Anti-CD99 Antibodies Cytotoxic to Leukemia

New anti-CD99 antibodies for the treatment of rare hematological malignancies

Technology Overview

The Koide Lab at NYU Langone Health has developed new anti-CD99 antibodies for the treatment of rare hematological malignancies. These antibodies possess several features advantageous for drug development: fully human framework and IgG formatted. PoC studies (*Romero et al. JMB 2021*) show these antibodies to bind endogenously-expressed CD99 with nanomolar affinity and high specificity (no off-target binding to CD99 homologs). Moreover, exogenous addition of these antibodies induces cytotoxicity in T-cell acute lymphoblastic leukemia (T-ALL) cell lines and T-ALL patient samples without toxicity to the PBMC of healthy donor samples.

Background

CD99 is a type-1 transmembrane protein that is upregulated in many types of cancers including, hematopoietic and bone malignancies. Prior work (*Chung et al. Sci Transl Med 2017*) has established CD99 as a therapeutic target for Acute Myeloid Leukemia (AML) and Myelodysplastic Syndrome (MDS). In this study, a mouse monoclonal antibody targeting CD99 in AML and MDS cell lines induced apoptosis independent of immune effector function (ADCC and ADCP). In a different study (*Pettersen et al. J Immunol. 2001*), an anti-CD99 antibody induced apoptosis of a T-ALL cell line. Despite strong proof-of-concept (PoC) data, these antibodies are in IgM format thereby limiting their potential to be manufactured into therapeutics.

Development Status

The NYU inventors have engineered improved anti-CD99 antibody clones with greater affinity and cytotoxicity. The lead clone is presently being tested for *in vivo* functional efficacy in a T-ALL xenograft mouse model.

Applications

Technology ID

KOI01-05

Category

Life Sciences/Biochemicals & Small Molecules

Life Sciences/Therapeutics/Oncology

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Learn more

- Hematologic cancers
  - T-ALL
  - AML
  - MDS
- Other potential cancer subtypes
  - Triple negative breast cancer
  - Colon cancer
  - Prostate cancer
  - Synovial sarcoma
  - Ewing's sarcoma
- Diagnostic tool
  - Detect CD99 as a biomarker
- Basic biology research
  - MoA of CD99

Advantages

- Drug target
  - The CD99 is cell-surface exposed and accessible to antibody drugs
- High affinity and specificity
  - Nanomolar affinity and high specificity
- On-target, on-tissue toxicity independent of immune effector function
- Large anticipated therapeutic window
  - No toxicity to healthy donor samples

IP Status

NYU has filed a PCT patent application covering the antibody sequences (including improved clones) and their uses.

References

1. Romero LA, Hattori T, Ali MAE, et al. , https://pubmed.ncbi.nlm.nih.gov/34958778/