Monoclonal antibody

- Direct Out-of-Pocket Costs of Nirsevimab vs. Palivizumab during the First Respiratory Syncytial Virus Season: A Comparative Analysis
- Global pharmacovigilance reporting of the first monoclonal antibody for canine osteoarthritis: a case study with bedinvetmab (Librela)
- Phase 1 study of talquetamab, a humanized GPRC5D x CD3 bispecific antibody, in Japanese patients with relapsed/refractory MM
- Human Metapneumovirus: A Comprehensive Epidemiological Analysis of a Global Respiratory Threat
- Use of Model-Based Meta-Analysis to Inform the Design of Early Clinical Trials of Anti-Amyloid Beta Therapies in Alzheimer's Disease
- The emerging role of lymphocyte-activation gene 3 targeting in the treatment of solid malignancies
- Development and application of IgT monoclonal antibody in Nile tilapia Oreochromis niloticus
- Monoclonal antibodies against beta-amyloid protein (lecanemab and donanemab) should not be used in the treatment of Alzheimer's disease

Monoclonal Antibody Classification

Monoclonal antibodies (**mAbs**) can be classified based on their **source, target,** and **mechanism of action**.

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1. Classification by Source (Suffix-Based)

Monoclonal antibodies are named based on their origin:

Suffix	Type	Description	Example
-omab	**Murine**	100% mouse-derived	Tositumomab
-ximab	**Chimeric**	~65% human, ~35% mouse	Infliximab
-zumab	**Humanized**	>90% human, small mouse portion	Trastuzumab
-umab	**Fully human**	100% human-derived	Adalimumab

Note: Murine antibodies (**-omab**) have a higher risk of immunogenic reactions (e.g., HAMA response: human anti-mouse antibody reaction).

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2. Classification by Target

mAbs are categorized based on their primary **target molecule**.

A) Immune System Modulators

- **Anti-TNF-α:** Infliximab, Adalimumab (for autoimmune diseases)
- **Anti-IL-6:** Tocilizumab (for rheumatoid arthritis)
- **Anti-CD20:** Rituximab (for B-cell lymphomas & autoimmune disorders)
- **Anti-IL-17:** Secukinumab (for psoriasis & ankylosing spondylitis)
- **Anti-IL-23:** Guselkumab (for psoriasis)

B) Oncology (Cancer Therapy)

- **Anti-HER2:** Trastuzumab (for HER2+ breast cancer)
- **Anti-VEGF:** Bevacizumab (angiogenesis inhibitor for various cancers)
- **Anti-PD-1:** Pembrolizumab, Nivolumab (immune checkpoint inhibitors)
- **Anti-CTLA-4:** Ipilimumab (checkpoint inhibitor for melanoma)

C) Infectious Diseases

- **Anti-RSV (Respiratory Syncytial Virus):** Palivizumab
- **Anti-Ebola:** Inmazeb (REGN-EB3)

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3. Classification by Mechanism of Action

A) Neutralizing Antibodies

- Bind and block the activity of a target molecule.
- **Example:** Bevacizumab (blocks VEGF to prevent angiogenesis)

B) Cytotoxic Antibodies

- Directly cause cell death via complement-dependent cytotoxicity (**CDC**) or antibody-dependent cell-mediated cytotoxicity (**ADCC**).
- **Example:** Rituximab (targets CD20 on B cells)

C) Immune Checkpoint Inhibitors

- Enhance the immune system's ability to fight cancer by blocking inhibitory pathways.
- **Example:** Nivolumab (**anti-PD-1**), Ipilimumab (**anti-CTLA-4**)

D) Drug-Conjugated Monoclonal Antibodies

- mAbs conjugated to chemotherapy or radioactive substances for targeted delivery.
- **Example:** Brentuximab vedotin (anti-CD30 conjugated to a cytotoxic agent)

Monoclonal antibodies (mAb or moAb) are monospecific antibody that are made by identical immune cells that are all clones of a unique parent cell, in contrast to polyclonal antibodies which are made from several different immune cells. Monoclonal antibodies have monovalent affinity, in that they bind to the same epitope.

Given almost any substance, it is possible to produce monoclonal antibodies that specifically bind to that substance; they can then serve to detect or purify that substance. This has become an important tool in biochemistry, molecular biology, and medicine. When used as medications, the non-proprietary drug name ends in -mab (see “Nomenclature of monoclonal antibodies”), and many immunotherapy specialists use the word mab acronymically.

see Monoclonal antibody therapy.

established a library of monoclonal antibodies (mAbs) against a tumor cell line derived from a patient with GBM. We identified mAbs that reacted with tumor cell lines from patients with GBM but not with nonmalignant human brain cells. We then detected the antigens they recognized using expression cloning. CAR-T cells derived from a candidate mAb were generated and tested in vitro and in vivo.

Results: We detected 507 mAbs that bound to tumor cell lines from patients with GBM. Among them, E61 and A13 reacted with tumor cell lines from most patients with GBM, but not with nonmalignant human brain cells. We found that B7-H3 was the antigen recognized but E61. CAR-T cells were established using the antigen-recognition domain of E61-secreted cytokines and exerted cytotoxicity in co-culture with tumor cells from patients with GBM.

Conclusions: Cancer-specific targets for CAR-T cells were identified using a mAb library raised against primary GBM tumor cells from a patient. We identified a GBM-specific mAb and its antigen. More mAbs against various GBM samples and novel target antigens are expected to be identified using this strategy [1)].

Murine monoclonal antibody

Murine monoclonal antibody

Trastuzumab

Trastuzumab

1)
Nakagawa T, Kijima N, Hasegawa K, Ikeda S, Yaga M, Wibowo T, Tachi T, Kuroda H, Hirayama R, Okita Y, Kinoshita M, Kagawa N, Kanemura Y, Hosen N, Kishima H. Identification of glioblastoma-specific antigens expressed in patient-derived tumor cells as candidate targets for chimeric antigen receptor T cell therapy. Neurooncol Adv. 2022 Nov 15;5(1):vdac177. doi: 10.1093/noajnl/vdac177. PMID: 36601313; PMCID: PMC9798403.