

Psychoneuroimmunology essay



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The article provides detailed mechanism of how state of mind is interconnected with processes taken place in the human body. The article is of great importance for psychologists and physicians as it thoroughly examines the issues. The article is subdivided in several sections headed: introductory part providing the task of psychoneuroimmunology (PNI); the systems of the body that relate to PNI; picture of immune cell and receptor site, the stress pathway and stress. The guideline of the paper is to provide detailed mechanism of interrelation between body and mind. (Frenandez 2005)

Firstly it is necessary to underline that pshychoneuroimmunolgy (PNI) deals with such branches of medicine as endocrinology, immunology, psychology, neurology, etc. PNI is able to integrate the body systems into a “ unified view” presenting how the body interacts with environment and itself while working. Actually PNI is science dealing with interactions between bodily functions and mechanisms with the purpose to produce the states of disease and health. (Frenandez 2005) For many years physicians has been using the Cartesian paradigm considering the dualistic view of the human’s body.

Even now the major part of contemporary medicine suggests that body and mind are separate performing their prescribed functions. It is apparent that western medicine has been seriously affected by this paradigm for centuries. Nowadays it is claimed that the mention paradigm undergoes significant problems and contradictions. It was stated that body and mind aren’t interrelated being two discrete systems. Therefore they were described in terms of one another. A fundamental error has been committed, because

links between mind and its affect on bodily functions weren't taken into consideration.

The task of the PNI is to "collect" the obtained relevant information from endocrinology, neurology, and immunology and psychology in order to define the link between body work and states of mind. Fernandez admits that it is rather difficult to study these mechanisms and truly understand them, because PNI requires "a mastery of all these subjects". (Fernandez 2006) In order to understand the PNI it is required to provide detailed description of the involved processes and possible consequences i. e. knowledge of immune and neural systems, stress pathways, etc.

The nervous system is claimed to be one of the most complex systems in human body. The main tasks performed by nervous system are: to receive information and to relay it to the brain. It is suggested that "the neurons in humans connect and penetrate every square inch (centimeter) of the body". Nerves can't be replaced and divided if they are laid down by the central nervous system. Neurotransmitters are used to communicate with nerves and to transfer obtained information. It allows neurons to fire in different ways.

Concerning mechanism, the nerve receives a signal and then transfers it to the next neuron by means of neurotransmitters. It is apparent that neurotransmitters are like "synaptic gap between the nerves". (Fernandez 2006) Immune system in the body performs different function. Primarily, immune system defines foreign materials and infectious agents in the human's body. The second function is to rig the body of foreign materials.

Foreign material are harmful for health and organs' functioning, though body constantly interacts with them trying to remove infectious agents from the body.

The most important aspect of human's immune system is white blood cells (leucocytes). There are two main types of them: T-cells and B-cells. Usually B-cells release antibodies and infectious agents, bind them to eliminate from organism. T-cell is a major factor of HIV spread. They are considered essential part of immune system. Three types of T-cells are known: (Fernandez 2006) 1. helper T-cells enhance enhancing the immune response 2. suppressor T-cells reduce reducing the immune response 3. killer T-cells remove infectious agents and antibodies

It is indicated that human body is able to communicate with immune system. Fernandez noted that emotions and stress were associated with physiological changes such as hypothalamic-pituitary-adrenocortical system (HPAC) and sympathetic adrenal-medullary system (SAM). These stress systems are claimed to affect the immune system by chronic and clinical stresses activated by the adrenocortical system. SAM's activation is thus enhanced by the release of catecholamines (epinephrine and norepinephrine) into the blood stream. HPAC's activation releases corticosteroids along with adrenocorticotrophic hormone.

It is necessary to say that both systems activate the fight response of the body constituting chemical interactions taken place during stress situation. Chemicals are stress mediators in the organism. For example, glucocorticoids and cortisol have immunosuppressive effect

redistributing and killing immune cells. Norepinephrine and epinephrine cause butterfly effect acting similarly to adrenalin. Among chemicals glucocorticoid is of interest, because it is released during stresses and it act affecting the whole body seeming to be related directly to control of immune function.

It is a well-known fact that glucocorticoid effects efficacy of lymphocytes as well as their number. Glucocorticoid task is to suppress immune system acting throughout the body. Usually, glucocorticoid is able cause the T-cells' destruction and keep their information. Actually, many other types of PNI-significant chemicals exist are discovered during experiments such as opioids and neuropeptides. The mentioned chemicals are able to influence the communication between human organism and immune system. Opioids and neuropeptides are responsible for stress responding being released into the blood stream.

It is outline that both of them effect pain and “ have been shown to be present in the blood without bodily pain or physical stress”. (Fernandez 2006) According to Fernandez, neuropeptides affect both immune and nervous system. The evidence provided notices that neuropeptides are playing the most significant role in immune and nervous systems.

Neuropeptides mediate brain state and affect immune function. (Fernandez 2006) Opioid peptides are one more nomination for neuropeptides. It is known that their structure and effect have some relation to that of the opium and morphine performing the same functions.

It is noted in the article that these chemicals are able to mediate emotional states being the analog to natural drugs. Limbic system is the most innervated with receptors being the mediator between emotions and brain. All receptors for all the neurotransmitters have been already discovered and it makes the understanding of PNI easier. It is impossible to define exactly the role of the mentioned chemicals for immune system. Scientists know for sure only that neuropeptides and opioids affects strongly the immune system, though they don't know what effect they have.

They think the effect is either enhancing or a suppressing. Nevertheless, these facts are still unproved. (Fernandez 2006) It is apparent that communication between immune system and nervous system does exist and must be taken into account. Theoretically, contemporary science is able to present that subjective experience or mind state affects the immune system functioning, whereas immune function surely affects the state of mind due to bi-direction system of communication.

Actually it is difficult for scientists to measure or to quantify the mind, because it is too "tricky thing". It is stated that "the conundrum as hopeful that a comprehensive view of psychoneuroimmunological phenomena will eventually include specification of the association between specific subjective states, neuroendocrine processes, and immune function".

(Fernandez 2006) Scientists use animal models to measure and to quantify the states of mind, because it the only known method nowadays.

Nevertheless, experiences conducted have had serious problems. It is argued that human emotions are not localized to certain areas being more whole-brained activities.

The situation with animals is a little bit another and therefore these models can't be applied to humans. It is apparent that animal models are imperfect, though they appear to provide effective starting points that are necessary for PNI explanation. Animal models aim at providing primarily the explanation of complex psychological aspects. To identify the psychological aspects of PNI succession of experiments and tests have been conducted by scientists. For example, Soloman provides rather interesting interpretation of people' coping mechanisms.

He asserts that “ trait characteristics should influence the susceptibility of an individual's immune system to alteration by exogenous events, including reactions to events”. (Fernandez 2006) According to his theory, women having autoimmune disease represent frequency of denial of hospitality, masochism, sensitivity to anger, self-sacrifice, depression, compliance-subservience compared with healthy women. (Fernandez 2006) Soloman also sums up that “ CNS involvement is further suggested by the finding that left-handedness, determined by the brain, is associated with increased risk of an autoimmune disease”.

It is founded that individual emotional state is strongly affected by autoimmune disease, because it weakens psychological defenses and may cause dysphoria. Actually, autoimmune disease is rapidly progressing disease responding less to medical treatment and being incapacitated. (Fernandez 2006) Medical students also contributed significantly the research conducted. The task was to examine the students with high levels of distress during examination period. Those students showed marked

decrease in immune response. Those students were compared with students who didn't have exams.

The results seem to be similar to the initial ones. Before exams medical students have increased responsiveness of immune system. (Fernandez 2006) Nevertheless, during exams the responsiveness significantly decreased. Therefore the explanation of physiological aspects is of great importance for PNI science. It is suggested that immune function is affected strongly by state of mind, thus it is implicated for health psychology. To prove the suggestion that brain affects immune system means to change considerably the healing approach.

The effects of the psychological experiences and the nervous system on the immune system can be judged by means of stress evaluation, because stress is considered the best model. It is asserted that stress is "the environmental condition under which homeostasis is interrupted". Thus stress pathways are activated by body's response to stress. (Fernandez 2006) Interrelations between decrease in lymphocyte proliferation and stress are apparent and can't be ignored. Type of stress relates also to its duration and immune function.

If stress is short (i. e. exam pressure), then decrease in lymphocyte proliferation is observed. Nevertheless, long-term stresses differently affect the immune system. For example, chronic stresses lead to suppression of chronic immune. O'Leary conducted three studies of chronic stress. (Fernandez 2006) The result showed that immune in the long-term is incompetent. It means that long-term stresses surely result in health

problems, because individuals become less capable of fighting off disease. Immune system consequently becomes less effective. It may lead to the danger of cancerous cells release.

Nevertheless, no studies correlate the mentioned facts. These questions are under discussion, because they would provide a complete picture of communication between stress and immune system. There is a saying “ Don’t work too hard or you’ll get sick! ” Such statement is nowadays supported by evidence. Long-term stresses cause suppression of the immune system, though further researches are being conducted nowadays. Fernandez says that “ as the information from PNI research increasingly becomes part of the accepted wisdom, we may see a drastic shift in the way western medicine is practiced”.

As it was mentioned above state of mind and body work were considered separate earlier. One scientist considered human body as thing to digest the food, and it is body that made human brain wrote poetry. He thought those two systems were completely autonomous. Such suggestions are disapproved though. (Fernandez 2006) If to prove that state of mind is able to affect the body work in daily functions, the changes in contemporary approaches would be apparent and significant.

Contemporary society is unaware that their day-to-day affairs are the potential cause of stress and they are endangered. Exploration of stress situations and their affects would lead to changes in clinical medicine. (Fernandez 2006) PNI researches warn people to take into consideration their own health, because it is strongly affected by brain state. If state of

mind is affected, the body fights disease less effectively. If it is true, then it is apparent that human state of mind directly affects response to stress and stress situation developments.

For example, if a businessman is working 100 hours per week, he will be come down with influenza. It means that hardworking can cause diseases. (Fernandez 2006) Nevertheless, the similar person working 100 hours per week will be never ill due to different approach to the work. If a person takes into account psychological level, he will be aware of potential affects and diseases. Maybe the person is fonder of his present work and it brings pleasure to him/her, not only material benefits. Such statement isn't accepted universally. Genetics and environment are key factors for immune system.

Therefore the statement “ Well, he got sick because he was really stressed” isn't blanket. It is suggested that disease and sickness are multifactoral. The most important aspect of disease is PNI. (Fernandez 2006) In conclusion it is necessary to outline that the suggested model of body and mind are applied to of medicine in the western world. Environment and social factors affect the health state as well as stresses and other psychological disorders. It is apparent that the suggested model including all the mentioned factors above would change the practice of medicine. (Fernandez 2006)