



H2 Adrenal Gland Changes in Relation to the Cause of Death

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After attending this presentation, attendees will understand the importance of improving knowledge regarding adrenal gland involvement in response to stress related to the death process and their changes in relation to cause of death.

This presentation will impact the forensic science community by highlighting: (1) whether the adrenal gland is undergoing structural and/or molecular changes in relation to different causes of death; (2) if these changes have significant differences; and, (3) if it is possible to create a timeline of the death process resulting in more or less prolonged pain.

The adrenal response to stress occurs in a syndrome that reflects activation of the sympathoadrenal system and the Hypothalamic-Pituitary-Adrenocortical (HPA) axis, and a “stress syndrome” maintains homeostasis in emergencies, such as “fight or flight” situations. One of the principal tissues involved in the stress response is the adrenal gland; in fact, there is clear evidence of fasciculata activation with the release of cortisol and the release of adrenaline from the medulla.

The literature suggests that the biochemical analyses of catecholamines may be useful markers for investigating various stress responses in the process of death involving bleeding, burns, cold exposure, physical hyperactivity, or drug abuse; this is possible when these markers can be used in combination with other chemical and immunohistochemical markers; however, in postmortem investigation, catecholamines have been considered rather unstable markers for investigating the cause or process of death due to pain, terminal medical care, and postmortem interference.¹

This study sought an adrenal tissue marker that was involved in the stress response process with special reference to activated/stimulated receptors by the activation of the sympatho-adrenal system and HPA. The β 2-AR (adrenergic receptor) was chosen because stress promotes the release of epinephrine, a catecholamine stress hormone that binds to β (2)-adrenergic receptors (β (2)ARs) with high affinity.

Cases with several causes of death were selected in order to conduct an immunohistochemical analysis by the β 2-AR antibody. Several causes of death were drowning, sudden cardiac death, sepsis, hanging, strangulation, traffic accident, and fire. This study revealed a different expression of β 2-AR immunopositivity in relation to the cause of death; highlighted was the fact that the positive staining varied both for localization (fasciculate and/or glomerulosa and/or reticularis zone and/or medulla) and quantity. The results were then analyzed in relation to factors such as sex, age, and timing of the death process.

Reference(s):

1. Zhu B.L., Ishikawa T., Michiue T., Li D.R., Zhao D., Quan L., Oritani S., Bessho Y., Maeda H. Postmortem serum catecholamine levels in relation to the cause of death. *Forensic Sci Int.* 2007;173(2-3):122-9.

Adrenal Gland, Medicolegal Autopsy, Immunohistochemistry