Mystery of the missing breast cancer genes

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Researchers from the University of Adelaide are hoping to better understand why the mutated genes for breast and ovarian cancer are not passed on more frequently from one generation of women to the next.

That's despite a documented link between breast cancer genes and increased fertility in women.

Dr Jack da Silva from the University's School of Molecular & Biomedical Science says that because women who carry breast cancer genes are more fertile, in theory they have a greater chance of passing these genes on to future generations.

"A recent study in the United States found that mutations in the breast cancer genes BRCA1 and BRCA2 were directly linked with a 50% increase in the fertility of women, which is a huge number," Dr da Silva says.

"With such an increased fertility rate, you would expect to see a high frequency of these cancer-causing genes in modern populations, but in fact that is not the case - the frequencies are relatively low."

In a paper being published today in the *Proceedings of the Royal Society B*, he argues that the so-called "grandmother effect" may in part be the reason behind this phenomenon.

"In an earlier study, researchers found that post-menopausal women create a 'grandmother effect' - that is, the longer they live, the more they

are able to support their daughters and their grandchildren, thereby creating an environment in which more grandchildren are born.

"The reverse of this is that women who die earlier - such as from breast or ovarian cancer, which are usually post-menopausal - will no longer be able to support their daughters and grandchildren. This has the effect of limiting the number of grandchildren born, and therefore the chances of passing on the mutated genes from one generation to the next is also limited," Dr da Silva says.

However, the "grandmother effect" does not entirely negate the increased fertility caused by breast cancer genes, he says.

"Our change to today's industrial and technological age has been relatively rapid in human history. For most of our existence, we have been hunter-gatherers. During this time, female fertility was limited, and this may have reduced the increase in fertility caused by mutations of these genes."

Dr da Silva says further studies examining modern-day hunter-gatherer societies might shed more light on how and why the spread of these genetic mutations occurs across generations.

Provided by University of Adelaide

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