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Seeking out cancer with CancerSEEK

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Original title
Detection and localization of surgically resectable cancers with a multi-analyte blood test.[1]

Introduction
Cancer is a very slow disease often taking 20-30 years from initiation until the affected person is close to dying. However, most people do not know about having cancer until a very late stage of the disease – often too late to be cured. In cancer-therapy it is always a big advantage to know about the disease as early as possible. If the entire initial tumor can be removed the person is cured. In contrast, if the tumor has started spreading from the original site to another location in the body it is almost impossible to be cured. Therefore, many countries have started screening-programs for certain cancers such as breast, colorectal, and prostate cancer. These screens are based on actually seeing (with scanners/cameras) or feeling the abnormal growth, and are therefore performed relatively late. The only widely used screen for earlier detection of cancer is a blood sample-based test used to predict prostate cancer from circulating tumor proteins. There are of course many more types of cancer, and the majority does not have any screening programs in place.

Findings
The authors of "Detection and localization of surgically resectable cancers with a multi-analyte blood test" [1] have researched whether it was possible to make a test that would detect a wide range of cancers at an early stage, also using a simple blood sample like the prostate cancer test. First, the authors set up a list of criteria they would like the test to fulfil. Since many cancers are caused by mutations in our DNA, the authors first criteria for the test was that it should be able to detect many different cancers, even if very few mutations are present. Secondly, the test should minimize falsely diagnosed individuals by only querying a limited stretch of DNA. Finally, the test should be easy and cheap enough to use for a large number of people. After doing some optimization, the authors made a test that assays 61 different pieces of circulating tumor DNA and 8 circulating tumor proteins. They called this test CancerSEEK.

Using CancerSEEK, the authors tested blood samples from 1005 patients with different types of diagnosed cancers (liver, stomach, pancreatic, esophagus, colorectal, lung, or breast) and 812 healthy individuals. Certain cancers were easier to detect (98% ovarian) than others (33% breast), but overall CancerSEEK was able to detect cancer in 70% of the cancer patients. In contrast less than 1% of the healthy individuals were assayed to have cancer, showing that there are few falsely diagnosed individuals. In theory the healthy individuals determined to have cancer by CancerSEEK might even have it, even though there are no symptoms yet.

CancerSEEK was better at detecting late stage cancer compared to early stage with detection rates going from 78% to 73% to 43% for stage III to stage II to stage I cancer. The authors also tested whether CancerSEEK could determine which type of cancer it was. The advantage of this is that the follow-up monitoring and tests made by the doctor will already be narrowed down. The authors found that 63% of the cancers could be correctly identified.

Conclusions

CancerSEEK have shown very promising results in detecting various types of cancers from a simple blood test, but there is still room for improvement in both early detection as well as in detecting the type of cancer. The authors also mention that their test is not meant to replace screening programs already in place, but would be able to supplement them. In the end, CancerSEEK is a very good step on the way to early detection of cancer, but the real test will be to see if individuals can actually be diagnosed before the cancer would normally be seen (which will take some years to figure out).

Article info

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References

1. Cohen, J. D. *et al.* Detection and localization of surgically resectable cancers with a multi-analyte blood test. *Science* **359**, 926–930 (2018).