

# The Stress Response of Critical Illness: Metabolic and Hormonal Aspects



Jean-Charles Preiser  
Editor

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 Springer

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# Foreword

Life is like riding a bicycle. To keep your balance, you must keep moving.

Albert Einstein

All living organisms share common biological characteristics, developed over hundreds of millions of years, which have allowed them to adapt and survive since the beginning of life on earth. This is particularly true for human beings, so weak and frail before the occurrence of organized civilizations. The importance of effective adaptation abilities was recognized very long ago by the Chinese and Greek physicians, although it was not before the nineteenth and twentieth centuries that the real importance of the stress response with its complex multisystem mechanisms was discovered. Claude Bernard recognized the importance of a constant *milieu intérieur*, insuring the function of body cells in a changing environment via adaptive mechanisms in the vital organs. Later, Walther Cannon developed further the concept of *homeostasis*, leading in case of failure of the homeostatic mechanisms to disequilibrium and illness.

In 1936, Hans Selye published the historical Letter to the Editor of Nature, “A syndrome produced by diverse nocuous agents,” describing stress as the consequence of an inadequate response to harmful physical and psychological agents. The stress response was originally believed to be mainly related to the neuroendocrine system activation, but Selye later realized that nearly all systems were involved and the concept of a multisystem general response was developed.

Although the clinical relevance of such adaptive mechanisms in trauma and acute conditions was long recognized, their long-term effects on the mood and behavior were not acknowledged before the second part of the twentieth century: the post-traumatic stress disorder was only included in 1980 in the third edition of the DSM of the American Psychiatric Association. This underlines the central role of the brain in the response to stress, as a regulation but also as a target organ, when its vulnerability to emotional and psychological challenges, exceeds its resilience capacity and induces undesirable emotional and behavioral symptoms.

In the field of stress response, the critical care environment is unique, since it gathers individuals with different kinds of stress: patients with life-threatening conditions, health-care professionals, mainly physicians and nurses, as well as family members. In the early phase of critical illness, the patients are submitted to acute challenges such as hemorrhage, ischemia, hypoxia, sepsis and pain, as well as psychological or emotional threats. The initial adaptation to the critical illness is mainly related to the multiple autonomic, endocrine, tissue, and immune mediators; it promotes survival and recovery. However, when the critical illness is prolonged, inadequate regulation of this response may occur, inducing damaging effects, such as depressed immunity, metabolic dysfunctions, and malnutrition. At longer term, patients with prolonged or complicated stay are at risk to develop post-traumatic stress disorder, mainly characterized by psychological, emotional, and behavioral symptoms.

The family is submitted to intense psycho-emotional stress, leading to adverse psychological responses, the so-called post-intensive care syndrome-family. The latter is mainly characterized by insomnia, anxiety, depressive symptoms, inability to perform the grief, and difficulty or inability to work. Surprisingly, the clinical importance of post-intensive care syndrome-family was only discovered about 20 year ago, despite quite a high prevalence: about a third of family members are affected by PTSD symptoms in both pediatric and adult ICUs. The process of decision making involving families and proxies plays a critical role, particularly the methods of communication and inclusion. Various strategies of communication with family members have shown to be associated with decreased anxiety, improved resilience, and coping.

In addition to emotional, psychological stress, the health-care givers are submitted to work-related stress, promoting burnout symptoms, as emotional and physical exhaustion, inability to work, depersonalization, and depression. The prevalence of PTSD in ICU nurses is particularly high, due to the daily contact with suffering, uncertainty of therapy, and death. This is also the case of health-care professionals working in emergency and mental health care, which in addition are often submitted to violence and physical assaults. The occurrence and severity of work-related stress is affected by several factors, the type, nature, and severity of the stressor, the presence of a team support, and the quality of professional training, as well as by individual factors, such as the individual personality, mental health, and social-family support.

The publication of *The Stress Response of Critical Illness: Metabolic and Hormonal Aspects* by Jean-Charles Preiser and more than 20 top-level scientists must be highlighted, since it constitutes a remarkable high level and original contribution. This book comes at a right stage, as a large body of recent information has brought new insights on the metabolic and endocrine aspects of the stress response during the last decade, such as the corticoadrenal response in sepsis, the regulation of blood glucose, and substrate metabolism in the settings of critical care.

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