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Mammo Screen Artificial Intelligence (AI) Tool Improves Diagnostic Performance of Radiologists in Detecting Breast Cancer

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Abstract

The abundance of T cells helps predict the patient's response to immunotherapy, so researchers hope this new method could provide specific and more effective treatments for cancer. Scientists analyzed DNA sequencing data from patients 'cancerous tumors to see if they could detect T cell deficiency. DNA sequencing is often performed on cancerous patients' tumors. It is done to classify them and understand how the cancer progresses. Estimation of immune cells, which are important for cancer control, affects patient survival and guides treatment. Our goal was to be able to develop a new method for annotating immune cells directly from DNA sequences without the need for further data. DNA sequencing allows scientists to see the history and evolution of tumors. In this study, scientists developed a way to calculate the historical levels of T cells; By reassembling or modifying them, they are provided with tools that allow them to detect attackers. In particular, the scientists found a "signal" for the loss of TREC cell division, and by recording this, they were able to accurately estimate the number of T cells in the tumor. In recent years, screening inhibitors (IPCs), a type of immunotherapy, have emerged as a revolutionary treatment for many types of cancer. ICPs work by blocking proteins called checkpoints made by T lymphocytes. These checkpoints prevent strong immune responses, as they can sometimes prevent T lymphocytes from killing cancer cells. When these checkpoints are closed, T cells are better able to kill cancer cells. One of the biomarkers showed that the potential success of immunotherapy was predicted by the number of T cells available, and that the more T cells available to IPCs, the more cancer cells were killed. It provides the patient's response to treatment without the need for additional data. In fact, the process we have developed can go beyond the standard DNA sequence at no extra time or cost. Our tools also make it possible to study the immune system more than just cancer.

Keywords: Cancer; Cells; Tissues; Tumors; Prevention; Prognosis; Diagnosis; Imaging; Screening; Treatment; Management

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Introduction

There are many risk factors that can cause cancer. Among the known factors that increase the risk of breast cancer is family history, which is one of the most important factors. About 5 to 10 percent of breast cancers have a family history, and it is estimated that 13 to 16 percent of women with breast cancer have at least one of their first-degree relatives (mother, sister or daughter) with cancer. A woman who has a first-degree relative with breast cancer is almost twice as likely to have the disease as a woman who has no family history of the disease. If she has more than one first-degree relative with a history of breast cancer, her risk is about 2-4 times higher. One of the factors to prevent breast cancer in women is screening and early diagnosis. . Initial breast cancer screening should be performed by a specialist every three years from the age of 30 to 40; More accurate screening, led by mammography, begins at age 40, which, despite the assumption that the test is inexpensive and has no detrimental effect on the patient. Or underarms and asymmetry of the breasts can be a sign of breast cancer, which if you see any of these symptoms should immediately see a specialist. Most uterine cancers are due to the HPV virus. There are different types of viruses, only a few of which can cause cancer and are dangerous, but just how many viruses actually cause most cervical cancers; Symptoms of this disease are ulcers and the presence of appendages in the genital area that in the long run turn into cancerous tissue. In cervical cancer, prevention comes first; Vaccination is the first preventative measure that can eradicate HPV infection and cervical cancer. One of the most important issues in this disease is the discussion of screening before cancer, which if paid attention to this issue, can reduce up to 60% of cancers. The World Health Organization recommends cervical cancer screening tests for people over the age of 30, and if patients have acute symptoms, they should see a specialist before a screening test to determine the stage of the disease [1-490].

Results and Discussion

Breast cancer is the most common cause of death from cancer, and about 1.8 million people worldwide die each year from the disease. Breast cancer is often diagnosed late, which reduces the chance of successful treatment. Researchers hope that using artificial intelligence to support breast cancer screening could speed up the process and ultimately help diagnose more early-stage patients. Computed tomography or CT scans are now used to diagnose the symptoms of a breast tumor, followed by biopsy or surgery to confirm that the tumor is malignant. But each scan involves a specialist radiologist who examines about 300 images and looks for signs of cancer, which can be very small. Tests using CT scans to screen people at high risk for breast cancer have been promising, but screening with the practical difficulty of a radiologist examining each image individually will determine who needs the tests the most. The researchers trained their artificial intelligence program using a set of CT scans of 888 patients previously examined by radiologists to identify suspicious growths. They were then examined in different groups of 1179 patients who underwent a three-year follow-up breast screening test using a CT scan performed in the last two years of the

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trial. This included 177 patients who were diagnosed with breast cancer after a final scan in the experiment. The program identified 172 of the 177 malignant tumors on that CT scan, meaning that it was 97% effective in diagnosing cancer. There were five unidentifiable tumors near the center of the chest, where tumors are more difficult to distinguish from healthy parts of the body. The researchers also performed the program on scans performed on the same 1179 patients a year before the diagnosis of tumors, and were able to identify 152 suspected areas that were later diagnosed with cancer. However, the researchers say the program also detects many suspected areas that are not cancerous (false positives) and should be greatly improved before using the program in the clinic, as examining all of these leads to unnecessary biopsies. Breast cancer screening means that more CT scans are done and we do not have enough radiologists to look at all of them. That's why we need to develop computer programs that can help. Our study shows that this program can detect possible symptoms and diagnose breast cancer a year earlier. The goal of our research is not to replace radiologists, but to help them by providing a tool that can detect the first signs of breast cancer. Researchers plan to work on a new system that can differentiate between malignant and non-malignant tissue to help radiologists decide which patients should be further examined. "Early detection of breast cancer is vital to improving survival, and screening will be an important step in that direction," said the secretary general of the European Respiratory Association and a consultant on respiratory medicine at the National Institute of Tuberculosis and Lung Diseases in Warsaw, Poland. Research shows that CT scan screening can reduce breast cancer mortality. This is promising because it shows that artificial intelligence can help us quickly examine scans and even the signs of cancer in the early stages. However, before using the program, researchers should use it to better distinguish between abnormal but benign breast tissue and tissue that may be cancerous.

Conclusion

Regulatory T cells (TReg) are essential for regulating the immune system, however there are several different types of TReg cells, and scientists are now beginning to distinguish between them and understand their functions and patterns. The TCF-1 gene controls the functions of a specific set of TReg cells. Without TCF-1, these TReg cells retain their normal suppressive function, but acquire additional properties and become inflammatory: they become more active, increase cancer signals, and acquire a breast property, resulting in cancer. Breasts become more severe and dangerous. Patients with breast cancer have the same TReg cells. Prior to this research, scientists knew many of the major regulators, but this is the first time that a link between TCF-1 and breast cancer has been discovered. The development of future drugs could focus on this pathway to treat or cure certain types of breast cancer. It is very important to be able to manage the immune response rate. This is why understanding these TReg cells is so important. If you have too many answers, you will become immune. If it is too low, you will get cancer. Healthy systems must strike the right balance between autoimmune diseases and cancer and proper TReg. Cell function plays a key role in this. The scientists tried to study the relationship between TCF-1 and TReg cells. They found that when they removed TCF-1, TReg cells changed their behavior, became more mammalian, and more numerous. They studied the activity of TReg cells in defective mice and compared this activity with TReg cells in human breast cancer patients.

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