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Denollet, J.; Kupper, N.

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Commentary

Type-D personality, depression, and cardiac prognosis: Cortisol dysregulation as a mediating mechanism^{☆,☆☆}

The pathways underpinning the relationship between psychological distress and poor prognosis in cardiac patients are not fully understood. The recent study “Cortisol awakening response is elevated in acute coronary syndrome patients with type-D personality” by Whitehead et al. in the April 2007 issue (Volume 62, No. 4) of this Journal [1] sheds new light on potential mechanisms that may explain the observed association between the type-D personality construct and increased risk of adverse clinical events in cardiac patients.

Research on type-D comes of age

Type-D denotes the synergistic effect of negative affectivity (tendency to experience negative emotions) and social inhibition (tendency to inhibit self-expression) [2]. As a result, type-D patients experience more feelings of anxiety, depression, and anger, but inhibit self-expression in order to avoid disapproval by others. Type-D is associated with a four- to fivefold increased risk of death or myocardial infarction in cardiac patients [3–5], and this associated risk may be even higher [6].

In addition to major clinical events, type-D has been related to increased risk of poor health-related quality of life [6–11], depressive symptoms [10–13], and anxiety [13,14]. This adverse effect of type-D on prognosis and morbidity has been observed across a wide variety of patients with cardiovascular disorder [15], ranging from peripheral arterial disease [11] to heart failure [10,16]. Finally, type-D personality also predicts poor outcome following invasive cardiac treatment, including implantation of an automatic cardioverter defibrillator [13], coronary artery bypass surgery [7], drug-eluting coronary artery stenting [17], and even heart transplantation in patients with end-stage heart failure [8,18].

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Given this growing evidence on the adverse effect on prognosis and patient-centered outcome measures, it is important to better understand the mechanisms that may explain the relationship between type-D personality and health outcomes. The pathology of cardiovascular diseases is complex, and it can be assumed that the link between type-D personality and poor outcome in heart disease, in addition to potential behavioural explanations, has its origin in several physiological mechanisms of which the hypothalamuspituitary-adrenal (HPA) axis could be one.

Cortisol, HPA Axis dysfunction, and type-D

Following the initial release of the catecholamines by the sympathetic nervous system during the first seconds of the stress response, the hypothalamus produces corticotrophin-releasing factor that acts on the pituitary to activate the release of adrenocorticotrophic hormone (ACTH) into the circulation in the ensuing minutes. In response to multiple brain-driven impulses of ACTH, the adrenal glands enhance cortisol production as part of the acute stress reaction of the HPA axis. Normally, stress-induced secretion is superimposed on the basal circadian rhythm. Continued or frequently repeated stress challenges may result in an exaggerated secretion of basal cortisol with potentially harmful effects on the cardiovascular system [19,20]. Indeed, HPA axis dysregulation has been related to many cardiovascular disease risk factors such as obesity, high blood pressure, hypercholesterolemia, hypertriglyceridemia, and elevated heart rate [21].

In type-D individuals, social situations may elicit insecurity, anxiety, and other negative emotions, resulting in a more frequent release of cortisol from the HPA axis every time such a situation is encountered. Previous articles have presented a theoretical rationale [22] or findings from laboratory research in healthy subjects [23] linking type-D personality to greater cortisol reactivity, but the study by Whitehead et al. [1] is the first to report empirical data on the association between type-D and cortisol in patients with established heart disease.

Whitehead et al. [1] assessed cortisol output in patients who had recently suffered an acute coronary syndrome (ACS) to examine the hypothesis that a dysfunctional HPA axis is a biological pathway that may explain the link between

emotional distress and poor clinical outcome in these patients. To test this hypothesis, they assessed emotional distress in two different ways while patients were hospitalized for ACS. They found that type-D personality was positively associated with the cortisol-awakening response, independently of age, sex, and body mass [1]. Depressive symptoms, as measured by the Beck Depression Inventory, were not related to cortisol. They concluded that disruption of the HPA axis function is a pathway that may explain the increased risk for clinical events in type-D patients.

In an earlier study, using an experimental design, Habra et al. [23] showed that type-D personality was associated with greater cortisol reactivity to stress in healthy undergraduate students. Hence, to advance beyond the current state of affairs, future studies may want to focus on testing the intermediary properties of cortisol reactivity (both to stress and to awakening) in linking type-D with health outcomes in a prospective study of healthy subjects and cardiac patients. Possible confounding factors for cortisol assessment include awakening time, health status, age, and sleep quality. In the study of Whitehead et al. [1], patients were admitted to a hospital ward. Although this usually impairs sleep quality, the sampling of the awakening cortisol was presumably very well regulated in this hospital setting. Noncompliance with the sampling protocol often is an important issue in cortisol research [24,25]. Precision of cortisol sampling can be augmented by adding heart rate measurements to assess the exact moment of awakening [26] or by using storage devices that time-stamps the use of each Salivette.

Answering skepticism about type-D

It is often questioned whether type-D personality predicts outcome above and beyond other negative emotions, such as depression, and whether it actually is a reinvented construct under a new label. The findings by Whitehead et al. [1] are important with reference to this skepticism about the utility of the type-D construct. First, their study provides more evidence for the notion that type-D and depression are two distinctly different manifestations of psychological distress in coronary patients, i.e., type-D was positively associated with the cortisol-awakening response, whereas depression was not related to cortisol. These results are in concurrence with a previous study that found type-D, but not hostility, to be related to cortisol stress reactivity [23]. Another study testified to the predictive role of type-D personality above subjective stress symptoms to predict events in coronary artery disease patients [5]. Second, it was the interaction between negative affectivity and social inhibition (which delineates type-D personality) that was related to cortisol-awakening response in this study—when the individual traits were entered into the regression (instead of their interaction), neither was independently associated with cortisol. This finding may help to explain why the interaction between

negative affectivity and social inhibition is important in the prediction of mortality and morbidity [27].

Concluding, the study by Whitehead et al. [1] contributes significantly to further our understanding of the underpinnings of the pathogenic nature of type-D personality in cardiac patients.

Johan Denollet

Nina Kupper

CoRPS—Center of Research on Psychology in Somatic diseases

Tilburg University, Tilburg

The Netherlands

E-mail address: denollet@uvt.nl

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