

# An Integrated Approach to the Diagnosis and Treatment of Anxiety Within the Practice of Cardiology

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**Abstract:** Coronary heart disease (CHD) is the leading cause of death and disability in the United States and in highly industrialized countries. Many modifiable psychosocial risk factors have been identified and can affect the course of cardiac illness. These include the negative emotional states of depression, anxiety, stress, anger/hostility, and social isolation. Anxiety has been found to increase the risk of developing CHD in healthy subjects and can lead to worsening of existing CHD. There is much overlap and confusion throughout the research literature between what authors define as anxiety, stress, Type A behavioral pattern, and anger/hostility.

There is a need for better screening within the practice of cardiology for these psychosocial risk factors to ensure better integration of mental health services. Established screening tools such as the Beck Anxiety Inventory, Patient Health Questionnaire-9, Zung Self-Rating Anxiety Scale, and the Hamilton Anxiety Scale are described and compared with the newer Screening Tool for Psychologic Distress as part of the initial work-up of every cardiac patient. Recommendations are made using the author's Anxiety Treatment Algorithm regarding when to refer to a mental health professional along with how to reduce stigma and provide more integrated care. The diagnosis and treatment of anxiety disorders is reviewed, with attention to selective serotonin reuptake inhibitors, benzodiazepines, cognitive-behavioral therapy, stress reduction, and behavioral medicine group programs. These group programs are recommended because they help to overcome social isolation and counsel patients on how to adapt to a healthy lifestyle. Better clinical outcome research is needed that specifically addresses the question of whether the treatment of anxiety and anxiety disorders can affect the course of cardiac illness.

**Key Words:** coronary heart disease, psychosocial risk factors, anxiety (disorders), cognitive behavior therapy, behavioral cardiology, behavioral medicine, integrative medicine

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Coronary heart disease (CHD) is the leading cause of death and disability in the United States and in highly industrialized countries throughout the Western world.<sup>1,2</sup> In 2004, 1 of every 2.8 deaths in the United States was due to CHD. CHD claims more lives each year than cancer, accidents, lower respiratory diseases, and diabetes mellitus combined.<sup>1</sup> Each year, approximately 1.5 million people in the United States will have a myocardial infarction (MI) and about one-third of them will die.<sup>1</sup> Direct and indirect costs in 2007 from CHD were estimated to be \$431.8 billion and there was an 8.06% increase in costs from 1987 to 2000.<sup>2</sup> From 1980 to 2000 there was a substantial decrease in overall deaths from CHD.<sup>3</sup> Even though it is estimated that half of the decline was due to reductions in major risk factors and half from evidence-based medical therapies, much work remains to reduce the modifiable risk factors of CHD.<sup>3</sup>

Beginning with the Framingham Heart Study, we know that 45% of CHD is “premature,” meaning that it occurs in people under the age of 65. Atherosclerosis, the leading cause of CHD, results from a number of modifiable risk factors such as obesity, sedentary lifestyle, cigarette smoking, hypertension, unhealthy diet, and psychosocial behaviors. Traditional risk factors such as family history, age, and gender account for only 40% of the occurrence of CHD.<sup>4</sup> From the late 1950s when Friedman and Rosenman first coined the term, Type A Behavior Pattern (TABP), there has been a steady flow of research into the mind/heart connection,<sup>4–6</sup> which has led to ongoing research into how these modifiable risk factors can be reduced and to the development of the new interdisciplinary field of behavioral cardiology or psychocardiology.<sup>7</sup> In 2004 a very large, multinational study demonstrated that psychosocial risk factors (depression, anger, anxiety, stress, and lack of adequate social support) accounted for 32% of the risk for CHD.<sup>8</sup> These risk factors were found to have the same impact as smoking and carried almost twice the risk associated with a history of hypertension.

From the National Comorbidity Survey,<sup>9</sup> we now know that in the United States anxiety disorders are the most common groups of psychiatric disorders. One in 4 in the general population will meet the criteria for an anxiety disorder with a 1-year prevalence rate of 17.7%. There is an 8.8% 1-year prevalence of phobia, 3.8% prevalence of generalized anxiety disorder, and 0.9% prevalence of panic disorder. Women are more likely to have an anxiety disorder than men (30.5% vs. 19.2% lifetime prevalence) and the prevalence decreases with higher socioeconomic status.<sup>9</sup>

Because anxiety occurs along a spectrum from normal to pathologic states, these represent only the most severe cases of pathologic anxiety. The numbers are much higher if patients with subclinical anxiety or normal anxiety are included. For example, the prevalence of panic disorder is 0.9% but the prevalence of panic attacks in the general US population is 15%.

In a family medical center where the Zung Self-Rating Anxiety Scale was administered to 739 consecutive patients, Zung found that 20% of the patients had clinically significant anxiety symptoms.<sup>10,11</sup> He concluded that clinically significant anxiety may be as common as the depressive disorders previously found in primary care settings. Mixed anxiety-depressive disorder has been included in the appendix of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and in the 10th revision of the ICD-10 and is estimated to be common in the primary care clinic population.<sup>9,12–14</sup> This diagnostic category has been recognized as a type of “Anxiety Disorder Not Otherwise Specified” and in need of further research.<sup>14</sup>

Over 50% of patients worked up for chest pain are diagnosed with noncardiac chest pain. In follow-up studies of these patients, 30% are found to have panic disorder with normal angiograms.<sup>15</sup> These workups of anxiety and panic symptoms masquerading as cardiac disease have been estimated to cost \$35 million a year in the United States. Other work ups for palpitations due to stress and anxiety and stress-induced hypertension are present in the everyday practice of cardiology. Therefore, it is very likely for the typical cardiologist to encounter patients with significant anxiety symptoms

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that can have a major impact on the etiology and course of cardiac illness.

## EPIDEMIOLOGIC LINK BETWEEN ANXIETY AND CHD

Many epidemiologic studies have suggested that psychiatric and nonpsychiatric patients with chronic anxiety may be at risk for developing CHD. Kawachi et al<sup>16</sup> found that over a 20-year follow-up of the Normative Aging Study, worry, particularly about social conditions, increased the risk for nonfatal MI and for total CHD (nonfatal MI and fatal CHD) to 2.41 and 1.48, respectively. There was a dose-response relationship between the intensity of worry and total CHD risk.<sup>17</sup> In the Health Professionals Follow-up Study it was found that phobic anxiety in an ongoing cohort of 33,999 US men aged 42–72 years increased the relative risk of fatal CHD.<sup>18</sup> Among men with the highest levels of anxiety, the relative risk (RR) of fatal CHD was 2.45 compared with men reporting no symptoms of anxiety. The investigators used the Crown-Crisp Index and found that 3 questions were associated with an elevated risk of fatal CHD: (1) “Always feeling panicky in crowds,” (2) “Worrying unduly when relatives are late coming home,” and (3) “Definitely feeling more relaxed indoors.”<sup>18</sup> Heart rate variability had been found to be reduced among men with the highest levels of anxiety. This led Kawachi et al in the Normative Aging Study to suggest that phobic anxiety may increase the risk of sudden cardiac death (SCD) because of decreased heart rate variability.<sup>19</sup> Frasure-Smith et al<sup>20</sup> reported in a sample of 222 post-MI patients a relationship between increased anxiety and acute coronary syndromes (unstable angina admissions and recurrent fatal and nonfatal MI). Coryell et al,<sup>21</sup> in a 35-year follow-up study of patients with panic disorder found a 2.0 RR of fatal CHD in men and women as compared with the general population. Other psychiatric conditions did not show this RR.

Anxiety linked to social stressors associated with poverty, job strain, and/or being a woman or a minority, all lead to an increased risk of CHD. A strong social support system and higher socioeconomic status can be protective against CHD. This is important when looking at the rate of social anxiety and phobia in the United States.<sup>22,23</sup>

Kubzansky et al, in their extensive review of the epidemiologic evidence for the link between anxiety and coronary heart disease, concluded that, “The magnitude, consistency and dose-response gradient of the association lend support to the notion that anxiety may contribute to the risk of CHD.”<sup>24</sup> They point out some of the limitations with the data, namely that subclinical heart disease may be triggering the sensation of anxiety, that the research has been done primarily on men, that different scales were used to measure anxiety across the studies, and that these studies do not separate anxiety from other negative emotional states such as depression, anger, grief, stress, and other psychiatric comorbidity. Not all studies separate normal anxiety from pathologic states and DSM-IV diagnosed anxiety disorders, which can make the results misleading because anxiety occurs along a continuum.

## THE PSYCHOLOGY OF ANXIETY AND NEGATIVE EMOTIONAL STATES

### Anxiety and Anxiety Disorders

Anxiety is an “apprehension of danger and dread accompanied by restlessness, tension, tachycardia, and dyspnea unattached to a clearly identifiable stimulus,” or “a state learned from and thereafter associated with previously neutral cues.”<sup>25</sup> In other words

anxiety may be free floating or triggered by specific stimuli that are conditioned to be stressful. Stress is “a physical or psychological stimulus which, when impinging upon an individual, produces strain or disequilibrium.”<sup>25</sup> There is obvious confusion in the literature between what patients and researchers call “anxiety” and “stress.” For example, an anxiety disorder may or may not be present when discussing “stress” within a study.

The major anxiety disorders as listed in the DSM-IV are generalized anxiety disorder (GAD), panic disorder with and without agoraphobia, acute stress disorder, post-traumatic stress disorder (PTSD), obsessive-compulsive disorder, specific phobia, social phobia, substance-induced anxiety disorder, anxiety due to a general medical condition, agoraphobia without panic disorder and as described above, anxiety disorder not otherwise specified (Table 1). All anxiety disorders have, by definition, overlapping/underlying symptoms of severe anxiety and carry a significant level of impairment by definition in the DSM-IV. What defines an anxiety disorder depends upon which behaviors and symptoms are prominent by the time frame involved, and by their level of severity and functional impairment.

Poor coping with stress and trauma can lead to anxiety, depression, deleterious behavior (alcohol/drug abuse, an unhealthy lifestyle, poor medical compliance), and impaired social relationships. To illustrate the diagnostic confusion between anxiety and stress, acute stress disorder and PTSD are listed within the anxiety disorders category, even though they are reactions to stress that involve many types of symptoms such as dissociation, avoidance, and intrusive memories. In reviewing the anxiety disorders, Barlow suggests that the DSM-IV diagnostic categories are not well understood and that there is considerable overlap between diagnoses.<sup>26</sup> Regardless, he concludes that these diagnostic entities are important when deciding upon treatment.

Although researchers have linked panic disorder and GAD to an increased risk of CHD, other patients with psychiatric conditions that manifest anxiety may be equally at risk. Therefore, further research into these other psychiatric disorders and their relationship to CHD is needed.

For example many DSM-IV somatoform disorders such as hypochondriasis and somatization disorder, as well as other disorders such as sexual disorders and sleep disorders, are also relevant

**TABLE 1.** DSM-IV Conditions That Include Anxiety

Anxiety Disorders	Other Conditions With Anxiety
GAD	Somatization disorder
PD with/without agoraphobia	Hypochondriasis
Agoraphobia without history of PD	Pain disorder
Specific phobia	Sleep disorder
Social phobia	Eating disorder
OCD	Sexual disorder
Substance-induced anxiety disorder	Adjustment disorders
PTSD	ADD/ADHD
Acute stress disorder	Mood disorders/bipolar disorder
Anxiety due to general medical condition	Factitious disorders
Anxiety disorder not otherwise specified	Personality disorders

PD indicates panic disorder; ADD/ADHD, attention-deficit disorder/attention-deficit-hyperactivity disorder; GAD, generalized anxiety disorder; OCD, obsessive compulsive disorder.

Reprinted with permission from American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Washington, DC: American Psychiatric Association; 1994.<sup>12</sup>

to cardiology because of the hyperarousal of the autonomic nervous system brought on by the excessive worry over disturbed somatic functioning. Mood disorders including bipolar disorder, schizophrenia, personality disorders, and adjustment disorders are also of concern because of the coexistence of anxiety. In addition, medical conditions such as cardiac arrhythmias and thyroid disease and side effects from medications can elicit negative emotional states, including anxiety.

### Other Negative Emotional States/Risk Factors and Their Relationship to Anxiety

Given the established impact of depression on CHD and the high comorbidity between anxiety and depression, it is also vital to screen for depression.<sup>27,28</sup> There may be a common etiology because both can develop from a sense of uncertainty and lack of predictability regarding the future.<sup>26</sup> Throughout the Type A research of Friedman et al,<sup>4-6</sup> there has come to be a heightened awareness of the interplay between anxiety, stress, and hostility within the TABP. With TAB an individual's perfectionism and unrealistic standards produce constant anxiety and stress.

Hostility and anger are now recognized as independent risk factors for CHD with an increased risk of cardiac events seen with healthy controls and patients with known CHD.<sup>29-32</sup> The RR for chronic anger in 1 study was 2.7, with a greater risk seen with increasing anger.<sup>30</sup>

Anxiety can be experienced along with anger and can be viewed as a psychodynamic representation of repressed anger and hostility. Patients who are socially isolated as a result of depression, TAB, and/or anxiety are at higher risks of CHD.<sup>23,24,31</sup> Also given the high level of comorbid alcohol and substance abuse as a result of self-medicating, there is a need to accurately diagnose these conditions when suspected. Finally, patients with anxiety and depression can exhibit poor compliance with medical treatment, causing a negative impact upon their heart disease.

In summary, because of the confusion between the definitions of stress, anger, depression and anxiety, an accurate psychiatric diagnosis must be established to differentiate normal negative emotions from a pathologic state that could adversely affect cardiac health and require specific psychiatric treatment. Kubzansky et al<sup>33,34</sup> studied shared risk between anger, depression, and anxiety versus unique risks, and concluded that general distress common to all 3 is the integral link in the emotion-CHD relationship. They also found anxiety to be an independent risk factor.

### THE HISTORY OF STRESS AND CARDIOVASCULAR DISEASE

Throughout ancient history and over the last 500 years, much has been written about the harmful effects of stress on the heart. Research dates back to 1587 when Soares de Souza first reported SCD induced by fright among South American Indians.<sup>35</sup> William Harvey stated in 1628 "a mental disturbance provoking pain, excessive joy, hope or anxiety extends to the heart, where it affects temper and rate."<sup>36</sup>

The final common physiologic pathway of all anxiety disorders and anxiety/stress states as it pertains to heart disease is its probable triggering of the "fight or flight" reaction first coined by Walter Cannon<sup>37</sup> and called the "general alarm reaction" by Hans Selye.<sup>38</sup> This leads to the commonly known effects of sympathetic hyperarousal (ie, rapid heart rate, increased blood pressure, increased respiratory rate, increased muscle tension, and an increased metabolic rate).

From the INTERHEART study group, which evaluated the link between stress and acute MI in 11,119 cases and 13,648 controls, there was a 4-fold increase in cardiovascular death among those with the highest levels of stress.<sup>8</sup>

Holmes and Rahe found that stressful life events, such as divorce, are highly associated with survivors of MI and SCD when using their Recent Life Change questionnaire.<sup>39</sup> There are other studies that link catastrophic stress, such as war, and the development of CHD and SCD.<sup>40</sup> There are many studies linking acute stress and anger preceding the onset of MI.<sup>29-32</sup> Whether this leads to plaque rupture and ensuing thrombosis remains controversial as a possible mechanism.

The research linking mental stress and silent ischemia dates back to 1984.<sup>41</sup> Krantz et al concluded that patient-reported angina is poorly correlated with the extent of CAD, MI, or prognosis.<sup>42</sup> Because a patient can be unaware of their physiologic vulnerability, cardiac counseling is necessary to modify this risk factor.

Wittstein et al evaluated 19 patients without CHD who presented with severe, reversible left ventricular dysfunction after sudden emotional stress.<sup>43</sup> They concluded that severe sympathetic activation is the probable central mechanism.

Allan and Scheidt provide an extensive review of the research literature looking at the link between stress and cardiac disease and summarize that even though there seems to be a strong link, the results are confusing because different definitions of stress are used between studies, there isn't enough that is known about an individual's resistance and susceptibility to stress, and the research is limited into fully elucidating the mechanisms that modulate cardiac damage.<sup>44</sup> In their review, they cite the cardiovascular reactivity hypothesis (triggering of the hypothalamic pituitary axis and sympathetic activation) as the most prevalent explanation of the mechanisms linking psychological stress to CHD.<sup>44</sup> Other theories include the effect of stress on lipids, hypertension, platelet aggregation,<sup>45</sup> atherosclerotic plaque development, rupture of plaque, hyperventilation triggering coronary vasospasm, and sympathetic hyperarousal leading to fatal ventricular arrhythmias.<sup>46</sup>

### SCREENING FOR ANXIETY AND DEPRESSION

The following section offers a theoretical model for integrating the screening of anxiety and depressive disorders within the practice of cardiology. This model is based upon clinical experience and studies that have established the use of these instruments within primary care and cardiology. There is a need for the American Heart Association (AHA), the American College of Cardiology, and the American College of Physicians to adopt national standards regarding screening for anxiety, depression, and other psychosocial risk factors. Martha N. Hill, PhD, RN, past president of the AHA, in her 1997 President's Address calls for guidelines that will help to "close the gap" between "behavior and biology" within the field of cardiology.<sup>47</sup>

To ensure the integrated treatment of anxiety, depression, anger, stress, and social isolation (ie, the major psychosocial risk factors), simple screening questionnaires that have high reliability and validity like the Beck Anxiety Inventory,<sup>48</sup> the Patient Health Questionnaire (PHQ)-9<sup>49,50</sup> for depression, the Zung Self-Rating Anxiety Scale,<sup>11</sup> or Hamilton Anxiety Scale<sup>51</sup> can be used as part of the routine workup of every patient. The PHQ was used in a recent cardiac study and found to be reliable and valid with CHD patients,<sup>50</sup> and the Hamilton Anxiety Scale has the advantage of diagnosing depression as well as anxiety.<sup>51</sup> The major disadvantages in using the above scales are the time required for administration (15-25 minutes as part of a full battery), the need for scoring, and significant cost to purchase.

**TABLE 2.** STOP-D (Screening Tool for Psychosocial Distress)

Over the last 2 wk, how much have you been bothered by:

- Feeling sad, down, or uninterested in life?  
 0 1 2 3 4\* 5 6 7 8  
 not at all a little moderately
- Feeling anxious or nervous?  
 0 1 2 3 4\* 5 6 7 8  
 not at all a little moderately
- Feeling stressed?  
 0 1 2 3 4 5\* 6 7 8  
 not at all a little moderately
- Feeling angry?  
 0 1 2 3 4 5\* 6 7 8  
 not at all a little moderately
- Not having the social support you feel you need?  
 0 1 2 3 4 5\* 6 7 8  
 not at all a little moderately

\*Recommended cutoff scores based on receiver operating characteristic curve analyses.

Reprinted with permission from Young QR, Ignaszewski A, Fofonoff D, et al. Brief screen to identify 5 of the most common forms of psychosocial distress in cardiac patients: validation of the screening tool for psychological distress (STOP-D). *J Cardiovasc Nursing*. 2007;22:525-534.<sup>52</sup>

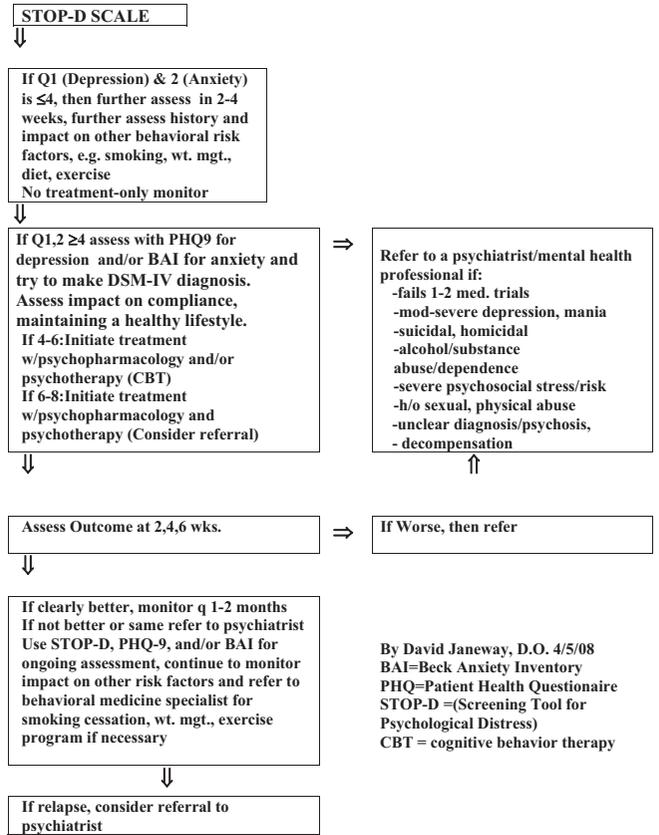
A newly created instrument, the Screening Tool for Psychologic Distress (STOP-D) was designed specifically for the outpatient cardiology setting.<sup>52</sup> This is a brief 5-item self-report measure (Table 2) that takes only minutes to perform and is highly correlated with other common scales and screens for depression, anxiety, stress, anger, and poor social support. The advantage of the STOP-D is that only 1 scale is required to screen for all of these risk factors, and it can be filled out easily by the patient as part of the initial work up. Scoring of these scales is not required because each item has a cutoff point that is highly correlated to an established scale. The results can be quickly analyzed by a nurse or the cardiologist and is available for no charge.

These scales provide data that can quickly lead to treatment decisions regarding mental health care. The screening has the effect of ensuring that mental health issues are integrated into the discussion of overall risk factors and how to promote the development of a healthy lifestyle. This discussion should elicit the history of alcohol/substance use and abuse, tobacco use, weight management and diet, exercise, stress management, past and current psychiatric history, TAB/hostility, and current social functioning. The screening can serve to delineate normal levels of anxiety and depression from more pathologic levels.

**TREATMENT OF ANXIETY, STRESS, AND ANXIETY DISORDERS**

The following Anxiety Treatment Algorithm (Fig. 1), formulated by the author, offers treatment recommendations based upon clinical experiences and a review of the literature. It points out when the cardiologist should treat and/or refer to a mental health professional. For example, if a patient who is status post-MI, scores  $\geq 4$  on questions 1 (moderate depression) or 2 (moderate anxiety) of the STOP-D, then a discussion can be initiated that at least checks for other related modifiable risk factors.

If further screening is desired to help make a diagnosis, then the Beck Anxiety Inventory, PHQ-9, and DSM-IV can be used. A cardiologist with minimal mental health training can look to see if the symptoms reported are in clusters that suggest either



**FIGURE 1.** Anxiety Treatment Algorithm.

panic disorder, GAD, PTSD, or a combined anxiety disorder with depression. Given that the DSM-IV is a theoretical and only a descriptive, nosological system for diagnosing mental illness without regard to treatment, it is vital to go one step further in understanding how to best treat patients with anxiety. Because anxiety can have neurobiologic, behavioral, and cognitive/psychologic correlates, it is imperative that cardiologists accurately elicit symptoms of anxiety in the history and via screening that draw upon these 3 domains.

For example, some patients say they are “anxious” when they mean they are primarily “worried” and cannot shut off these intrusive thoughts. These patients most likely would fit the diagnosis of GAD. In contrast, other patients with panic disorder, phobias, or PTSD may primarily manifest somatic symptoms of anxiety and autonomic arousal such as palpitations, a choking sensation, and/or increased sweating. Other patients exhibit abnormal behavior related to anxiety such as social withdrawal, obsessions/compulsions, or unhealthy behavior such as alcohol/substance abuse, smoking, and overeating.

As seen in the algorithm, when the screening identifies patients who have more than mild anxiety and depression and have failed 1–2 medication trials, have suicidal or homicidal ideation or a history thereof, alcohol/substance abuse, mania or psychosis, history of sexual, physical abuse, or severe psychosocial distress, a referral should be made to a mental health professional. Ideally, if there were a mental health professional employed as part of the practice, this could create a seamless level of care for all patients. Otherwise a referral to a nearby mental health professional or group with expertise in behavioral medicine can be made. Stigma is greatly reduced when the cardiologist can simply state, “All patients as part

of our workup and treatment are provided integrated behavioral health treatment and this is done because we know that this ensures your optimal health by reducing harmful risk factors and by helping with the development of a healthy lifestyle." This is clearly different than a cardiologist telling a patient that because their screening tests showed high anxiety and depression they are being referred to a psychiatrist. A patient in the latter example can only hear that "he/she is crazy/disturbed" and is being told that their problems are "all in their head" and some patients may feel rejected and stigmatized.

Allowing a patient to talk openly about their lives, feelings, relationships, and stress sets the tone toward reducing stigma and anxiety, which strengthens the therapeutic alliance and can improve compliance with treatment. In general, there is a need for more medical school training in behavioral medicine and in doctor-patient relationship issues.<sup>53-56</sup>

### PSYCHOPHARMACOLOGIC MANAGEMENT

The 2 major categories of medications used in the treatment of anxiety disorders are the benzodiazepines and selective serotonin reuptake inhibitors (SSRIs).<sup>57</sup> Both are efficacious and FDA approved for the treatment of anxiety disorders (Table 3).<sup>58</sup> It is unclear from the research literature if these should be prescribed to patients with mild anxiety symptoms who do not fit the criteria for a full disorder.

If benzodiazepines are given without extensive counseling and/or cognitive-behavioral therapy (CBT), patients can quickly and easily develop psychologic dependency because of the immediate relief that they provide. This leads to tolerance, physical and psychologic dependence within several weeks of regular use, and subsequent withdrawal states with high rates of relapse.<sup>59</sup>

For this reason a benzodiazepine should only be given initially in the first 2 weeks when a SSRI is being titrated up to a therapeutic dose, and then slowly titrated down and discontinued as the SSRI becomes effective.<sup>57</sup> The benzodiazepine can then be used more appropriately as a prn medication only for severe breakthrough anxiety and panic. Other medication issues that are commonly overlooked are that the dosage of SSRI medication needs to be higher for the treatment of anxiety disorders than with mood disorders, and the maximal effect may take as long as 6 weeks. For

example, doses of Sertraline for obsessive-compulsive disorder may have to be in the 100–200 mg range.<sup>57</sup>

Other older psychopharmacologic treatments for anxiety disorders that were established in the 1960s include tricyclic antidepressants and monoamine oxidase inhibitors. These medications are not recommended within cardiology because of their adverse side effect profile, which include anticholinergic effects, orthostatic hypotension, effects on cardiac conduction, weight gain, hypertensive crises, and lethality in cases of overdose, especially if combined with alcohol.<sup>57</sup> Propranolol 10–40 mg has been found to be effective in the treatment of performance anxiety.<sup>60</sup> Results are mixed for using beta-blockers in other anxiety disorders such as panic disorder, social phobia, PTSD, and for states of severe anger and agitation.<sup>61</sup> Buspirone, with its unique effects on 5-HT<sub>1A</sub>, without affecting GABA, like the benzodiazepines, has been shown to be effective in treating GAD. It also can be useful in helping to wean patients off benzodiazepines and as an adjunctive medication for depression.<sup>57</sup> Other complementary and alternative treatments exist for the treatment of anxiety within cardiology, including herbal medications, acupuncture, massage, yoga, tai-chi, and nutritional supplements. These treatments are beyond the scope of this article and are reviewed in depth in a recent text.<sup>62</sup> Overall, given the complexity and expertise that is required in treating anxiety disorders (which commonly occur with comorbid depression and substance/alcohol abuse), pharmacologic management should ideally be managed by a psychiatrist.

### COGNITIVE-BEHAVIORAL THERAPY

CBT, a well-documented evidence-based treatment for anxiety disorders, should be instituted at the beginning of treatment to ensure that patients understand their condition and that medication management is only one aspect of their treatment.<sup>63</sup> In CBT, patients are taught to restructure anxiety-provoking thoughts leading to panic attacks, are taught relaxation techniques to counteract stress and anxiety, and are given exposure therapy to desensitize themselves to stressful stimuli. CBT is also extremely useful and effective in teaching anger management skills when treating TABP personality. CBT can also assist in weaning patients off benzodiazepines, helping to ensure greater self-reliance and mastery over anxiety symptoms.<sup>59</sup> CBT conveys the message to the patient that it is possible to learn self-management techniques and methods that will most likely allow them to discontinue medications within 6 months to 1 year. This is an entirely different message that is promoted than when a medication is prescribed where the only goal is to alleviate symptoms. Studies show that relapse rates are higher when medication is withdrawn after 1 year compared with when CBT is the main treatment or when CBT is combined with medication.<sup>63-66</sup> Other forms of psychotherapy, such as psychoanalytic, interpersonal, and supportive therapies, can be effective as adjunctive therapies, but do not carry the wealth of evidence-based research demonstrating their effectiveness in the treatment of anxiety disorders.

### STRESS MANAGEMENT AND BEHAVIORAL MEDICINE

Benson was the first to systematically study the physiologic changes that occur with the practice of meditation and mind/body therapies. He coined this physiologic state that counteracts the "stress response" as the "relaxation response."<sup>67,68</sup> He initially studied practitioners of transcendental meditation, but later studied yoga and other ancient eastern meditation practices. This knowledge of the profound ability of the individual to affect the autonomic

**TABLE 3.** FDA-Approved Psychiatric Indications for Serotonin Uptake Inhibitors\*

Medication	MDD	PD	SAD	PTSD	GAD	OCD	PMDD	BUL
SSRIs								
Citalopram	X							
Escitalopram	X				X			
Fluoxetine	X	X				X	X	X
Fluvoxamine						X		
Paroxetine	X	X	X	X	X	X	X	
Sertraline	X	X	X	X		X	X	
SNRIs								
Duloxetine	X				X			
Venlafaxine	X	X	X		X			

\*The absence of an X does not necessarily imply that a drug is ineffective for a given indication, but more likely that definitive studies are lacking.

SSRIs indicate selective serotonin reuptake inhibitors; SNRIs, serotonin-norepinephrine reuptake inhibitors; MDD, major depressive disorder; PD, panic disorder; SAD, social anxiety disorder; PTSD, posttraumatic stress disorder; OCD, obsessive-compulsive disorder; PMDD, premenstrual dysphoric disorder; BUL, bulimia.

Reprinted with permission from Jefferson JW. Antidepressants. The spectrum beyond depression. *Curr Psychiatry*. 2007;6:36.<sup>58</sup>

nervous system led to the integration of mind/body therapies into mainstream medicine. Herbert Benson's Mind/Body Institute has integrated relaxation training and CBT into clinical group programs ranging from the reduction of cardiac risk factors to helping patients with infertility, HIV, and cancer. These programs have been shown to reduce the cost of unnecessary medical procedures and work-ups, improve compliance with treatment, and reduce the risk factors of stress and an unhealthy lifestyle.<sup>69–70</sup> This training, which is usually provided in groups, can help patients overcome isolation. They also provide nutritional/exercise counseling, smoking cessation treatment, and use CBT for the treatment of anxiety and anxiety disorders. Through continued work at the Mind/Body Institute at Harvard and the Behavioral Medicine Departments at Emory, Duke, Stanford, and other medical centers, the current concepts regarding the negative impact of stress on most medical conditions have flourished. With this increased understanding and awareness, recommendations can be made as to what appropriate steps can be taken within the cardiology practice to ensure that patients with significant symptoms of anxiety and stress are properly diagnosed and treated.

Other behavioral medicine trials that have attempted to incorporate stress reduction, relaxation training/CBT, and lifestyle modification for heart disease include Ornish's Lifestyle Heart Trial<sup>71,72</sup> and the Recurrent Coronary Prevention Project for reducing Type-A behavior.<sup>73</sup> In the case of the former, actual regression of coronary artery stenosis was achieved in 1-year, and 4- and 5-year follow-up studies in those participants who maintained the lifestyle changes.<sup>74</sup> A recent study of an integrative medicine approach applied to cardiac risk reduction demonstrated that after 10 months of a personalized health plan consisting of mindfulness meditation, relaxation training, stress management, and health education and coaching, patients in the active treatment group had lowered risk, lost more weight, and exercised more frequently compared with a usual care group.<sup>75</sup> In all of the above studies patients suffered from stress, anxiety, and other psychosocial risk factors, but were not diagnosed with an anxiety disorder, making it unclear if these results apply to the treatment of anxiety disorders.

If similar group programs cannot be instituted, it is possible to at least initiate relaxation training and stress management. Printed information and instructions on simple relaxation techniques along with providing relaxation training CDs and tapes can be an easy way to educate and begin to help patients better manage their stress. Many patients with anxiety and depression already practice some form of relaxation therapy,<sup>76</sup> but providing this service can ensure that all patients are at least exposed to the benefits of this treatment.

## SUMMARY AND CONCLUSIONS

Although it is increasingly clear through epidemiologic studies that anxiety and anxiety disorders can lead to an increased risk of CHD, it is less clear from the literature whether all of the psychosocial risk factors (depression, anxiety, stress, anger/TABP, and social isolation) pose an equal risk. Because these emotional states have overlapping etiologies, symptoms, and behavioral consequences, it makes it difficult, if not impossible, to state definitively that anxiety and anxiety disorders are mutually exclusive states. There is a need for more behavioral medicine programs that perform clinical outcomes research. This research needs to focus on whether the treatment of these risk factors, especially in those patients diagnosed with an anxiety disorder, has a significant effect on the course of cardiac disease. Hopefully this research will be accompanied by more behavioral medicine training being offered in medical schools and teaching hospitals where cardiologists will be more apt to integrate these services into their practices. This will help ensure that patients

receive the message from day one that their mental health and behavior is vital to their physical health. This would reduce the stigma of mental illness that prevents the integration of a biopsychosocial treatment.

Conversely, psychiatrists and mental health professionals treating anxiety disorders often do so in a way that is isolated from the cardiologist and primary care provider's office. This promotes fragmentation within the patient, promoting the thought that "my mental health is totally separate from my physical health." Mental health professionals often do not communicate directly with the cardiologist and/or primary care provider. This contributes to professional isolation and stigma and does not provide the necessary opportunity for liaison and integration. Few mental health professionals are adequately trained in behavioral medicine. There is a need for more psychiatrists in the United States to specialize in the field of psychosomatic medicine/consultation-liaison psychiatry.<sup>77</sup> Psychologists are often the leaders in this field, having a subspecialty of behavioral medicine, which grew out of the field of health psychology. Because the medical system is set up in a fragmented way, treatment reflects this mind-body split. As long as cardiologists look at mental health issues as outside their domain and not pertinent to the treatment of heart disease, and mental health professionals look at heart disease as being outside the scope of their practice, there is no hope that the stigma of mental illness will be eliminated and patients will not be treated in a holistic manner. If we are to continue lowering the rates of CHD, we have to continue to emphasize prevention of the modifiable risk factors. This will require that cardiologists and mental health professionals collaborate and integrate the treatment of anxiety, depression, stress, and anger/hostility into the everyday practice of cardiology.

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## ERRATUM

The Review article “Device-Based Nonspecific Immunomodulation Therapy (Celacade), and Its Potential Role in the Treatment of Chronic Heart Failure” (*Cardiol Rev*. 2008;16:280–287) misidentified Dr Joon-Hyuk Kim’s affiliation as Department of Anesthesiology, Loyola University Medical Center, Maywood, IL. Dr Kim is with the Department of Medicine, Georgetown University Hospital, Washington, DC.