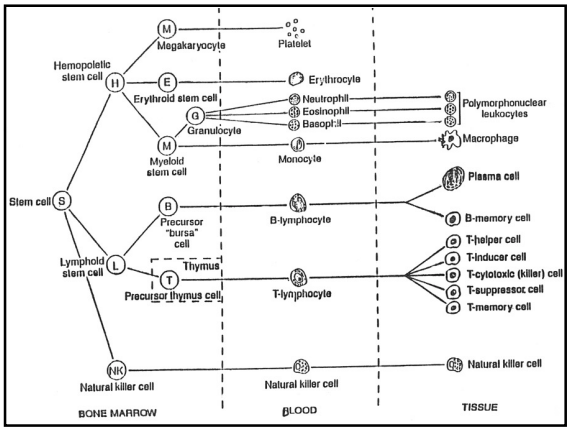
Mechanisms and Manifestations of Disease Lecture 2

Part 4

Alterations in Immunity

Primary (Congenital) Immune Deficiencies

- Stem cell deficiency
  - Severe Combined Immunodeficiency Disease (SCID)
- Deficiencies in Antibody Production
  - IgA Deficiency
  - X-linked hypogammaglobulinemia



Primary (Congenital) Immune Deficiencies (cont.)

- Deficiencies of cell-mediated immunity
  - DiGeorge Syndrome
- Complement Abnormalities

Secondary (Acquired) Immune Deficiencies

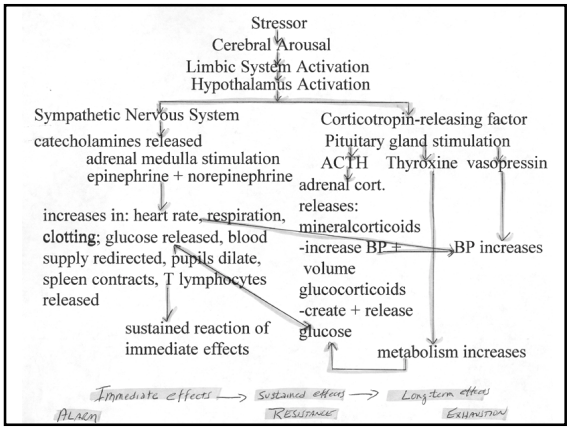
- Multifactorial secondary immune deficiency
  - Stress
    - Considerable empirical evidence shows that stress suppresses the immune system
  - Psychosocial variables
  - Nutritional deficiencies

Psychoneurolmmunology (PNI)

- The study of the physiologic processes underlying emotional impact upon the body
- The study of the relationship between emotional affect and health

Physiological Effects of Stress

- Stressors may be events or anticipation of events with unfavorable implications
- Communication between endocrine, nervous, and immune system is through common mediators
  - Neurotransmitters
  - Hormones
  - Cytokines



Neuroendocrine Stress Response

- Stressor perception and physiological activation occurs from complex feedback between cerebral cortex, limbic system, thalamus, hypothalamus, reticular formation, and reticular activating system

Physiological Effects of Stress (cont.)

- In order to postulate that emotion influences health, a direct connection between the nervous system and immune system must be demonstrated

Neuroimmune Connection

The modulation of immune function by neuropeptides may be an important physiological phenomenon

- suggests the link between behavior, disease development, and progression may exist on a cellular level
- may occur locally at nerve endings or distally through the circulatory system

Neurological Cytokine Production

- Nervous system can secrete cytokines, the immune system activators

Lymphocytes Produce Neurohormones

- ACTH, endorphins, thyrotropin, chorionic gonadotropin, growth hormone, somatostatin, luteinizing hormone

Lymphocytes Have Receptors For:

- Substance P
- Opiates
- Norepinephrine
- Epinephrine
- Bombesin
- Neurotensin
- Somatostatin)
- Vasoactive intestinal peptide

Limbic System

- Limbic system may link the nervous and immune systems
  - Regulates visceral, affective, and cognitive behaviors
  - Controls CNS neurohormonal and autonomic outflow
  - Responds to peripheral endocrine signals
  - Responds to normal physiological signals from the immune system

Pavlovian Conditioning

- Evidence for neuroimmune communication is through behavioral (pavlovian) conditioning of the immune responses

Psychological Variables

PNI Studies

- Studies relating psychological stress and NK down-regulation
  - Separation/divorce/marital discord studies
  - Bereavement studies
  - Depression studies
  - Stress reduction studies

Powerlessness

Mood/Affect

Nutrition