer. In case of oesophageal cancer, AI developed interpretation of endoscopic images reduces errors to a great extent. US – FDA has approved a real – time DL computer – aided detector for detecting colon polyps and enlarged lymph nodes. To assess the genetic alterations in the tumor, non invasive models have been developed which pave way for virtual biopsy.

4 Conclusion

At the outset, the development of AI technology further stretches its arms towards a highly innovative AI-powered technology which helps the medical and surgical oncologists to provide effective personalized care for improved clinical outcomesAt the outset, the development of AI technology further stretches its arms towards a highly innovative AI-powered technology which helps the medical and surgical oncologists to provide effective personalized care for improved clinical outcomes

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