

Gene maps to transform scientists' work on cancer

(Reuters) - Scientists have indentified all the changes in cells of two deadly cancers to produce the first entire cancer gene maps and say the findings mark a "transforming moment" in their understanding of the disease.

The studies by international scientists and Britain's Wellcome Trust Sanger Institute are the first comprehensive descriptions of tumour cell mutations and lay bare all the genetic changes behind melanoma skin cancer and lung cancer.

"What we are seeing today is going to transform the way that we see cancer," Mike Stratton of the Sanger Institute's cancer genome project told a briefing in London. "We have never seen cancer revealed in this form before."

The scientists sequenced all the DNA from both tumour tissue and normal tissue from a melanoma patient and a lung cancer patient using a technology called massively parallel sequencing. By comparing the cancer sequences with the healthy ones, they were able to pick up all the changes specific to cancer.

The lung tumour carried more than 23,000 mutations and the melanoma had more than 33,000.

Peter Campbell, also of the Sanger Institute, said the lung cancer study suggests a typical smoker develops one mutation for every 15 cigarettes smoked and the damage starts with the first puff. Lung cancer kills around 1 million people worldwide each year and 90 percent of cases are caused by smoking.

"These catalogues of mutations are telling us about how the cancer has developed -- so they will inform us on prevention -- and they include all the drivers, which tell us about the processes that are disrupted in the cancer cell which we can try and influence through our treatments," Stratton said.

But the scientists said identifying all the drivers -- the mutations that cause cells to become cancerous -- would take far more work and it could be several years yet before any new targets are found for the development of new cancer drugs.

"Somewhere among the mutations we have found lurk those that drive the cells to become cancerous," said Andy Futreal, who worked on the research published in the Nature journal. "Tracking them down will be our major challenge for the next few years."

Scientists have already identified some genetic mutations linked to cancers -- mutations of a gene called BRAF are found in melanoma and new drugs to block its

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Published on Electronic Component News (<http://www.ecnmag.com>)

cancer-causing activity are already in development. Drugs such as Roche AG's Herceptin and AstraZeneca's Iressa also target tumour cells that carry specific mutations.

Stratton said the aim now was to produce genetic maps of all types of cancer. There are more than 100 cancers in all, and each genome mapping process requires several months of work and costs tens of thousands of dollars.

The first 50 cancers are to be mapped by scientists in the International Cancer Genome Consortium, launched in 2008, which includes the U.S. National Institutes of Health and groups from Australia, Canada, China, France, India, Japan and Singapore.

Experts said this was a first glimpse of the future of cancer medicine. With ever improving technology to map genomes, and costs falling fast, the scientists said in future each cancer patient could have a complete genome catalog to help doctors pick the right treatments for individual cases.

"As more cancer genomes are revealed by this technique, we will gain a greater understanding of how cancer is caused and develops, improving our ability to prevent, treat and cure cancer," Elizabeth Rapley of the Institute of Cancer Research said in a statement.

Source URL (retrieved on 07/29/2014 - 1:45am):

<http://www.ecnmag.com/news/2009/12/gene-maps-transform-scientists-work-cancer>