Transforming Growth Factor-Beta (TGF-β)-Responsive Single-Chain Variable Fragments And Chimeric Antigen Receptors

Tech ID: 27499 / UC Case 2016-076-0

SUMMARY

UCLA researchers in the Department of Chemical and Biomolecular Engineering have developed chimeric antigen receptors that are responsive to human and mouse TGF-β (Transforming Growth Factor-Beta).

BACKGROUND

TGF-β is a pleiotropic cytokine found at high levels in a variety of pathogenic states, including solid tumors, fibrosis, and dysregulated wounds. Many anti-TGF-β antibodies exist, but few anti-TGF-β scFvs have been described.scFvs and antibodies share the ability to bind tightly and specifically to target proteins, in this case TGF-β.However, scFvs are superior due to the following features: the smaller size of scFv facilitates smaller packaging and lower production costs, scFvs allow for more flexibility when designing applications, and scFvs are easier to genetically engineer.

INNOVATION

Researchers at UCLA have successfully described the sequences of scFvs that neutralize human and mouse TGF-β as well as chimeric antigen receptors (CARs) that robustly activate primary human T cells in response to TGF-β.

APPLICATIONS

Therapeutics for diseases where high levels of TGF-β are present

ADVANTAGES

The TGF-β CAR can be combined with tumor-targeting CARs or T cell receptors to render therapeutic T cells resistant to the immunosuppressive effects of TGF-β

Technical attributes of scFvs facilitate ease of production:

- Apply less stress to gene delivery modalities
- Can be collected directly from media in which it was produced
- More easily used in genetic engineering and gene therapy applications

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12590145	03/31/2026	2016-076
Republic Of Korea (South Korea)	Issued Patent	10-2771979	02/19/2025	2016-076
Japan	Issued Patent	JP 7539434	08/15/2024	2016-076
Macau	Issued Patent	J/6916	04/25/2023	2016-076
Albania	Issued Patent	AL/P/2022/591	12/07/2022	2016-076
Austria	Issued Patent	3368571	12/07/2022	2016-076
Belgium	Issued Patent	3368571	12/07/2022	2016-076
Bulgaria	Issued Patent	3368571	12/07/2022	2016-076
Switzerland	Issued Patent	3368571	12/07/2022	2016-076
Cyprus	Issued Patent	3368571	12/07/2022	2016-076

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OTHER INFORMATION

KEYWORDS

TGF-ß, Transforming growth factor-beta, chimeric antigen receptors, antibody, single-chain variable fragments, tumors, fibrosis, dysregulated wounds, therapy, immunotherapy, T-cell therapy, genetic engineering, gene therapy

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Medical**
  - Disease: Cancer
  - Other
  - Therapeutics

RELATED CASES

2016-076-0

Czech Republic	Issued Patent	3368571	12/07/2022	2016-076
Germany	Issued Patent	3368571	12/07/2022	2016-076
Denmark	Issued Patent	3368571	12/07/2022	2016-076
Estonia	Issued Patent	3368571	12/07/2022	2016-076
Spain	Issued Patent	3368571	12/07/2022	2016-076
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France	Issued Patent	3368571	12/07/2022	2016-076
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Italy	Issued Patent	502023000005823	12/07/2022	2016-076
Liechtenstein	Issued Patent	3368571	12/07/2022	2016-076
Lithuania	Issued Patent	3368571	12/07/2022	2016-076
Luxembourg	Issued Patent	3368571	12/07/2022	2016-076
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Netherlands (Holland)	Issued Patent	3368571	12/07/2022	2016-076
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San Marino	Issued Patent	SM-T-202300027	12/07/2022	2016-076
Turkey	Issued Patent	2022/019147	12/07/2022	2016-076
China	Issued Patent	ZL 201680077053.0	12/06/2022	2016-076
Japan	Issued Patent	7104624	07/12/2022	2016-076
United States Of America	Issued Patent	11,014,980	05/25/2021	2016-076
Japan	Published Application	2024-155943	10/31/2024	2016-076
Hong Kong	Published Application	40091180A	12/01/2023	2016-076

Additional Patents Pending

RELATED MATERIALS

- Chang, ZeNan L., Pamela A. Silver, and Yvonne Y. Chen. "Identification and selective expansion of functionally superior T cells expressing chimeric antigen receptors." Journal of translational medicine 13.1 (2015)

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Single-Chain Bispecific Chimeric Antigen Receptor Targeting BCMA And CS1 For The Treatment Of Multiple Myeloma
- Il-6 Receptor Alpha-Binding Protein And Its Use In Controlling Cytokine Release Syndrome In Immunotherapy
- Intracellular-Ligand-Responsive Cytotoxic Molecules For Selective T-Cell Mediated Cell Killing

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