

Researchers one step closer to understanding deadly facial tumor in Tasmanian devils

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Tasmanian Devil. Credit: Andy Flies

New findings in research funded by Morris Animal Foundation offer valuable insight on how to fight devil facial tumor disease (DFTD) that has resulted in a catastrophic decline in wild Tasmanian devils.

Researchers have shed light on how the tumors successfully evade the immune system, which may offer possible strategies to protect the endangered devils from this devastating disease.

"We've had incremental progress in our understanding of devil facial tumor disease over the past two decades," said Dr. Andy Flies, a Morris Animal Foundation-funded researcher and one of the study's authors. "Low genetic diversity was initially thought to be the primary reason for the fatal transmissible tumors, but more recently it was discovered that DFT [cells](#) hide from the immune system by not expressing key immune recognition molecules, a sort of invisibility cloak for [cancer cells](#)."

Devil facial tumor disease (DFTD) was discovered in 1996 and kills nearly every devil it infects, with some experts estimating a decrease of 90 percent or more in wild devil populations. One of just three known contagious cancers (the other two are a transmissible venereal tumor in dogs and a water-borne leukemia in soft-shell clams), researchers believe DFTD is transferred between individuals through biting behaviors. The disease first struck populations in northeastern Tasmania, but now encompasses most of the geographic range of *Sarcophilus harrisii*, threatening the iconic devil with extinction.

Dr. Flies and his collaborators searched for a very specific cell surface molecule, called PD-L1, on tumor samples from Tasmanian devils. Strong evidence exists in other species, including people, that when cells express high levels of PD-L1, it can shield cells from attacks by the immune system.

"Our discovery that DFT cells produce the [PD-L1 'molecular shield'](#) in response to inflammation represents another important step toward understanding DFTD and developing more potent ways of preventing or treating the facial tumors," said Dr. Flies, who is a postdoctoral research fellow at the University of Tasmania, Australia. "DFTs probably have more ways to hide from or suppress the immune system of the Tasmanian devil, and our ongoing research efforts aim to uncover and counteract these mechanisms."

"We are excited to support this critical work to protect the health of Tasmanian devils," said Morris Animal Foundation Chief Scientific Officer Barbara Wolfe, DVM, PhD, DACZM. "As a nonprofit dedicated to improving the health of animals through science and education, Morris Animal Foundation only funds projects with the highest scientific rigor. Dr. Flies' work is already showing results."

Dr. Flies' primary research interest lies in developing an immunotherapy treatment, such as a vaccine, for DFTD. The devil immunology team is currently performing functional tests on newly created antibodies to see if they can "release the brakes" on the devil immune system and allow devil T cells to kill [tumor](#) cells. His team also is working toward treatments for canine cancers.

Dr. Flies' discovery of the PD-L1 molecular shield has far-reaching implications beyond protecting Tasmanian devils from potential extinction. This finding helps researchers better understand cancer immunology through exploration of the interactions between the immune system and cancer cells. The PD-L1 molecular shield also has potential as a tool to improve transplant tolerance in multiple species.

More information: Andrew S. Flies et al, Comparative Analysis of Immune Checkpoint Molecules and Their Potential Role in the Transmissible Tasmanian Devil Facial Tumor Disease, *Frontiers in Immunology* (2017). [DOI: 10.3389/fimmu.2017.00513](https://doi.org/10.3389/fimmu.2017.00513)

Andrew S. Flies et al. PD-L1 Is Not Constitutively Expressed on Tasmanian Devil Facial Tumor Cells but Is Strongly Upregulated in Response to IFN- γ and Can Be Expressed in the Tumor Microenvironment, *Frontiers in Immunology* (2016). [DOI: 10.3389/fimmu.2016.00581](https://doi.org/10.3389/fimmu.2016.00581)

Provided by Morris Animal Foundation

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