

ARE YOUR ANTIBODIES WORKING HARD,
OR HARDLY WORKING?

75%

OF MANUFACTURED
ANTIBODIES ARE
NON-SPECIFIC OR DID
NOT WORK AT ALL*



EVERY ANTIBODY THAT
BETHYL SELLS IS
MANUFACTURED TO
EXACTING STANDARDS
ON SITE IN
MONTGOMERY, TX

TARGETING OVER
3,300

PROTEINS AND 1,300
SECONDARY ANTIBODIES

Bethyl is dedicated to improving lives by supporting scientific discovery through its qualified polyclonal and recombinant rabbit monoclonal antibody products and ELISA kits. Our antibodies have been manufactured and validated on-site by our scientists to ensure target specificity and sensitivity. If a product doesn't meet our standards, it doesn't leave our facility and every antibody sold is backed with a 100% guarantee to provide confidence in your results. **We put a lot in every drop.**

FIND OUT MORE AT BETHYL.COM/VALIDATION

\$350

MILLION
IS WASTED ANNUALLY ON
BIOMEDICAL RESEARCH
BECAUSE POOR QUALITY
MATERIALS LEAD TO
FALSE RESULTS**



QUALIFIED
ANTIBODIES
MADE IN THE USA
VALIDATED IN THE USA

40+
YEARS OF
EXPERIENCE

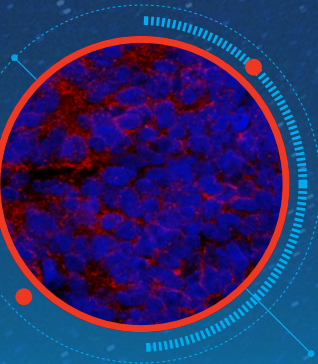
OF CATALOG &
CUSTOM ANTIBODY
PRODUCTION SERVICES



Really Good Antibodies

BETHYL LABORATORIES

Since 1972, Bethyl Laboratories has been dedicated to improving lives by supporting scientific discovery through its qualified polyclonal and recombinant rabbit monoclonal antibody products and ELISA kits. Every antibody Bethyl sells has been manufactured and validated on site in the USA to exacting standards. Our in-house validation process ensures target specificity and sensitivity to provide confidence in your results. With over 40 years of experience, Bethyl is also a leading provider of bulk and custom production services. Bethyl's newest catalog offering of recombinant rabbit monoclonal antibodies serve to advance immuno-oncology research. To learn more, please visit www.bethyl.com. We put a lot in every drop.



STARS
OF THE
SHOW

THE IMMUNE SYSTEM PLAYS A PIVOTAL ROLE IN TUMOR FORMATION,
DEVELOPMENT, AND METASTASIS.

Light
your way.

Get the full picture with trusted tumor immune response results from our in-house validated antibodies.

When it comes to your tumor immune response research, blind spots are unacceptable. Independent testing has demonstrated that 75% of antibodies in today's market are non-specific or simply do not work at all.* But at Bethyl, we've manufactured and validated every antibody we make on site to ensure target specificity and sensitivity. All to guarantee our antibodies will function as designed in your assay 100% of the time. More than 10,000 independent citations over the past 15 years have proven that, at Bethyl, we put a lot in every drop.

See our data at bethyl.com/immuno-oncology

*Weller, MG, Analytical Chemistry Insights:11, 21-27 (2016).

Antibodies shown: Rabbit anti-PD-L1 (red, A700-020) & Lamin-A/C (green, A303-430A) in FFPE lung.
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Really Good Antibodies

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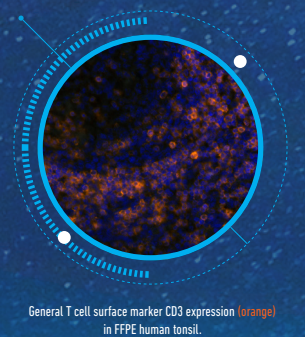
STARS OF THE SHOW

The immune system plays a pivotal role in tumor formation, development, and metastasis. Cancer cells are inherently antigenic,¹ which normally allows immune cells to identify and eliminate them prior to tumor formation. Tumor formation occurs when cancer cells develop methods to evade or outpace immune-mediated killing. Understanding this relationship between immune and cancer cells is therefore integral to restoring immune system potency for cancer therapeutics.

T

T CELLS

The primary effectors of immune-mediated cell death, T cells exert their tumoricidal functions by recognizing antigens presented on tumor cells' surfaces.² Tumor cells evade T cells through nutrient deprivation,³ promoting cell inactivation, and activating immunosuppression mechanisms.² Augmenting T cell activity to counteract these effects is a primary focal point of immuno-oncology research.



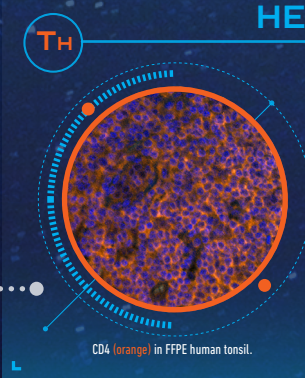
Th

HELPER T CELLS (T_H CELLS)

Mechanism:

- Regulates immune system function through cytokine secretion and activation of macrophages, B cells, and CTLs
- Vital for anti-tumor protection⁷

Markers: **CD4**; distinguished from T_{reg} cells (also CD4+) by secretion profile (T_{H1} cells secrete IFN γ , T_{H2} interleukins (ILs) 4, 13, and 5, and T_{H17} ILs 17 and 21)⁴



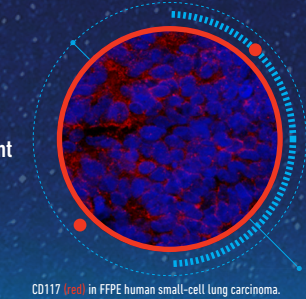
NK

NATURAL KILLER (NK) CELLS

Mechanism:

- Effectively eliminates circulating cancer cells via cytotoxic mechanisms¹¹
- Activity against solid tumors is dependent on extent of cytokine-mediated activation¹¹

Markers: CD95, **CD117**, CD62L, CD56_{dim} or CD56_{bright}¹²



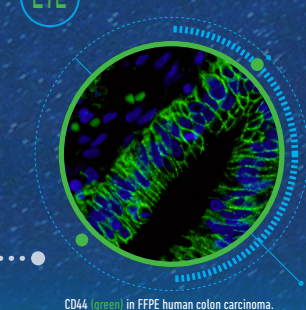
CTL

CYTOTOXIC T CELLS (CTLs)

Mechanism:

- Primed and activated through T cell receptor (TCR)-major histocompatibility complex (MHC)-antigen presentation
- Releases cytotoxins to kill cells expressing said antigen

Markers: CD8, **CD44**, CD62_{Lo}



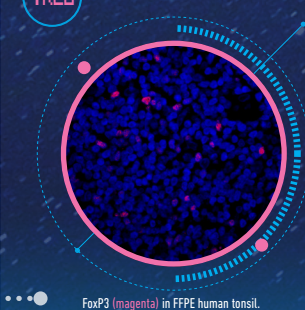
TREG

REGULATORY T CELLS (T_{REG} CELLS)

Mechanism:

- Suppresses immune system activity to prevent deleterious inflammation and autoimmune disorders⁷
- Tumor cells promote T_{reg} recruitment, resulting in immunosuppression and evasion⁸

Markers: FoxP3, CD258



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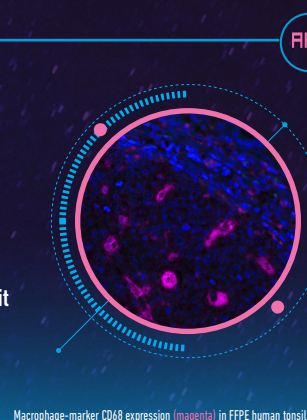
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DENDRITIC CELLS AND MACROPHAGES: ANTIGEN PRESENTING CELLS (APCs)

Mechanism:

- Dendritic cells (DCs) and macrophages are professional antigen-presenting cells (APCs) pivotal for activating T cells¹³
- Macrophages also kill cells via phagocytosis or cytotoxic mechanisms; phenotypes range from pro-inflammatory to anti-inflammatory/pro-repair¹⁴
- Cancer cell-secreted cytokines cause tumor-infiltrating DCs to switch to an immuno-suppressive phenotype, while tumor-associated macrophages (TAMs) present anti-inflammatory phenotypes, inhibit T cell activity, and promote angiogenesis, tumor growth, and metastasis^{13,14}

DC Markers: CD1c, CD14, CD141¹⁵
Macrophage Markers: CD14, CD11b, **CD68**, HLA-DR, CD163, CX3CR1¹⁶

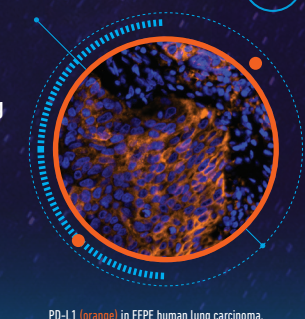


IMMUNE CHECKPOINTS

Mechanism:

- Checkpoint proteins and the pathways they activate are critical for immune self-regulation¹⁷
- The ability to inhibit immune responses is key for limiting collateral damage and maintaining self-tolerance¹⁸
- Cancer cells have co-opted the activation of these pathways to deactivate immune-mediated tumoricidal mechanisms, thereby facilitating tumor immune evasion¹⁹
- Checkpoint inhibition – using exogenous agents to prevent cancer cell-mediated checkpoint pathway activation – is a popular anti-cancer therapeutic strategy undergoing intensive research¹⁹

Checkpoint Pathway Proteins: PD-1, **PD-L1**; CTLA-4, CD80/CD86^{19,20}

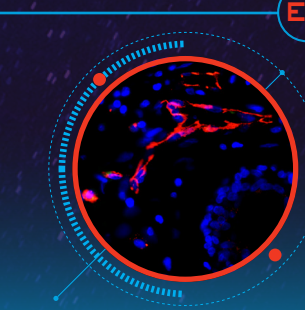


ENDOTHELIAL CELLS

Mechanism:

- Regulates and promotes angiogenesis²³
- Controls tumor cell intra/extravasation, metastasis, and immune cell infiltration²³

Markers: **CD31**, von Willebrand Factor²⁴

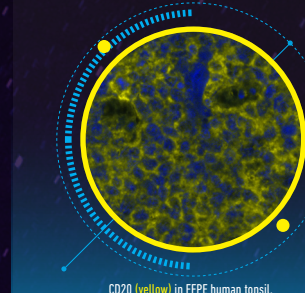


B CELLS

Mechanism:

- Produces antibodies that promote anti-tumor T cell, macrophage, and NK cell activity⁷
- Can encourage tumor development by producing growth factors and autoantibodies⁹

Markers: CD19, **CD20**, CD21, CD40, CD80, CD86, & CD69¹⁹

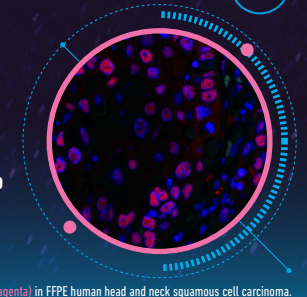


CANCER CELL MARKERS

Mechanism:

- Cancer stem cells are resistant to anti-tumor therapies and are capable of self-renewal, facilitating disease relapse and metastasis¹⁷
- Host mesenchymal stem cells can differentiate into immunosuppressive immune cells¹⁸

Markers: β -catenin, **PCNA**, Ki-67, cytokeratin



FIBROBLASTS

Mechanism:

- Creates a favorable environment for tumor growth by secreting growth factors and extracellular matrix²¹
- Promotes angiogenesis as well as recruitment of vascular cells (e.g., endothelial cells and pericytes)²¹

Markers: α -smooth muscle actin, **vimentin**, desmin, platelet derived growth factor receptor²²

