

| Meet the Marker: TRBC1

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T cells, also known as T-lymphocytes or thymocytes, are a type of white blood cell that originates in the bone marrow and matures in the thymus. T cells detect specific antigens for attack and play a major role in long-term immunity.

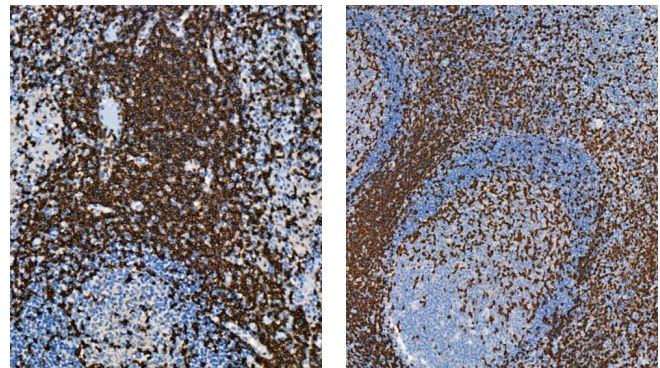
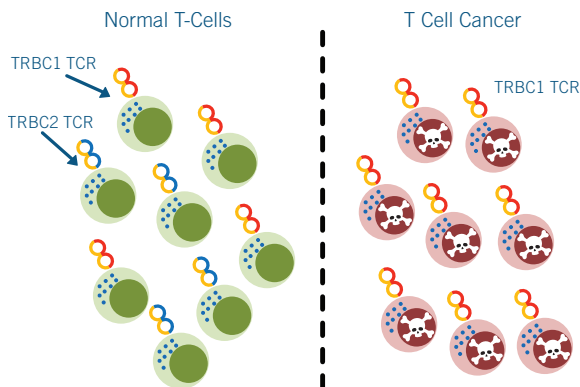
Mature T cell cancers can be very severe as they are typically aggressive, resistant to treatment, and generally have poor outcomes.² The ability to distinguish malignant T cells from normal T cells has been a major obstacle to the treatment of these cancers since, unlike B cell depletion, depleting all T cells in a patient is prohibitively toxic.² Therefore, abnormal T cells would need to be specifically targeted in the patient while leaving normal T cells alone. TRBC1 expression appears to be a promising method for identifying and targeting only abnormal T cells.

T cell Receptors (TCR) are receptors on the surface of T cells that recognize antigens which will then activate the T cell immune response.³ A TCR consists of an α -chain and a β -chain.² The β -chain of each T cell will express one of two genes in its constant domain: TRBC1 (T cell Receptor Beta Constant 1) or TRBC2 (T cell Receptor Beta Constant 2).² The selection and expression of these receptor genes are mutually exclusive.² Normal T cell production will consist of a mixture of T cells expressing TRBC1 and TRBC2.² However, studies have shown that T cell malignancies tend to show a disproportionate amount of T cells expressing either TRBC1 or TRBC2.²

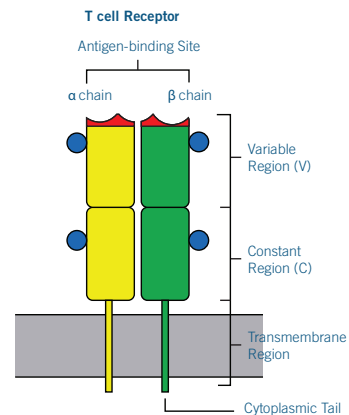
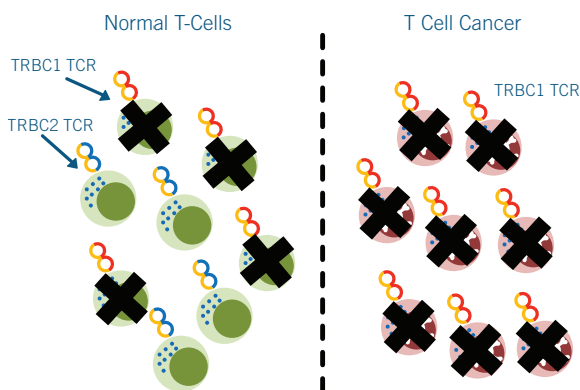
Because of this, the use of antigen markers to distinguish between TRBC1 and TRBC2 may help detect the presence of T cell malignancies, and may direct treatment strategies for such malignancies in the future.²

In experimental studies, scientists have been able to develop anti-TRBC1 chimeric antigen receptor T cells that can recognize and kill only T cells expressing TRBC1 while leaving T cells expressing TRBC2 alone. This capability has been demonstrated both in vitro and in a mouse model of leukemia.² Thus, TRBC1-targeted immunotherapy appears to have the potential to eradicate T cell malignancies while maintaining sufficient normal T cells for the health and safety of the patient.

Stain and Illustrations



T cell lymphoma stained with TRBC1 antibody Tonsil stained with TRBC1 antibody



To learn more about Biocare's TRBC1 marker, please call 1-800-799-9499, option #3, or visit our website at biocare.net

1. Chandran SS, Klebanoff CA. T cell receptor-based cancer immunotherapy: Emerging efficacy and pathways of resistance. *Immunol Rev.* 2019;290(1):127-147.
2. Maciocia PM, Wawrzyniec PA, Philip B, et al. Targeting the T cell receptor β -chain constant region for immunotherapy of T cell malignancies. *Nat Med.* 2017 Dec;23(12):1416-1423
3. Sewell Andrew K. Why must T cells be cross-reactive? *Nat Rev Immunol.* 2012 Sep;12(9):669-77.