New research gives deeper understanding of why some breast cancers are hard to treat

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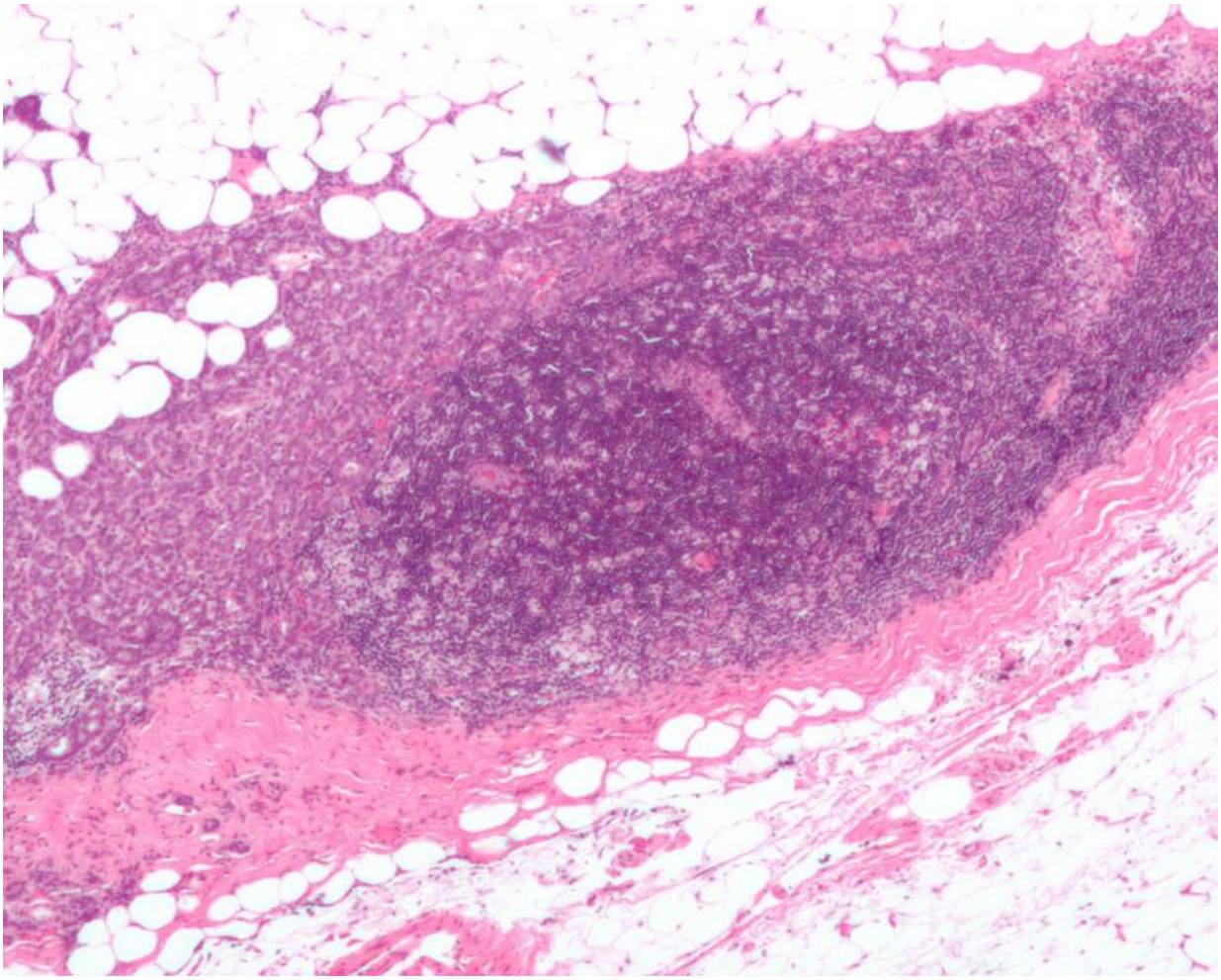

Micrograph showing a lymph node invaded by ductal breast carcinoma, with extension of the tumour beyond the lymph node. Credit: Nephron/Wikipedia

Scientists have unearthed crucial new genetic information about how breast cancer develops and the genetic changes which can be linked to survival, according to a Cancer Research UK-funded study published in *Nature Communications* today (Tuesday).

The Cancer Research UK funded researchers, from the University of Cambridge, analysed tumour samples from the METABRIC study—which revealed breast cancer can be classified as 10 different diseases - to get a deeper understanding of the genetic faults of these 10 subtypes.

They found 40 mutated genes that cause breast cancer to progress. Only a fraction of these genes were previously known to be involved in breast cancer development. They also discovered that one of the more commonly mutated genes, called PIK3CA, is linked to lower chances of survival for three of the 10 breast cancer subgroups. Crucially, this might help explain why drugs targeting PIK3CA work for some women but not for others.

And the researchers think the results could in the future help find drugs to target these genetic faults, stopping the disease from progressing. The research could also provide vital information to help design breast cancer trials and improved tests for the disease.

The findings add a more detailed layer of information to METABRIC, a major study involving 2,000 patients in 2012 which revealed breast cancer can be classified as 10 diseases or sub types. METABRIC was the largest molecular profiling study looking at how patients progress after treatment for any type of cancer. It was carried out by Cancer Research UK, in collaboration with the British Columbia Cancer Agency.

Professor Carlos Caldas, lead author and Cancer Research UK scientist based at the University of Cambridge, said: "The METABRIC study

mapped out the genetic blueprints for breast cancer. And these new results give us even more detail about which genetic faults could be linked to how different types of breast cancer develop and progress."The information could in the future help design clinical trials for breast cancer patients, or give researchers more flags to look out for in liquid biopsies, a type of test used to detect genetic material in the blood that is released by dying cancer cells."

The results will be made available to the public so that other researchers can benefit from the work.

Professor Peter Johnson, Cancer Research UK's chief clinician, said: "Our research continues to highlight just how complicated cancers are, but we are managing to solve these puzzles faster than ever. This study gives us more vital information about how breast cancer develops and why some types are more difficult to treat than others, and this information is a great resource for researchers all over the world. Research like this will help us invent new diagnostic tests to guide treatment for breast cancer patients in the future."

More information: Christina Curtis et al, The genomic and transcriptomic architecture of 2,000 breast tumours reveals novel subgroups, *Nature* (2012). DOI: 10.1038/nature10983

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