The influence of opioids on the humoral and cell-mediated immune responses in mice. The role of macrophages

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Abstract:
Background: Our experiments were aimed to test the influence of treatment with different opioids (morphine, fentanyl, methadone) on the humoral and cell-mediated immune responses.

Methods: Mice were treated intraperitoneally (ip) with opioids for several days and next either immunized with sheep red blood cells (SRBC) to test the antibody production or skin-sensitized with hapten picryl chloride (PCL) to induce contact hypersensitivity (CHS). In addition, the effects of opioids on the production of reactive oxygen intermediates (ROIs) and cytokines by peritoneal macrophages (Mφ) and on the expression of surface markers on these cells and blood leukocytes were estimated.

Results: Opioids caused an enhancement of ROIs and cytokines production when macrophages were stimulated with zymosan or lipopolysaccharide (LPS) and reduced the expression of antigen presentation markers on Mφ. Numbers of anti-SRBC plaque forming cells (PFC) and antibodies titres were lower in mice treated with all tested opioids. Depending on the use of particular opioid and the phase of allergic reaction, effects of the treatment on CHS were diverse. While morphine decreased the early and late phases of induction of CHS responses, methadone increased both reactions. In case of the effector phase of CHS, morphine and fentanyl increased both its early and late stages, while methadone decreased the late reaction. Treatment of recipients with opioids had diverse influence on the passive transfer of CHS in these animals.

Conclusions: Our experiments show that the action of opioids on the immune system is a complex phenomenon dependent on such variables as type of opioid, character of response (humoral versus cellular) and types of cells involved. Here Mφ seem to play a significant role.

Key words: opioids, macrophages, humoral response, contact hypersensitivity