

# Infliximab (Remicade)

Infliximab is a biologic agent classified as a tumor necrosis factor-alpha (TNF-alpha) inhibitor. Since its initial approval by the U.S. Food and Drug Administration (FDA) in 1998 for the treatment of Crohn's disease, infliximab has expanded to include multiple indications for various inflammatory diseases. As a chimeric monoclonal antibody, infliximab targets and neutralizes the activity of TNF-alpha, a key cytokine involved in inflammatory processes. This biologic therapy is delivered via intravenous infusion and offers significant benefits for patients with autoimmune and inflammatory disorders.

## Mechanism of Action

Infliximab is a chimeric IgG1k monoclonal antibody, meaning it is composed of a combination of human constant regions and murine (mouse) variable regions. This structure enables the drug to bind specifically to human TNF-alpha, a pro-inflammatory cytokine involved in the pathogenesis of various autoimmune and inflammatory diseases. Infliximab has a high affinity for both soluble and transmembrane forms of TNF-alpha. By binding to TNF-alpha, infliximab prevents its interaction with its receptors (TNFR1 and TNFR2), thereby inhibiting the downstream inflammatory signaling pathways that contribute to disease pathology. This action reduces inflammation, alleviates symptoms, and slows disease progression in the affected tissues.

Unlike other TNF-alpha inhibitors that are administered subcutaneously, infliximab is given as an intravenous (IV) infusion. This route allows for higher systemic concentrations of the drug, which is beneficial for conditions with widespread or severe inflammation.

## Indications

Infliximab has been FDA-approved for the treatment of several inflammatory and autoimmune diseases. The following are the major approved uses for infliximab:

- **Crohn's Disease:** Infliximab is used for inducing and maintaining remission in patients with moderate to severe Crohn's disease who have not responded to conventional therapies, such as corticosteroids or immunosuppressants. It is particularly effective in patients with fistulizing Crohn's disease.
- **Pediatric Crohn's Disease:** Infliximab is also approved for the treatment of pediatric patients (aged 6 and older) with moderate to severe Crohn's disease who have not responded to conventional therapy.
- **Ulcerative Colitis:** Infliximab is approved for both the induction and maintenance of remission in moderate to severe ulcerative colitis in adult patients who have not responded adequately to conventional treatment options.

- ***Pediatric Ulcerative Colitis:*** Infliximab is used in children (aged 6 and older) with moderate to severe ulcerative colitis when conventional therapies have failed.
- ***Rheumatoid Arthritis:*** As part of a combination therapy with methotrexate, infliximab is used to treat moderate to severe rheumatoid arthritis in adults. It helps reduce joint inflammation and damage.
- ***Ankylosing Spondylitis:*** Infliximab is approved for the treatment of ankylosing spondylitis, a chronic inflammatory disease of the spine, which can cause pain and stiffness.
- ***Psoriatic Arthritis:*** Infliximab is used to treat psoriatic arthritis, reducing symptoms such as joint pain and skin inflammation in individuals with this condition.
- ***Plaque Psoriasis:*** Infliximab is approved for the treatment of moderate to severe plaque psoriasis in adults who are candidates for systemic therapy.

## Side Effects

While infliximab is generally effective, it is associated with a range of potential side effects, some of which are serious. The side effect profile of infliximab is similar to that of other TNF-alpha inhibitors and can be divided into common and severe adverse events.

- ***Common Side Effects:***
  - *Infections:* Upper respiratory infections, sinusitis, and pharyngitis are common among patients receiving infliximab therapy.
  - *Infusion-Related Reactions:* These can include fever, chills, pruritus, and hypotension, occurring during or shortly after the infusion.
  - *Headache and Abdominal Pain:* These symptoms are also frequently reported in patients undergoing treatment.
- ***Serious Side Effects:***
  - *Hepatotoxicity:* Infliximab can cause liver damage, which is often monitored through liver function tests during treatment.
  - *Malignancy:* There is an increased risk of certain cancers, including lymphoma and other malignancies, particularly in patients who have received long-term immunosuppressive therapy.
  - *Myelosuppression:* Infliximab may suppress bone marrow function, leading to a reduced number of blood cells and increased susceptibility to infections.
  - *Lupus-like Syndrome:* Some patients may develop lupus-like symptoms, including rash, joint pain, and other systemic effects.
  - *Demyelinating Disease:* Rarely, infliximab may exacerbate or contribute to the development of demyelinating conditions, such as multiple sclerosis.
  - *Heart Failure:* TNF-alpha inhibitors like infliximab can worsen or induce new-onset heart failure, especially in patients with pre-existing heart conditions.
  - *Opportunistic Infections:* Due to its immunosuppressive effects, infliximab increases the risk of serious infections, including tuberculosis and fungal infections. Screening for tuberculosis and hepatitis is essential before initiating treatment.

Given these risks, patients are carefully screened for tuberculosis and hepatitis before beginning treatment with infliximab. Regular monitoring during treatment is critical to ensure that any adverse effects are detected early and managed appropriately.

### **Conclusion**

Infliximab is a powerful biologic agent that has been proven effective in treating a wide range of inflammatory and autoimmune diseases, including Crohn's disease, rheumatoid arthritis, and plaque psoriasis. By targeting and neutralizing TNF-alpha, infliximab reduces inflammation and improves clinical outcomes for patients with chronic inflammatory conditions. While the drug is generally well-tolerated, it is associated with a range of side effects, particularly related to infection and immunosuppression, which necessitate careful patient selection and monitoring. Ongoing research and clinical trials continue to explore new uses for infliximab and strategies for optimizing its safety profile.

### **References**

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