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Enhancing Cytotoxic Potency of Monoclonal Antibodies Through Swainsonine Treatment

Stanford researchers in Dr. Taia Wang's lab have developed a technology that utilizes swainsonine to enhance the cytotoxic potency of monoclonal antibodies, thereby improving their efficacy in cancer and autoimmune disease treatments. This method significantly boosts antibody-dependent cellular cytotoxicity (ADCC) and overall therapeutic outcomes.

The current field of monoclonal antibody therapies for cancer and autoimmune diseases relies heavily on ADCC to target and destroy diseased cells. However, the efficacy of these treatments is often limited by the suboptimal affinity between the antibodies' Fc regions and the CD16 receptors on immune cells. Existing strategies, such as Fc engineering and glycoengineering, have attempted to enhance this affinity but still face limitations in achieving consistent and robust therapeutic outcomes.

This technology leverages swainsonine to enhance the cytotoxic potency of monoclonal antibodies by increasing the high-mannosylation of CD16 receptors on immune cells. This modification significantly improves the binding affinity between the antibodies' Fc regions and CD16, boosting ADCC, and thereby improving the overall effectiveness of the treatment. By addressing the limitations of suboptimal receptor-antibody interactions in current therapies, this approach enhances the efficacy of monoclonal antibody treatments for cancer and autoimmune diseases. Evidence shows that swainsonine treatment can increase ADCC activity by up to 200%, demonstrating its potential to significantly improve therapeutic outcomes.

Stage of Development
Proof of concept - in vivo mouse data

Applications

- **Cancer treatment:** Enhances the efficacy of monoclonal antibody therapies in targeting and destroying cancer cells
- **Autoimmune disease therapy:** Improves the potency of therapeutic antibodies used in treating autoimmune conditions
- **Immunotherapy adjuvant:** Acts as an adjuvant to boost immune responses in various antibody-based treatments

Advantages

- **Improved potency:** Co-administration with swainsonine boosts the efficacy of therapeutic antibodies, enhancing their tumor cell-killing ability
- **Enhanced antibody-dependent cellular cytotoxicity activity:** Swainsonine can significantly increase ADCC by up to 200%
- **Broad applicability:** Effective with various monoclonal antibodies for treating different cancers
- **Versatile administration:** Suitable for oral, parenteral, or intratumoral delivery, offering flexible treatment options for patients

Innovators

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