

# Proinflammatory Cytokines and Sickness Behavior: Implications for Depression and Cancer-Related Symptoms

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**Purpose/Objectives:** To review the relationship between proinflammatory cytokine release and resultant sickness behavior; to explore the implications of sickness behavior related to depression and cancer-related symptoms.

**Data Sources:** Published articles and book chapters.

**Data Synthesis:** Proinflammatory cytokines (interleukin-1, interleukin-6, and tumor necrosis factor- $\alpha$ ) are released as part of the immune response resulting in a syndrome called sickness behavior that is an adaptive and motivational reaction to disease. Sickness behavior includes lethargy, depression, anorexia, energy conservation, fever, anhedonia, cognitive impairment, hyperalgesia, and decreased social interaction. Sickness behavior is seen in patients with depression or cancer and has been described as a symptom cluster. Sickness behavior in patients with cancer may be the result of both the disease and the treatment. The related symptoms may have a profound effect on patients' quality of life. Treatment strategies that inhibit the release or activity of proinflammatory cytokines and relieve patients from symptoms of sickness behavior are being evaluated.

**Conclusions:** Further research is needed to pinpoint the exact effects of specific cytokines, identify targets for therapy, and develop viable treatment strategies for preventing or minimizing the detrimental effects of cytokine-induced inflammatory responses.

**Implications for Nursing:** Sickness behavior resulting from cytokine release may provide a framework to explain many cancer-related symptoms, including depression, cognitive impairment, cachexia, fatigue, and a component of pain perception. Oncology nurses would benefit from awareness and understanding of the relationship between proinflammatory cytokine release and tissue involvement by tumors as well as some cancer-related therapies. Knowledge about the effects of cytokine release on patient behavior and the symptom experience would enhance nurses' ability to assess patients for anticipated side effects and provide appropriate education to patients and their families.

### Goal for CNE Enrollees

To enhance nursing knowledge regarding the relationship between proinflammatory cytokines and sickness behavior.

### Objectives for CNE Enrollees

1. Define the immune response and its relationship to sickness behavior.
2. Identify proinflammatory cytokines and the symptoms related to sickness behavior.
3. Identify nursing interventions to support patients with sickness behavior.

### Key Points . . .

- Proinflammatory cytokines are involved with sickness behavior that occurs in association with the immune response and tissue damage caused by malignancy.
- Sickness behavior also may be a result of treatment for cancer, particularly biotherapies such as interleukin-2 and several chemotherapy drugs.
- Sickness behavior is comprised of various behavioral responses including depression and cognitive impairment, and fits the definition of a symptom cluster.
- Cytokine production and release may provide a viable target for treatments to prevent or minimize sickness behavior.

Much has been written about the release of proinflammatory cytokines and their association with the response syndrome of sickness behavior. Cytokine production and release is associated with cancer and cancer therapy. Symptoms associated with sickness behavior are seen in patients with cancer and have been described as a symptom cluster. The goal of this article is to summarize the information and implications for the etiology of depression and other symptoms associated with cancer.

### Proinflammatory Cytokine Production Immune Response

When the human body is exposed to a pathogen (e.g., bacteria, virus), antigenic components of the pathogen (antigens) are recognized by the body's immune system as being foreign or "not self" (Maier & Watkins, 1998). Antigens have

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