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Letter to the Editor

The Relationship between Vital Spirit and Fevers in the "Canon of Medicine": A Probable Solution for the Controversy over Stress-Induced Hyperthermia

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Dear Editor-in-Chief

Based on the Canon of Medicine by Avicenna (980-1037), fever is defined as an abnormal heat ignited in the heart and spreads throughout the body via the arteries (1). Following the Galen theory about fevers (2), Avicenna describes three main types of fevers in relation with the three types of material structures in the body (2). According to the theory of "Natural bodily affairs" mentioned in the basic teachings of Hikmat-based Persian medicine, the physical body is composed of three types of biologic structures. The somatic trio which forms the body as a whole functioning entity is Organs, Humors, and Spirits (3). Fevers which originally belong to the Spirits (mainly vital spirit in the heart), and afterwards spread throughout the body via the arteries, are called Ephemeral fevers. Fevers which initially belong to the Humors are Humoral fevers (including Infectious fevers); and the fever which firstly involves the Organs is called Atrophic fever (3). The ephemeral fever is an acute disease, typically a one day-lasting fever, mainly due to the inflaming events on vital spirit in the heart. Avicenna attributes the Ephemeral fever to three main causes including the psychogenic, bodily, and external physical causes (4). Explaining the psychogenic causes, he describes six main psychological states which can lead to Ephemeral fever if occurred severely enough. The classification of psychogenic fevers according to the description by Avicenna is as follows (5).

- Grief-induced fever
- Concern-induced fever
- Contemplation- induced fever
- Anger-induced fever
- Dread-induced fever
- Joy-induced fever

In the recent medical literature there are some terms pointing to the fact that the body core temperature increases after psychological stress. The famous terms used by authors as keywords to point this event includes "emotional hyperthermia", "emotional pyrexia", "psychogenic fever", "stress-induced hyperthermia" (SIH), and also "psychological stress–induced rise in core temperature" (PSRCT) which refers to the elevation of core body temperature regardless its classification as fever or hyperthermia. Today the term SIH is generally used in medical literature, but it's classification as fever or hyperthermia has been a subject to debate.

Although the recent articles are focused on using the term SIH, it still remains unknown whether it is just an autonomic response to stress or mediated also by immune system (6). Stress-induced hyperthermia and infection-induced fever are two distinct processes mediated largely by different

neurobiological mechanisms (6). Markus Schwaninger et al. declared that IL-6 plays an important role in the control of emotionality, but not in the regulation of body temperature after psychological stress (7), Moreover, although pyrogenic cytokines are not involved in psychogenic fever, the stress interview-induced increase in core temperature is an active hyperthermia under the control of the brain, as in case of infection-induced fever (8). Psychological stress contributes to the development or exacerbation of low-grade fever in some chronic fatigue syndrome patients, possibly via sympathetic activation, and peripheral cytokines may not be involved in this process (9). Stress hyperthermia is actually a fever mediated by endogenous pyrogens and prostaglandin E2 produced inside the blood-brain barrier (10). Briese et al. suggested the emotional rise in central temperature is a fever with an upward shift of the set-point temperature, and prostaglandin rise in core temperature is distinct from emotional or stress-induced hyperthermia and differs according to the daytime or nighttime period of assessment (11).

A probable explanation about the antithetical results of these studies can be presented through the idea of Avicenna about the time-dependent nature of Ephemeral fevers. Regardless the literal sameness of the word "Fever" in ancient and modern medicine, it should be noticed that Avicenna frankly declares that Ephemeral fevers mostly last from 12 – 24 hours, and rarely continue more than three days. He emphasizes that in the longer periods, the abnormal heat necessarily transmits into humors and organs and creates new types of fevers. It seems the idea of conversion of Ephemeral fevers to Infectious fevers or Atrophic fever can justify some changes in immunologic factors found in the recent researches, and looks to be necessary in establishing new well-designed methods for studies about the nature of SIH, concerning the time as an important and determinant variable.

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