

'Stealth' properties of cancer-causing genetic mutations identified

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Scientists have discovered that cancer-causing genetic mutations have better-disguised electronic signatures than other mutations - a trait which could help them fly under the radar of the body's defence mechanisms.

Results of a new study by [physicists](#) at the University of Warwick and in Taiwan hint at the possibility that one day the electronic properties of DNA could play a role in early diagnosis and detection of mutation hotspots.

Researchers drew on the power of supercomputers to model every possible mutation for 162 disease-related genes, a total of 5 billion calculations.

When they compared the models with [medical databases](#) of real-life mutations known to have caused cancer in individuals, they found that the real-life mutations had a "stealthier" [electronic structure](#) than the theoretical mutations which didn't have a documented real-life counterpart.

These disease-causing mutations caused a smaller change in the electronic structure of the DNA molecule, which may make them less detectable to the cell's damage repair process at work on a molecular level .

Professor Rudolf Roemer from the Department of Physics at the University of Warwick said: "We studied the scale of change in

[electronic charge](#) transport for pathogenic mutations when compared to all possible mutations.

"We found that those mutations which had the smallest change in electronic properties correspond to those mutations which we know to have caused cancer in real life.

"You could compare these disease-causing mutations to planes that use stealth technology to go undetected by defence systems like radar.

"Similarly the real-life mutations that show up in the medical databases are likely to be the ones that didn't have a sufficiently dramatic effect on the structure of the DNA when they first appeared, which is why they were not spotted and repaired early on by the body's molecular defence mechanisms.

"It seems they are able to use stealth tactics which may allow them to go undetected by the body's defence systems – making them all the more dangerous in their ability to then go on and cause a disease like cancer."

Dr Stephen Wells of the Department of Physics at the University of Warwick added: "This is the first time scientists have identified a link between mutations and the electronic properties of disease-related genes.

"Although it is obviously very early days, these findings suggest that we could one day use these differences in electronic signatures as a red flag in terms of early detection of diseases like cancer."

The paper, The Interplay of mutations and [electronic properties](#) in disease-related genes, is published in the open access journal *Scientific Reports*.

It is co-authored by Chi-Tin Shih and Yun-Yin Cheng of Tunghai

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