

Combining modern biomedical and ancient Vedic approaches in the understanding and treatment of neurodegenerative diseases.

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Mental diseases have been extensively described in ancient Ayurvedic texts including epilepsy, anxiety, depression, psychosis, and impaired functioning of the mind. Although Alzheimer's Disease (AD) is not specifically described, cognitive dysfunction due to aging was noted. Within the Vedic system, the Vata dosha relates to the nervous system and many neurological and psychological diseases are thought to largely involve imbalances in Vata. In addition, the mind has combinations of three mental qualities or gunas; Sattwa, Rajas, and Tamas. Sattwa is purity, calmness and clarity, Rajas is movement, Tamas is dullness and laziness and these gunas also contribute to the ayurvedic view of psychology. For example, anxiety disorders are associated with Vata imbalances and Rajasic tendencies. Tamasic tendencies underlie depression. In neurodegenerative diseases such as AD and Parkinson's disease, how can the western biomedical approach be combined with the ancient hypothesis and ideas of Ayurveda to gain new insight into the treatment of these two devastating disorders?

An emerging concept in allopathic medicine is the role that inflammation plays in neurodegeneration. Modern scientific research has documented that inflammatory pathways within the brain, including activation of microglia and the triggering of the inflammasome, contributes to cellular cascades that result in neuronal loss. These inflammatory cascades would be termed rajasic. Although Ayurveda considers the major factor in neurological disease to involve Vata, many of the rasayana drugs used to treat neurodegenerative diseases are employed to enhance digestion and metabolism, and improve tissue perfusion, all rajasic processes. Importantly, Ayurveda linked the nervous system and the immune system together thousands of years ago through the description of the *majja* dhatu. The *majja* dhatu is composed of nerve tissue and bone marrow and the main function of the *majja* dhatu is communication. Immune cells, including those involved in inflammatory processes, are produced in the bone marrow and scientific studies have shown an intimate interaction between immune cells and the nervous system. Many of the Ayurvedic herbs used in the treatment of neurological dysfunction are also effective in inflammatory diseases such as rheumatoid arthritis.

One of the most common Ayurvedic herbs used to treat central nervous system (CNS) disorders is *Bacopa monnieri*. *Bacopa* has been used for centuries as a memory enhancing, analgesic, anti-inflammatory, antipyretic, anti-epileptic, anti-depressant, and sedative agent and is used traditionally to help improve memory, learning, and concentration. It is recommended for anxiety and used in the treatment of diseases such as Alzheimer's and autism. The molecular basis by which *Bacopa* exerts its effects remains to be fully defined, but recent scientific studies have documented that *Bacopa* and/or its constituents possess a wide spectrum of cellular activities. We have found that *Bacopa* inhibits the activity of Caspase-1 (involved in the inflammasome and the inflammatory cascade) and Caspase-3 (associated with cellular death and neuronal communication). Thus, a mechanism of action for *Bacopa* appears to exploit the link between the immune system and the CNS, and offers novel insight into the treatment of neurodegenerative diseases.