Researchers uncover cancer survival secrets

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A team of Monash University researchers has uncovered the role of a family of enzymes in the mutation of benign or less aggressive tumours into more aggressive, potentially fatal, cancers in the human body.

The discovery, published today in the international journal *Cancer Cell,* provides valuable insights into how cancer cells develop and mutate, and could ultimately change treatment options for sufferers around the world.

Team leader, Associate Professor Tony Tiganis, from the Department of Biochemistry and Molecular Biology at Monash University said their work showed that the enzymes known as protein tyrosine kinases (PTKs) had a greater role than previously thought in the rate of growth and tumour change over time.

"We already know that PTKs are associated with several types of aggressive cancers, including colon, breast and lung cancers," Associate Prof Tiganis said.

"What we have discovered is that PTKs have an important role to play as cancer cells grow and mutate to become potentially more aggressive tumours.

"The more we can learn about how tumours develop, the more we are able to prevent their growth in the future. There are already drugs that inhibit particular PTKs in the late stages of treatment. Our discovery could change the timing of when and how those or similar drugs are

administered."

Assoc Professor Tiganis said all cells routinely divide and duplicate during growth. An entire genome is replicated and divides equally into two daughter cells. Sometimes things go wrong. To try to prevent this, nature has installed key cell surveillance checkpoints where molecular 'wardens' slow down DNA replication to try and correct mistakes to get the cell duplication back on track.

Normally, PTKs are turned off in the face of compromised DNA replication, but when PTK pathways remain on, unscheduled cell division can take place where cells distribute their DNA unevenly between the two resulting daughter cells. As a result, tumour cells can accumulate or lose genes and chromosomes, and gain a growth and survival advantage.

"Our studies have shown that PTK pathways are intimately associated with the regulation of checkpoint responses during DNA replication," Assoc Prof Tiganis said.

"We have identified one mechanism by which PTKs may remain activated and allow cancer cells to bypass the molecular warden of DNA replication. They may lack a key enzyme called TCPTP." Experiments published in the prestigious journal Cancer Cell have been conducted using cells grown in the laboratory. "But the big question remains. What happens in the real world of human cancers?"

Source: Monash University