Toll-like Receptor 2 Ligands and Methods of Making and Using Thereof

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Technology description

Invention

Inventors at the University of Arizona have developed a set of 13 high-affinity toll-like receptor 2 (TLR2) agonists. In certain diseases, particularly pancreatic cancer, these receptors are overexpressed. TLR2 agonists are absorbed by these receptors. When the ligands are labeled with fluorescent proteins, the tumors can be identified. Additionally, these ligands can be combined with therapeutic agents to allow them to be absorbed specifically by cancerous tissue.

Background

Pancreatic cancer has a 5-year survival rate lower than 6%. Improved survival rates are associated with surgical resection of the tumor, but the tumor must be completely removed in order for this to be effective. However, there is significant difficulty in clearly identifying the tumor tissue from the healthy tissue. By using these TLR2 agonists with a fluorescence agent, doctors can have a clear guide telling them which tissue to remove during surgery.

Application area

- Tumor removal surgery. Pancreatic cancer has a very low 5-year survival rate that can be improved if cancerous tissue is removed. However, it is very difficult to tell the difference between cancerous and healthy tissue. By labeling these TLR2 agonists, it is possible to distinguish between the two tissue types.
- Use in radiotherapy. Pancreatic cancer is often treated with radiotherapy. These TLR2 agonists could be radiolabelled. These radiolabeled ligands may then have therapeutic effects when absorbed by cancerous tissues.
- Therapies for immune disease. TLR2 proteins are found in immune system cells, and are used by immune cells to recognize pathogens. Drugs can be combined with these TLR2 agonists in order to exert various effects on the immune system. TLR2 proteins are involved in sepsis, inflammation, and autoimmune diseases.

- Cardioprotection. TLR2 ligands have been studied for their protective effects on cardiac (heart) tissue. It may be possible to develop drugs for use in patients at risk for heart attacks.

Advantages

- Specific. TLR2 proteins are overexpressed significantly in pancreatic cancer. This makes the system efficient for marking cancer cells and not marking healthy tissue. This may make it a more effective method for delivering certain types of chemotherapy.
- Versatile. The invention can be combined with a variety of different labels or drugs, making it an effective delivery system for a variety of different compounds.
- May minimize side effects during therapy. Pancreatic cancer is often treated with chemotherapy, radiotherapy, or a combination of the two. One of the primary issues with these types of therapy is the non-specific effects of these therapies. By marking drugs with these TLR2 ligands, this may minimize absorption of therapeutic agents that are harmful to healthy tissue.

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