

## **Tocilizumab: From Bench to Bedside - A Comprehensive Review**

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**Introduction.** Interleukin-6 (IL-6) is a key mediator of inflammation and cancer biology. Tocilizumab, an IL-6 receptor blocker, is used to treat autoimmune diseases and has become essential in managing cytokine release syndrome (CRS) associated with CAR-T cell therapy and bispecific antibodies. However, global access to tocilizumab, as well as the cost and uptake of its biosimilars, remains uneven. This review summarizes evidence across three major areas: clinical uses and safety, oncologic and CRS-related applications, and global access and biosimilars.

**Methods.** Using a PRISMA-ScR approach, we mapped published studies, clinical data, and economic reports. We included evidence on tocilizumab's approved and emerging indications; its role in CRS related to immunotherapies; and access, pricing, and biosimilar availability across regions.

**Results.** Tocilizumab continues to demonstrate reliable anti-inflammatory effects in rheumatoid arthritis, giant cell arteritis, and COVID-19, with a consistent safety profile that includes infections, cytopenias, and elevated liver enzymes or lipid levels. In oncology, it is the standard treatment for moderate to severe CRS associated with CAR-T therapy and is increasingly used with bispecific antibodies. Early or prophylactic use may reduce hospitalization without compromising anticancer efficacy. Preclinical and early clinical data also suggest IL-6 blockade may improve responses to immunotherapy, although this remains exploratory. Global access varies widely: FDA- and EMA-approved biosimilars have lowered costs in high-income regions, while affordability and availability remain major barriers in low- and middle-income countries.

**Conclusions.** Tocilizumab now spans autoimmune care, supportive oncology, and early investigational cancer applications. Improving biosimilar access, clarifying CRS management strategies, and expanding high-quality oncologic trials are important next steps.