Find me a mAb!

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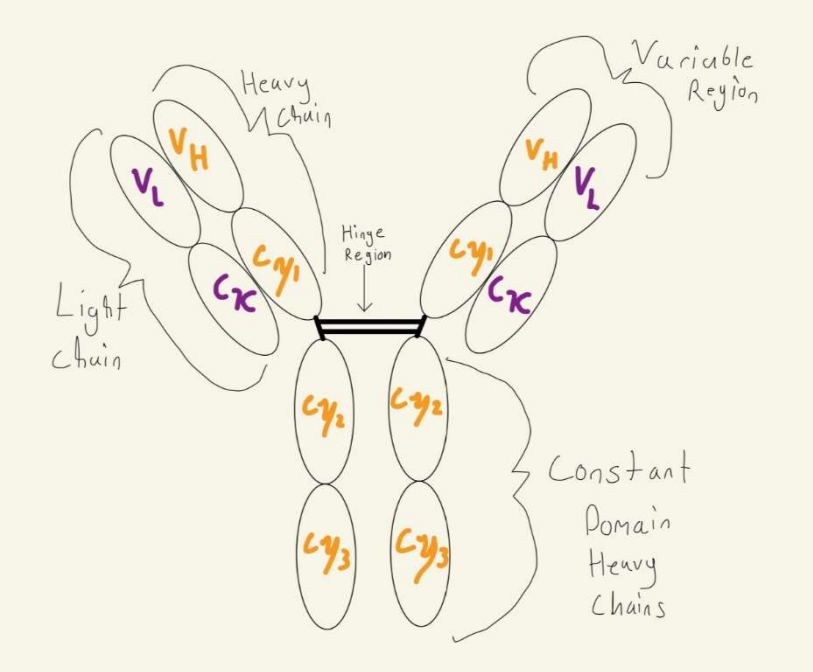
One example of a monoclonal antibody drug that is used today and is very effective is Pembrolizumab, going by the brand name KEYTRUDA. It is used to treat many types of aggressive cancers that usually have low life expectancies, increasing the patient's survival greatly. Most types of cancer that Pembrolizumab is used for are advanced to the stage that they are unresectable (unable to be cut out) or metastatic. Just some of the types of cancer it is used to treat are melanoma, Merkel cell carcinoma, cutaneous squamous cell carcinoma, non-small cell lung cancer (NSCLC), bladder cancer, Hodgkins lymphoma, Primary Mediastinal Large B-cell lymphoma, and importantly in triple negative breast cancer where surgery is not possible. Pembrolizumab is a targeted therapy drug, meaning it has the ability to target specific cells. This is achieved with immune checkpoint inhibition which will be described in the next paragraph. Usually KEYTRUDA is administered intravenously every three to six weeks until recession appears. Vials of KEYTRUDA are stored from 2 degrees Celsius to 8 degrees Celsius to deter bacterial growth before administration. Some of the adverse reactions from taking Pembrolizumab are immune-mediated reactions, headaches, rash, dyspnea (difficulty breathing), myasthenia gravis, anaphylaxis, diabetes, decreased appetite, fatigue, nausea, vomiting, pneumonia, arrhythmias, anemia, and hepatoxicity. Pembrolizumab is an IgG4 monoclonal antibody that targets the PD-1 receptor. A drawing of the IgG4 antibody is shown in the picture below:



Pembrolizumab is known as an immune checkpoint inhibitor, meaning it blocks certain proteins or ligands from binding to their receptors in immune processes. These types of drugs allow the immune system to find the cancer and prevent it from using the immune system against itself. The monoclonal antibody in Pembrolizumab targets the PD-1 receptor, also known as the programmed death receptor which is used to induce apoptosis in lymphocytes. Tumors will use the PD-1 receptor to hide from the immune system and prevent T-cells from killing them. One way this is done is by expressing high amounts of PDL-1 (programmed death ligand-1) which inhibits T-cell tumor surveillance. Another way that tumors will hid from the immune system is by using PDL-1 and changing it to prevent tumor killing responses from the immune system. By binding to the PD-1 receptor, PDL-1 is not able to bind, and the immune system is able to spot the tumor. Without the PD-1 and PDL-1 complex formed, the anti-tumor T-cells are able to target the tumor and induce apoptosis in the cancerous cells. Mouse models have been used to test the efficacy of Pembrolizumab and other chemotherapeutic drugs in tandem with Pembrolizumab. In one mouse model, PD-1 blockage resulted in inhibited tumor growth. In another mouse study model, KEYTRUDA was used in conjunction with a kinase inhibitor known as Lenvatinib. The results showed a decrease in tumor-associated macrophages, cytotoxic T-cells, and decreased tumor growth.

References:

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