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CHANGE IN SPLENCYTE IMMUNE FUNCTIONS AFTER
ELECTRICAL STIMULATION OF THE VENTROMEDIAL
HYPOTHALAMIC NUCLEUS IN RATS

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There is ample evidence for bidirectional communication between the central nervous system and the immune system. A typical example of the effect of the brain on the immune system is immunosuppression induced by some stressors. It is considered that stress-induced immunosuppression is mediated by the pituitary-adrenal axis. It is also well established that the stressors activate not only the pituitary-adrenal axis but also the sympathetic nervous system. Recent studies indicate that there is a rich sympathetic innervation to lymphoid organs such as the spleen.

To investigate the possible role of sympathetic nerves in immune functions of the spleen, a chronic electrode was implanted in the hypothalamus of rats, especially centred on the ventromedial hypothalamic nucleus (VMH) which is proposed as the central structure linked to the sympathetic nervous system. After electrical stimulation of the VMH, the mitogenic response of splenocytes to Concanavalin A (ConA) and natural killer cell (NK) activity were measured. Electrical stimulation of the VMH for 1hr produced a significant decrease in ConA response, while it had no effect on NK activity. The suppressive effect of the VMH was not seen under urethane-chloralose anesthesia. A longer (20hr) stimulation of the VMH suppressed not only the ConA response but also NK activity of splenocytes. Electrical stimulation of hypothalamic regions other than the VMH failed to show such effect on splenocytes.

These results suggest that the VMH suppresses the immune functions of the spleen through activation of the sympathetic nervous system.