Immunoglobulin G

Immunoglobulin G (IgG) is a type of antibody. Representing approximately 75% of serum antibodies in humans, IgG is the most common type of antibody found in blood circulation.

IgG molecules are created and released by plasma B cells. Each IgG has two antigen-binding sites.

Immunoglobulin G in Multiple Sclerosis

Zhoun et al. reported that multiple sclerosis (MS) plasma contains IgG aggregates and induces complement-dependent neuronal cytotoxicity (Zhou et al., 2023). Using ELISA, we report herein that plasma IgG levels in the aggregates can be used as biomarkers for MS. We enriched the IgG aggregates from samples of two cohorts (190 MS and 160 controls) by collecting flow-through after plasma binding to Protein A followed by detection of IgG subclass. We show that there are significantly higher levels of IgG1, IgG3, and total IgG antibodies in MS IgG aggregates, with an AUC >90%; higher levels of IgG1 distinguish secondary progressive MS from relapsing-remitting MS (AUC = 91%). Significantly, we provided the biological rationale for MS plasma IgG biomarkers by demonstrating the strong correlation between IgG antibodies and IgG aggregate-induced neuronal cytotoxicity. These non-invasive, simple IgG-based blood ELISA assays can be adapted into clinical practice for diagnosing MS and SPMS and monitoring treatment responses [1)].

Data support the pathological role of Multiple sclerosis IgG antibodies and corroborate their connection to complement activation and axonal damage, suggesting that apoptosis may be a mechanism of neurodegeneration in MS [2)].

Contact sports athletes and military personnel who suffered a repetitive mild traumatic brain injury (rmTBI) are at high risk of neurodegenerative diseases such as advanced dementia and chronic traumatic encephalopathy (CTE). However, due to the lack of specific biological indicators in clinical practice, the diagnosis and treatment of repetitive mild traumatic brain injury are quite limited.

Zhang et al. used 2-methacryloyloxyethyl phosphorylcholine (MPC)-nanocapsules to deliver immunoglobulins (IgG), which can increase the delivery efficiency and specific target of IgG while reducing the effective therapeutic dose of the drug.

The results demonstrated that MPC-capsuled immunoglobulins (MPC-n (IgG)) significantly alleviated cognitive impairment, hippocampal atrophy, p-Tau deposition, and myelin injury in rmTBI mice compared with free IgG. Furthermore, MPC-n (IgG) can also effectively inhibit the activation of microglia and the release of inflammatory factors.

In the present study, Zhang et al. put forward an efficient strategy for the repetitive mild traumatic brain injury treatment of related cognitive impairment and provide evidence for the administration of low-dose IgG [3)]

1)

Zhou W, Graner M, Beseler C, Domashevich T, Selva S, Webster G, Ledreux A, Zizzo Z, Lundt M, Alvarez E, Yu X. Plasma IgG aggregates as biomarkers for multiple sclerosis. Clin Immunol. 2023 Oct 8:109801. doi: 10.1016/j.clim.2023.109801. Epub ahead of print. PMID: 37816415.
2)
Zhou W, Graner M, Paucek P, Beseler C, Boisen M, Bubak A, Asturias F, George W, Graner A, Ormond D, Vollmer T, Alvarez E, Yu X. Multiple sclerosis plasma IgG aggregates induce complement-dependent neuronal apoptosis. Cell Death Dis. 2023 Apr 8;14(4):254. doi: 10.1038/s41419-023-05783-3. PMID: 37031195.
3)
Zhang C, Wei C, Huang X, Hou C, Liu C, Zhang S, Zhao Z, Liu Y, Zhang R, Zhou L, Li Y, Yuan X, Zhang J. MPC-n (IgG) improves long-term cognitive impairment in the mouse model of repetitive mild traumatic brain injury. BMC Med. 2023 May 30;21(1):199. doi: 10.1186/s12916-023-02895-7. PMID: 37254196.