Autoimmune Disease and Neurodegeneration

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Autoimmunity may be rising in the United States [1]

The realization that auto-antibodies can contribute to dysfunction of the brain has brought about a paradigm shift in understanding and targeting treatment for many neurological diseases over the past decade. "Detection of specific auto-antibodies to neuronal or glial targets has resulted in a better understanding of central nervous system autoimmunity and in the reclassification of some diseases previously thought to result from infectious, 'idiopathic' or psychogenic causes." [2] As the autoantibodies flood the brain and cross the blood brain barrier they bring with them of interleukins (IL), tumor necrosis factor (TNF), interferon gamma, cytotoxic T-lymphocyte–associated antigen 4 (CTLA-4), interferon-γ and other inflammatory cytokines. [3] Subsequently neuroglia is activated to a pathologic inflammatory state and then brain cannot withstand the storm.

Multiple sclerosis (MS), Parkinson's disease (PD), amyotrophic lateral sclerosis (ALS), etc., are neuro-inflammatory diseases where an accumulation of inflammatory cells occurs within the central nervous system. This chronic inflammatory state is associated with destruction of myelinating glia of the central nervous system. Several pieces of evidence support a role for IFNc in MS disease. Examination of lymphocytes from MS patient blood and cerebral spinal fluid (CSF) demonstrated increased production of IFN-gamma. [4] Further studies have suggested that interferon-gamma might be associated with the pathogenesis of autoimmune diseases such as systemic lupus erythematosus (SLE) and it can be one of the indices used to monitor disease activity. [5]

The kynurenine pathway is a delicately balanced immune cell regulating system in the brain. [6] A dysfunctional kynurenine pathway (KP) of tryptophan degradation also is involved with several neuropathological features present in ALS including neuroinflammation, excitotoxicity, oxidative stress, immune system activation and dysregulation of energy metabolism. The KP metabolites (KPMs) can cross the blood brain barrier, and multiple studies have shown their levels are altered in many major neurodegenerative diseases. [7]

Plasma from young donors (yFFP®) has been shown to decrease this cascade of inflammatory destruction. Inflammation, whether from disease or biological aging, can be addressed and stopped with yFFP infusions. Weikan et al., found study results that "provide evidence for understanding of the potential rejuvenation factor in the young donor serum." [8] Neuroinflammation decreases were seen in the mouse Alzheimer study by Zhao et al., who saw that "circulatory factors in young plasma can reduce neuroinflammation, reduce the deposition of Aβ, decrease the level of tau hyperphosphorylation, and reverse the cognitive impairment in aged 3×Tg-AD mice." [9] Clearly, the autoimmune state has a direct link to neurodegenerative diseases that can be ameliorated by transfusions of plasma from young donors.

[1]https://www.nih.gov/news-events/news-releases/autoimmunity-may-be-rising-united-states

[2] https://www.nature.com/articles/s41577-021-00543-w

[3] https://www.sciencedirect.com/science/article/abs/pii/S1568997220300124?via%3Dihub

[4] https://www.sciencedirect.com/science/article/abs/pii/S1043466614005584?via%3Dihub

[5] https://pubmed.ncbi.nlm.nih.gov/1746015

[6] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8469440

[7] https://www.frontiersin.org/articles/10.3389/fnins.2019.01013/full

[8] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6181631

[9] https://alzres.biomedcentral.com/articles/10.1186/s13195-020-00639-w

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