Blood-Based Cancer Test Works the Same Across Racial and Ethnic Groups

Summary of “Performance Of A Targeted Methylation-Based Multi-Cancer Early Detection Test By Race And Ethnicity”
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In the US, cancer does not always affect racial and ethnic groups equally. Rates of cancer detection and survival vary by race and ethnicity. Many new medical approaches are being developed to help reduce these healthcare gaps. One new tool is a cancer screening test that can detect many different cancer types using a single blood sample. The test was developed, tested, and refined in the three-part Circulating Cell-free Genome Atlas (CCGA) clinical study.[1-3] CCGA3, the third part of the study, looked at how well the screening test worked in people already known to either have cancer or not have cancer.[2] Researchers also wanted to see if the test performed the same across different racial and ethnic groups.

The CCGA3 study first looked at how well the cancer screening test worked for the entire study population. The results were then broken down by different racial and ethnic groups. These groups were non-Hispanic Black, Hispanic, Other (including Asian, Native Hawaiian, Pacific Islander, American Indian, Alaska Native), Unknown, and non-Hispanic White. The analysis used two measures to see how well the test performed— specificity and sensitivity. Specificity is how many people who didn’t have cancer had a negative test result. Sensitivity is how many people with cancer had a positive test result **(Figure 1)**. The analysis also looked at how well the test performed for twelve specific cancers in each racial and ethnic group. These twelve cancers, most of which do not have a screening test, were chosen because together they make up two-thirds of all US cancer deaths.[4]

Figure 1: How Well a Cancer Screening Test Performs is Based on the Sensitivity and Specificity

Specificity = Number of people who got a **negative** test result / Number of people who did not have cancer

Sensitivity = Number of people who got a **positive** test result / Number of people who had cancer

Specificity was very high regardless of race or ethnicity, ranging from 98% to 100%. This means nearly everyone without cancer got a negative test result. False positive results often lead to costly and inconvenient follow-up tests to confirm their results. High specificity equals very few false positives, and therefore fewer unnecessary tests. Sensitivity ranged between 44% to 64% across racial and ethnic groups **(Figure 2)**. Researchers also looked at how sensitive the test was for each racial and ethnic group for different stages of cancer. The sensitivity of the test increased with each higher stage across all racial and ethnic groups. For each of the twelve cancer types, sensitivity was similar across races and ethnicities. There were some exceptions because some racial and ethnic groups had very few people with that cancer.

Figure 2: This Screening Test had High Specificity and Sensitivity Across Racial and Ethnic Groups

	White (non-Hispanic) n=2316	Black (non-Hispanic) n=193	Other[a] (non-Hispanic) n=57	Hispanic n=192	Other/Unknown n=65
Specificity	99%	100%	100%	98%	100%
Test Sensitivity Observed in the Study	51%	54%	44%	63%	52%
Sensitivity Expected if Performance was Equal	51%	52%	47%	62%	52%

[a]The Other (non-Hispanic) group includes but is not limited to Asian, Native Hawaiian, Pacific Islander, American Indian, Alaska Native.

Even though the test's sensitivity was similar across racial and ethnic groups, researchers wanted to know what led to the minor differences. One explanation was that the test worked better for some racial and ethnic groups. The other explanation was that the cancer

types and stages in each group weren't the same. The test might detect some types and stages of cancer more easily, which could have led to the minor differences. To figure this out, researchers calculated the expected sensitivity for each racial and ethnic group. This is the sensitivity they would see if the test worked equally well for each race and ethnicity. First, they took the sensitivity for each cancer type and stage in the whole CCGA3 population. Then, they multiplied these sensitivities by the total counts of each type and stage in each racial and ethnic group of the study. If the test worked better for one race or ethnicity, then the observed and expected sensitivities would be different. But they saw that the expected sensitivity was about the same as the observed sensitivity **(Figure 2)**. Therefore, the reason the test gave slightly different results in some racial and ethnic groups likely wasn't that the test worked better or worse for that race and ethnicity. The differences were likely due to the uneven mix of cancer types and stages in the groups.

The study was limited in several ways. The screening test is meant for people who don't have symptoms. However, the study used a different population that included a mix of people with and without cancer. Also, the CCGA3 population was also mostly non-Hispanic White. This meant that other racial and ethnic groups weren't equally represented. With fewer people represented, it was not possible to make definite conclusions. But, when directly comparing the sensitivities of each racial and ethnic group, there was no strong difference that wasn't explained. This is useful, but highlights the need for future studies with a much larger and more diverse sample of people.

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