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Effect of Stress Reduction Using the BREATHE Technique on Inflammatory Markers and Risk Factors for Atherosclerosis

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Purpose: We propose that patients with the metabolic syndrome will have lower serum C-reactive protein (CRP), blood glucose, and triglyceride levels following a 6-week course using a stress reduction exercise known as the B-R-E-A-T-H-E technique.

Background: Emotional stress and the metabolic syndrome are both associated with increased cardiovascular risk.^{1,2} Data show that emotional stress leads to increased blood concentrations of adrenaline and cortisol that alter blood glucose and lipid metabolism. Additionally, stress leads to a proinflammatory state and increased levels of tumor necrosis factor (TNF)-alpha, interleukin (IL)-1, and IL-6. Inflammation is thought to be an integral part of atherosclerosis and has been associated with higher cardiovascular risk.³

Previous studies have shown that stress reduction lowers cardiovascular risk factors and cardiac events; however, the mechanisms for these findings have not been clearly defined. Possible explanations include behavioral changes such as better compliance with diet and exercise, or beneficial physiologic effects such as improved lipid and blood glucose metabolism, and antiinflammatory properties.

Stress activates the sympathoadrenal system and the hypothalamic-pituitary-adrenocortical (HPA) axis. Defense reactions involve catecholamine release, vagal withdrawal, cortisol secretion, and activation of the renin-angiotensin system. These mediators subserve functions that help the individual during short-term stress. When stress is frequent, adaptation (coping) is lacking, the ability to shut off the stress response is deficient, or the responses to stress are inadequate and compensatory mechanisms are activated, the allostatic load may become overwhelming and the adaptive processes become maladaptive. Stress is involved in the pathophysiology of cardiovascular disease, as nicely demonstrated in animal experiments, though human research in this area is complicated.

Stress is a nebulous concept that is subjective and difficult to measure. Thus, it is difficult to extrapolate from the laboratory environment to everyday life, to quantitate and categorize stress over time in the individual, and to pinpoint the role of stress in multifactorial cardiovascular diseases. However, epidemiologic studies have shown associations between psychosocial factors and cardiovascular disease.^{4,5}

The "metabolic syndrome" (also referred to as "syndrome X" or the "insulin resistance syndrome") has emerged as an important cluster of risk factors for atherosclerotic disease, the exact definition of which is not fully agreed on.

Common features are central (abdominal) obesity, insulin resistance/hyperinsulinemia, hypertension, and dyslipidemia (high triglycerides, low high-density lipoprotein cholesterol, and small atherogenic low-density lipoprotein particles). There are indications that neurohormonal activity may be causally involved in all of these conditions. Finally, obesity, insulin resistance, and diabetes are associated with a proinflammatory state, which is associated with increased cardiovascular risk.^{2,6}

Methods: Fifty patients with the metabolic syndrome, defined by the American Diabetes Association⁷ criteria (fasting blood sugar > 100 mg/dL, serum triglycerides > 150 mg/dL, body mass index > 19, systolic blood pressure > 130 mm Hg, and diastolic blood pressure > 80 mm Hg) will be randomly assigned to test or control groups. The test group will include 25 patients trained to use the BREATHE

technique by a physician and a registered nurse, both versed in behavioral cardiology; the control group will consist of 25 patients receiving standard medical care for the metabolic syndrome.

Instructional and therapeutic DVDs and audio CDs describing the BREATHE technique will be used twice weekly for 15 minutes per session over 6 weeks. The BREATHE technique is a novel relaxation exercise designed to elicit the relaxation response, the opposite of the stress response. BREATHE uses two proven forms of relaxation therapy, breath work and guided imagery and is an acronym where each letter represents a different step in the exercise: B-begin, R-relax, E-envision, A-apply, T-treat, H-heal, and E-end. <http://www.johnmkennedymd.com/breathe-technique.htm>

Anticipated Results: We expect those in the study group to have lower fasting serum triglycerides, blood sugar, and CRP levels compared with those in the control group.

We propose that the BREATHE technique will allow patients to elicit the *relaxation response*, which is the opposite of the stress response. By decreasing sympathetic tone and lowering cortisol and adrenaline/noradrenaline levels, the relaxation response will ultimately lower triglycerides, fasting blood sugar, and CRP.

BREATHE also has antianxiety effects that may help those in the study group exercise more frequently and improve compliance with diet and medications, further improving blood glucose, triglyceride, and CRP levels.

Conclusion: Previous studies suggest that stress reduction techniques decrease cardiovascular risk.⁷⁻¹⁰ Yoga, tai chi, biofeedback, and transcendental meditation have all been shown to lower blood pressure and heart rate primarily by attenuating sympathetic tone. In addition, studies have shown that eliciting the relaxation response increases vagal tone which may have an anti-inflammatory effect yielding lower serum levels of CRP.¹¹

BREATHE is a simple, easy-to-learn, self-directed relaxation tool that can be practiced anywhere and anytime, does not require a gym membership or yoga mat, and may be a helpful clinical tool for those at increased cardiovascular risk.

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