Swiss Re

Life & Health Trend Spotlight

Striking gold in cancer detection? New discoveries challenge insurers

By 2030 the number of new cancer cases around the world is expected to be 23.6 million – nearly double that of 2012. This proliferation of cancer and the complexity around its detection and treatment puts an extra push behind research to use technology for early detection and targeted treatment therapy.

Machine learning algorithms, ultra-deep gene sequencing and gold-nanoparticles are opening doors to a new breed of diagnostics that use a simple blood draw vs. an invasive tissue biopsy to confirm cancer. The newest trial to attract attention has been hailed as a "10 minute cancer test" and uses actual gold – an element with a connection to biology that dates back 1,000 years. How much is hype vs. fact and what should insurers consider to prepare for the potential impact on everything from underwriting to claims?

How does liquid biopsy work?

It turns out that tumors release a multitude of biomarkers into the bloodstream such as cell-free DNA, circulating tumor cells, exosomes and micro vesicles. In the past, DNA analysis was not sensitive nor cheap enough to detect tumor DNA routinely and reliably. This is changing, with the use of next generation sequencing, liquid biopsy and epigenetic profiles able to detect specific changes in the genome of cancer cells. In one of the newest examples, researchers at University of Queensland in Australia discovered that cancer DNA reacts differently than regular DNA when it comes in contact with gold. A grouping of molecules, called a methyl group, forms clusters in cancer cells called a "methylscape." By introducing nanoparticles of gold into blood samples and observing the reactions of the methylscape to the gold, researchers devised a simple assay, which could take less than an hour to complete once fully developed.[1]

The team started with just four types of tumors for breast, lymphoma, prostate and colorectal cancer and plan to validate the tests and improve their sensitivity by trying to detect very early stages of cancer and expand beyond the four tumors. The liquid biopsy market is expected to exceed USD 2 billion by 2022.[2] However, early-stage enthusiasm must be tempered by restraint. The tests can detect relapse or recurrence, are more appropriate for high-risk groups and could help guide personalised cancer treatment. However, it remains to be seen if liquid biopsy will be appropriate and accessible enough to screen asymptomatic patients in the general population.

Liquid biopsy unknowns:

- Will it overtake histopathology as the preferred method of diagnosing types of cancer?
- How clinically viable is it for wide use?
- Will the medical profession be able to avoid over-diagnosis and over-treatment of low-risk cancers?
- Will low-risk cancers be reclassified?
- Will cancer and CI products with long-term guarantees turn out to be profitable?

[1] https://www.genengnews.com/news/liquid-biopsy-detects-epigenetic-signature-common-to-all-cancers/

[2] https://www.marketwatch.com/press-release/liquid-biopsy-market-is-supposed-to-reach-us-2-billion-by-2022-2018-05-29

What are the limitations?

Each type of cancer has its own genetic signature. Liquid biopsy uses this signature and a positive ctDNA to offer hints as to the type of tumor but does not reveal the tumor location or stage. The nano gold test is attractive in this regard as it could detect almost any tumor type by looking at the broader methylscape that is similar across all tumors, with less effort and a lower cost.

For both liquid biopsy and the nano gold test, imaging techniques or an invasive tissue biopsy are still required to confirm the tumor. Other issues with the nano gold test include:

- The current study is limited to four tumor types and small in scale (200+ tissue and blood samples)
- Use of the test for treatment responses is still unknown

Overview of the issues for insurers

Underwriting	■ Re/insurers are likely to see more liquid biopsies at the underwriting stage as the tests are refined and offered direct to consumers – even before the tests are fully validated. ■ Direct-to-consumer liquid biopsy tests could lead to information asymmetry at the underwriting stage and opportunities for anti-selection. The current waiting periods for cancer claims might not be sufficient and should continue to be monitored. ■ The notion of liquid biopsy as a new, mandatory underwriting requirement might stimulate discussion similar to what took place when HIV testing was introduced. ■ Applicants with positive liquid biopsy tests should be fully investigated using traditional cancer imaging and discussed with your medical officer or your Swiss Re representative. ■ Underwriters should be aware of local regulations that prevent the use of liquid biopsy as part of genetic information bans.
Claims	■ Mortality – If these tests are successfully used to manage established cancer therapy or as part of early detection and diagnosis, we could expect an improvement in mortality in the long run. ■ Critical illness and cancer products – Cancer is the leading cause of critical illness claims. Most current best practice cancer definitions require histopathological evidence of a malignant tumor. Future cancer definitions might exclude tumors diagnosed solely through liquid biopsy and require tissue proof of a malignant tumor to pay out a claim.

Why should insurers care?

Liquid biopsy impacts ...

- the number and timing of claims
- cancer definitions and product design
- pricing and long-term guarantees
- anti-selection risk, how we underwrite
- possible future mortality improvement

... almost everything

[3] Press release 1 March 2018 on joint paper from ASCO (American Society of Clinical Oncology) and CAP (College of American Pathologists) – Circulating Tumor DNA Analysis in Patients With Cancer

What's next?

Despite compelling advances in cancer testing, there is still not enough evidence to rely solely on liquid biopsy to screen for most cancers. For the foreseeable future, histopathology will remain the standard for cancer diagnosis and staging. According to the American Society of Clinical Oncology and College of American Pathologists, there are still many unknowns, including the applicability of ctDNA tests for "early-stage cancer, making treatment decisions, monitoring how well a treatment is working, finding remaining cancer cells, or for cancer screening, except screening for participation in, or during, a clinical trial."[3]

Insurers should know their exposure, maintain underwriting discipline and vigorously investigate suspicious claims, remain actively engaged on the regulatory front and keep stakeholders informed every step of the way. Swiss Re is committed to actively monitoring this topic and will continue to share findings and impacts with our clients. Watch this space and reach out to your Swiss Re underwriter with questions.

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