# Immunologic Dysfunctions in Major Depressive Disorders

**An Essay**
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*By*
**Amany Wahba Fouad Farag**
*M.B., B.Ch.*




*Supervised by*

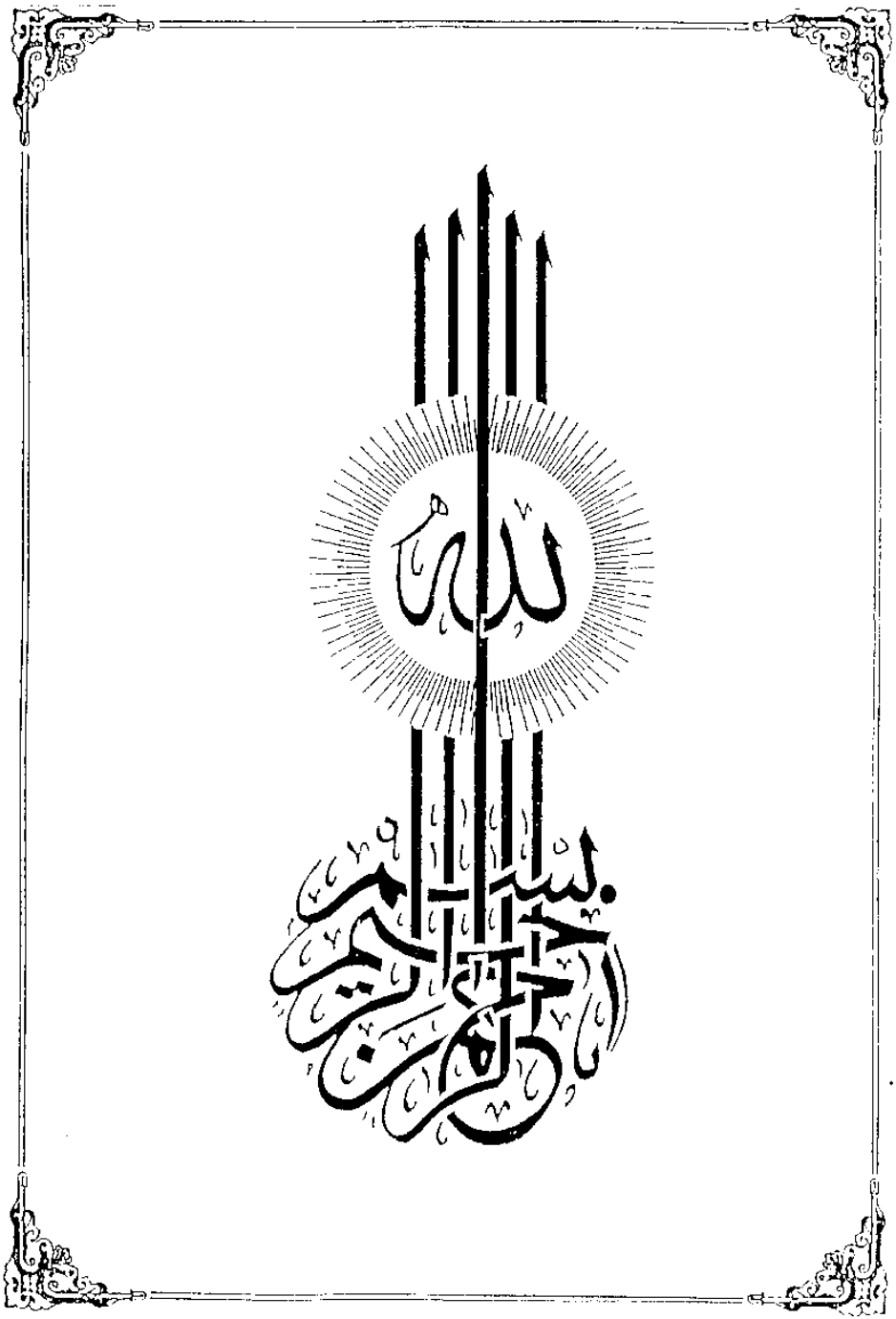

**Prof. Dr. Amani Ibrahim Saleh**
*Professor of Clinical Pathology and Immunology,*
*Faculty of Medicine,*
*Ain Shams University.*

**Dr. Aisha Yassin Abdel Ghaffar**
*Ass. Professor of Clinical Pathology and Immunology,*
*Faculty of Medicine,*
*Ain Shams University.*

**Dr. Hossam Mostafa Ibrahim Fahmy**
*Lecturer of Clinical Pathology and Immunology,*
*Faculty of Medicine,*
*Ain Shams University.*



**Faculty of medicine**
**Ain Shams University.**
**1996**



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To

my husband

and my family

with lots of love

& gratitude

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# INTRODUCTION

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Interest in the interactions between the central nervous system (CNS) and the immune system date back to Aristotle who hypothesized a connection between physical health and mood. During the mid 1950's, Selye demonstrated a clear relation among brain activity, endocrine organs, and immune function. In 1964 this field was first referred to as ***Psycho-immunology,*** later amended to ***Psycho-neuro-immunology:*** the study of interaction of consciousness, the brain and the CNS, and the immune system *(Stoudemire and McDaniel, 1995)*.

In 1975, Ader described the basic factors of psycho-neuro-immunology as follows:

- Nerve endings have been found in the tissues of the immune system. The central nervous system is linked both to the bone marrow and the thymus, where immune system cells are produced and developed and to the spleen and the lymph nodes, where those cells are stored.
- Changes in the CNS (the brain and the spinal cord) alter immune responses and triggering an immune response alters the CNS activity. Animal experiments show that damage to different parts of the hypothalamus can either suppress or enhance the allergic type response.
- Changes in hormone and neurotransmitter levels alter immune responses and vice versa. The stress hormones generally suppress immune responses, but other hormones, such as Growth hormone, also seem to affect immunity.
- Lymphocytes are chemically responsive to hormones and neurotransmitters. Immune system cells have receptors that are

responsive to endorphins, stress hormones and a wide range of other hormones.

- Lymphocytes can produce hormones and neurotransmitters.
- Activated lymphocytes produce substances that can be perceived by the CNS. The interleukins and interferons can also trigger receptors on cells in the brain.
- Psycho-social factors may alter the susceptibility to or the progression of autoimmune disease, infectious disease, and cancer.
- Immunological reactivity may be influenced by stress.
- Immunological reactivity can be influenced by hypnosis.
- Psychoactive drugs and substances of abuse influence immune functions. Substances that affect the CNS, including alcohol and nicotine, have all been shown to affect the immune response, generally suppressing it.

In the light of the above-mentioned links between immune cells and the brain, it has been suggested that there is a bi-directional relationship between depression and immunity (*Weisse, 1992).*

On the basis that a competent immune system ensures health by providing protection against pathogenic process and promotes healing and recovery from disease and injury, it has been argued that depressed mood may increase the susceptibility to disease or prolong existing medical problems by means of aberrations occurring within the immune system. Similarly, a large number of people may develop depression while sick with chronic illness and immune-related disorders such as Acquired Immune Deficiency Syndrome(AIDS) and certain cancers *(Weisse, 1992)*. In depression, the concept of a link between mental state