mainly reflected by activation of microglia and the local production and activation of complement components. Microglia activation, mainly mediated through the activation of the innate immune system, leads to the expression of histocompatibility antigens, the local production of pro-inflammatory cytokines and chemokines and the synthesis of potentially cytotoxic molecules such as oxygen and nitric oxide radicals, proteases, cytotoxic cytokines and complement. This local immune activation may be associated with recruitment of circulating leukocytes, including Class I and Class II MHC restricted T-cells. Local immune activation in the CNS in the course of neurodegeneration may augment the destructive process. In addition, however, local immune activation may also have beneficial effects, by mediating neuroprotection or by stimulating repair through leukocyte-derived neurotrophic factors. This dual role of inflammation in neurodegeneration may in part explain the contradictory results achieved in therapeutic attempts to ameliorate neurodegeneration by anti-inflammatory treatment strategies.

FW11-2

Inflammatory processes in Parkinson's disease

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The glial reaction is generally considered to be a consequence of neuronal death in neurodegenerative cells. In Parkinson's disease, post-mortem examination reveals a loss of dopaminergic neurons in the substantia nigra associated with a massive astrogliosis and the presence of activated microglial cells. Recent evidence suggests that the disease may progress even when the initial cause of neuronal degeneration has disappeared, suggesting that toxic substances released by the glial cells may be involved in the propagation and perpetuation of neuronal degeneration. Glial cells can release deleterious compounds such as pro-inflammatory cytokines (TNF-alpha, Il-1beta, IFN-gamma) which may act by stimulating nitric oxide production in glial cells or exert a more direct deleterious effect on dopaminergic neurons by activating receptors that contain intracytoplasmic death domains involved in apoptosis. In line with this, an activation of proteases such as caspase 3 and caspase 8, which are known effectors of apoptosis, has been reported in Parkinson's disease. Yet, caspase inhibitors or invalidation of TNF-alpha receptor do not protect dopaminergic neurons against degeneration in experimental models of the disease, suggesting that manipulation of a single signaling pathway may not be sufficient to protect dopaminergic neurons. In contrast, the anti-inflammatory drugs pioglitazone, a PPAR-gamma agonist, and the tetracycline derivative minocycline, have been shown to reduce glial activation and protect the substantia nigra in an animal model of the disease. Inhibition of the glial reaction and the inflammatory processes may thus represent a therapeutic target to reduce neuronal degeneration in Parkinson's disease.

FW11-3

Alzheimer's disease: From CNS inflammation to immunotherapy

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'Whiplash Injury' – traumatic distortion of the cervical spine

FW12-1

Physiology and pathology of the cranial vertebral junction and the cervical spine in respect to traumatic cervical distortion

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The term vertebral spine goes back to the description period of the anatomy. Because of the central position in the human body the spinal column should be called human axis organ. The axis organ has its functional center in the mid brain-pontine region, using the postural and turning reflexes to regulate the position and the movements of the human body in the gravity field. Perceptor is the labyrinth, supported by the receptors in the joints and muscles of the cervical spine. In the real and the simulated microgravity, the human cervical spine finds totally different circumstances with strong influence on the whole brain functions. The human axis organ plays a central role in all movements and is responsible for the static and kinetic functions of the human body. The vertical column has to carry the weight of the body, the shoulder girdle, the upper extremities and the head using more or less filigree vertebral bones and vulnerable discs. The axis organ allows the free movement of the head. Every movement of body and head is transferred to the regulating center in the midbrain. Finally, the spinal cord is covered by the spinal column, the inner organs are fixed on the spine. In the phylogenesis the upright position of the human race and the following influence of the new surrounding the 'bridge bow construction' in quadrupeds has to be changed in the 'lattice tower system ' in human beings. Only with the arch function of the spinal column the body weight can be carried. The functional overload, due to a continuously unphysiological position produces in special professional life situations but also due to psychological factors, can develop regional dysfunctions and may lead to pathological changes in the function of the spine producing degenerative changes in vertebrates discs as well as in the vertebral joints. Because of the central regulation of the axis organ, a dysfunction can be transferred to other parts of the spine. Regional disturbances and degenerative changes produce typical complaints with well known clinical symptoms (radicular, pseudoradicular syndrome vertebrogenic headaches, cervicogenic vertigo etc.). A local trauma to the spinal column, especially in its cervical part, as well as a pathological movement can cause dysfunctions mostly of the upper part of the axis organ, with typical symptoms like the whiplash injury.

FW12-2

Traumatic cervical spine distortion – former whiplash injury – a diagnostic and therapeutic dilemma. The neurologists' and psychologists' views

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Cervical spine distortion (whiplash injury, WI) is followed by a post-traumatic syndrome (PTS) (1) which is characterized by physical (e.g. headache, neck pain, dizziness, vertigo or

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