Chapter 6
Cancer Intercept – Early Detection Strategies for Enhanced Survival Rates

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ABSTRACT

Early detection of disease is important in healthcare not only for the hope that the patient might get cured, but also due to the low risk factor for conducting an operation. The current chapter will discuss some newly defined techniques and technologies that are changing the way early disease detection is done-from machine learning and wearable health monitoring devices to advanced medical imaging. Right application of newly given medical technology is making the concept of good patient recovery possible by coordinating machine learning with the medical field. Considering predictive algorithm in the identification of diseases with the use of large datasets for identifying the diseases through the help of machine learning and, with an upper hand of AI, finding proper cure along with experience from the doctors is allowing a patient to live more i.e. Better, faster recovery.

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1. INTRODUCTION

An important aspect of current health care is catching diseases in their earliest stages. Finding cancer, heart disease, diabetes, and brain disorders at their onset often-even before the patient realizes anything-puts patients on the road to recovery much more easily, because treatments can be administered at the time they will do the best, when the disease is least bad. For diseases such as cancer, catching it early will greatly advance a better prognosis, possibly lowering the burden of tough treatment, which is hard on the patient's body and spirit. The sooner the disease is detected, the greater the options for less intense or even more benign treatments that most of the time yield better results and, above all, a better quality of life.

Advances in the development of early-detection methods have been influenced by the introduction of new technologies. Traditional screening methods such as mammograms, Pap smears, and colonoscopies have long been able to detect diseases before they reach an advanced stage. The pace of innovation, however has relatively recently led us to improve upon early detection diagnostics using biomarkers, advanced imaging techniques, and artificial intelligence. Biomarkers give information about disease at the molecular level. They often depict problems in genes or proteins that can indicate a disease even before the symptoms surface. These molecular signs can be found in blood, tissue, or any other body fluid and especially prove helpful when finding cancers and other serious health issues early. (Bannasch, P., & Van Kaick, G., 1992).

New imaging technologies have really improved the early detection of diseases by showing very clear pictures of what is inside the body. Techniques like MRI, PET, and molecular imaging allow healthcare providers to find tiny changes in tissues and organs that may indicate the beginning of a disease. The imaging techniques can identify tumors, lesions, or other abnormalities at minute levels, and doctors have a far clearer view of the patient's health considerably earlier than when a person manifests diseases. Combining molecular imaging with standard techniques helps doctors identify problems such as cancers, heart disease, and brain disorders earlier when they can be treated more effectively. (Patriotis & Srivastava, 2023)

It becomes an even more important tool for early detection. It can look at large amounts of data and find patterns that human doctors might not see right away. AI algorithms can quickly and accurately identify early signs of disease from medical images, genetic data, and electronic health records. Such AI techniques have been helpful where, in terms of radiology and pathology, they prove to be very useful in spotting problems like tumors or lesions that might typically appear in medical images than in traditional methods. AI can collect information from sources such as images, biomarkers, and genetic data. This provides a wider view of a patient's condition and helps in giving a more accurate diagnosis. It enhances the speed of

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