Mental Stress, Arterial Stiffness, Central Pressures, and Cardiovascular Risk

To the Editor:

We read with great interest the meta-analysis by Chida and Steptoe1 linking poor responses to mental stress with future cardiovascular (CV) risk. The authors eloquently present the pros and cons of laboratory tests that are used to provoke stress, highlight the importance of immediate response to stimuli, as well as of subsequent poststress recovery, and focus on published studies that present longitudinal data regarding CV risk of the subjects that were exposed to the stressor test.

In longitudinal studies, the choice of end points and surrogate markers for assessing the effect of interventions is of paramount importance, because it influences sample size and length of follow-up. Published studies on stress reactivity have hitherto focused on traditional CV response predictors, such as brachial blood pressures and heart rate. Nevertheless, a range of hemodynamic indices that are readily measured, extensively validated, physiologically relevant, and, most importantly, predictive for CV outcome include large artery stiffness and central (aortic) hemodynamics, thus making them attractive candidates for the prospective assessment of mental stress reactivity.2,3 Large artery stiffness and central hemodynamics are both markers and makers of disease; injurious stimuli affect and stiffen the vessel wall, resulting in elevated blood pressures that set a vicious cycle in operation with further arterial stiffening and vessel wall damage. Central pressures are more physiologically relevant than peripheral pressures because they represent the load that the left ventricle “sees” and determine coronary perfusion. Importantly, they are better predictors of CV outcome compared with peripheral pressures.3 In addition, at instances, changes after various stimuli produce changes in central pressures that are not apparent in the periphery. Accordingly, these indices have the potential to aid in the timely detection of patients prone to mental stress-induced arterial dysfunction, well before overt hypertension and its sequelae manifest.

Our group has previously reported an acute effect of mental stress (mental arithmetic test and viewing of a stressful movie) on pulse wave velocity, aortic blood pressures, and augmentation index, as well as a delayed poststress return of these indices to their baseline values.4,5 Seen also from the opposite angle, a positive psychological stimulus, such as viewing of a comedy movie, led to a beneficial response of these indices.5 To date, there is a paucity of studies using the aforementioned indices as both response predictors after mental stress testing and surrogates of future CV risk status. Future studies incorporating them in their design can address the question of whether a transient deterioration after mental stress will later result in permanent arterial function impairment, thus giving birth to a self-fulfilling prophecy.

The present meta-analysis by Chida and Steptoe1 lends robust support to the view that mental stress reactivity can predict future clinical outcomes and, notably, peripheral blood pressure elevation. Measurement of arterial stiffness and central blood pressures and indices could be extremely useful to explore pathophysiological mechanisms and establish the effect of mental stress on CV outcome.

Disclosures

None.

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