Cancer rejection: Scientists discover crucial molecule

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Researchers at the Centenary Institute in Sydney have discovered a molecule on the surface of immune cells which plays a critical role in cancer rejection.

Using advanced multi-photon microscopy, the scientists have tracked the migration of immune cells called T cells within tumours in experimental models, and found that the surface molecule (CD44) directly impacts whether a tumour progresses or is rejected by T cells.

Professor Wolfgang Weninger, Head of the Immune Imaging program at Centenary, says this discovery advances our knowledge of the immune processes at play in cancer.

"The immune system and cancer were first linked in the 1900s but it wasn't until the 1980s that interactions between the immune system and cancer cells became a focus for medical researchers," says Professor Weninger.

"We know that migration of T cells within tumours is very important for rejection but we didn't know about how it worked. We found that this particular molecule regulates the navigation of T cells in tumours. In its absence, T cells are inhibited in migration and show a defect in their ability to reject a tumour."

Understanding how tumours avoid the natural processes of the immune system is one of the biggest questions in cancer. Finding the answer

could significantly improve cancer treatment.

Professor Weninger explains: "By understanding how the immune system fights tumours, we may be able to optimise cancer therapies in the future. It may provide the opportunity to design treatments that mimic certain aspects of immune responses and cellular processes, making cancer treatments less hit and miss and reducing the toll on patients."

Centenary Institute Executive Director, Professor Mathew Vadas, points out this discovery has been made possible by recent advances in research technology - in particular multi-photon microscopy.

"Previously, cancer researchers could only build assumptions by linking series' of still images of the immune system at work," Professor Vadas says. "Multi-photon microscopy allows us to make real time movies showing exactly how the immune cells interact and is opening up new frontiers for medical research."

Professor Weninger, a world leader in this form of imaging, is driving this research revolution using one of Australia's first multi-photon microscopes at the Centenary Institute in Sydney.

This discovery firmly places Professor Weninger and his team's focus on the next piece of the puzzle - how does the actual process of tumour rejection work?

"This next stage of our research is very exciting. What are the physical interactions of T cells and tumours and how do the T cells actually defeat a tumour?" says Professor Weninger. "If we can get to the bottom of these immune system interplays, the benefits for cancer patients around the world could be truly enormous."

Reference: Mrass P, Kinjyo I, Ng LG, Reiner SL, Puré E, Weninger W. CD44 mediates successful interstitial navigation by killer T cells and enables efficient antitumor immunity. *Immunity*. 2008 Dec;29(6):971-85.

Source: Research Australia