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Biomedicine

Biomakers in Cancer Diagnosis and Prognosis

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Biomarkers in Cancer Diagnosis and Prognosis

What is a biomaker?

A biomarker is "a biological molecule found in blood, other body fluids, or tissues that is a sign of a normal or abnormal process, or of a condition or disease," such as cancer, according to the National Cancer Institute. Biomarkers typically distinguish an affected patient from a healthy person. A variety of factors can cause the changes, including germline or somatic mutations, transcriptional changes, and posttranslational modifications. Biomarkers come in a wide range of forms, including proteins (e.g., an enzyme or receptor), nucleic acids (e.g., a microRNA or other noncoding RNA), antibodies, and peptides, among others. A biomarker can also be a group of changes, such as gene expression, proteomic, and metabolomic signatures.

How is it helpful?

Biomarkers can be used in a variety of clinical settings, such as estimating disease risk, screening for occult primary cancers, distinguishing benign from malignant findings or one type of malignancy from another, determining prognosis and prediction for cancer patients, and

monitoring disease status, either to detect recurrence or to determine response or progression to therapy.

In addition, biomarkers can be used to screen otherwise healthy individuals for cancer. Prostate specific antigen (PSA) is a widely used yet contentious biomarker for screening. Following FDA clearance in 1986, increasing screening of males over the age of 50 resulted in an increase in prostate cancer diagnoses, however there were worries about overtreatment. The most recent Preventive Services Task Force report found insufficient evidence to support regular PSA screening.

Moreover, biomarkers in cancer patients can help assess prognosis or the risk of disease recurrence, independent of treatment. The clinicopathologic features of a tumor have traditionally been utilized to predict prognosis. Newer technologies are now being used to estimate prognosis for particular malignancies. In breast cancer, for example, a variety of gene expression signatures have been established that may be used to estimate prognosis for an individual patient based on tumor evaluation.

Cancer biomarker research is divided into four categories.

Many clinical studies in many areas of biomarker development are now underway. In addition to discovering novel targets and establishing their importance, new research focuses on:

Immunotherapy response: Immunotherapy has revolutionized cancer treatment, but not all patients respond the same way. Biomarkers that predict immune response are being identified by researchers in order to assess which patients benefit from which sort of immunotherapy.

Liquid biopsies can detect circulating tumor DNA, which is DNA lost by the tumor. A simple blood sample can reveal common modifications in DNA to tailor treatment options; it may also assess whether the tumor is responding and investigate how the tumor develops tolerance to certain medicines based on additional genetic variations discovered in subsequent blood tests.

Minimal residual disease: This type of biomarker can be assessed by liquid biopsy testing after treatment has been finished and there is no identifiable disease remaining after exam and imaging. Through blood testing, minimal residual illness assesses remaining disease at the molecular level. It might be used to evaluate which patients would benefit from more severe treatment and which could be spared such treatment.

Pharmacodynamic markers: These employ a biopsy before and during treatment to examine dynamic molecular changes inside the tumor and identify whether or not the medicine is performing as expected.

Works Cited

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