Factors Driving Anorexia, Bulimia Are Complex

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BY JEFF EVANS
Senior Writer

BETHESDA, MD. — A complex set of predisposing, precipitating, and perpetuating factors appears to play a major role in driving the behavioral and neurochemical changes of patients with anorexia or bulimia, Craig Johnson, Ph.D., said at the annual conference of the National Eating Disorders Association.

"A belief system develops, and from that belief system, behaviors emerge. When those behaviors emerge, that also starts to alter the psychology and physiology of the patient and can set up these perpetuating factors so that they feed back on the predisposing and precipitating factors," said Dr. Johnson, founder and director of the eating disorders program at the Laureate Psychiatric Clinic and Hospital in Tulsa, Okla.

The factors that serve to perpetuate an eating disorder may have little to do with why the illness is continuing. The structural and functional changes to neurochemical pathways in the brain that occurred as a result of the eating disorder behavior will continue to reinforce whatever stimulation was gained from the behavior, he said.

"Without exception, patients we're taking care of entered into these behaviors to try to fix something in themselves. It was a self-improvement strategy. They thought they were doing a good thing. They were doing the same things they saw encouraged throughout our culture," Dr. Johnson said.

As they lost weight or altered their neurochemistry, though, "they stepped on a land mine, which is going to have a strong genetic predisposition to turn something on in their brain, which then sends them cascading down that road of being obsessed with weight loss and being compelled to accomplish it," he explained.

"Eating disorders are as heritable, have the same level of relative risk, and look to be as genetically mediated as the other major psychiatric illnesses," Dr. Johnson said.

If a relative has anorexia nervosa, other members of the family are 12 times more likely to develop the disorder than members of the general population. Similarly, if one family member has bulimia nervosa, other members are four times more likely to have it.

About two-thirds of eating disorder patients have a comorbid diagnosis of anxiety or depression, which predates the onset of the eating disorder in about half of such patients, he said.

Some patients also have an impaired ability to work with different sets of challenges on neuropsychological tests, although this measure is not correlated with intelligence. These test results "make sense, in terms of what we see happening to them when they move into increasing levels of complexity developmentally, starting with puberty," he said.

Even though he and his colleagues are seeing gender, ethnic, and socioeconomic drift in the epidemiology of anorexia nervosa and bulimia, Dr. Johnson noted that they are still illnesses that primarily affect white females. Girls who drop below about 17% body fat lose the secondary sexual characteristics associated with puberty and flatten out their hormone profiles so that they don't "feel" the effects of puberty, Dr. Johnson said.

"In our treatment center, one of the things we want to know as soon as we can is where the menstrual threshold is. At what point with our weight restoration are we going to be sending them clearly on the other side of puberty?" he said.

If patients do not stay in treatment long enough to restore their weight past the menstrual threshold, they will not have dealt adequately with their phobic fear of menstruation, he said.

Patients with bulimia nervosa often report that bingeing on carbohydrate-rich food calms them down, which may be the result of increased blood levels of tryptophan, an amino acid that can pass the blood-brain barrier and is synthesized into serotonin; treatment with selective serotonin reuptake inhibitors may make this effect even more pronounced by increasing the amount of serotonin available at synapses, Dr. Johnson suggested.

Vomiting also causes a sedating effect in bulimic patients because of the release of vasopressin. An autoaddiction to the vasopressin release may explain why binges become smaller and vomiting becomes disproportionate to the volume of food, he said.

Excessive exercise also appears to be a reinforcing and possibly anorexia-inducing behavior. "Running seems to have some unique interaction with restricting behavior that essentially stimulates something very, very toxic for the patients that have the more severe forms of the illness. We've found that very few patients are able to successfully return to running in our treatment program," he said.

Functional MRI studies of the brains of anorexic patients and healthy controls have revealed some striking differences in dopamine pathways that suggest that patients with the disorder do not discriminate between positive and negative feedback and have a blunted response to pleasurable stimuli, according to Dr. Walter Kaye, who gave a separate presentation during the same session at the conference.

During a gambling task in which participants could win or lose money, trials in which patients with anorexia nervosa won money produced brain activity similar to that of control patients during winning trials, but anorexic patients who lost money also had brain activity similar to that of controls who won money, said Dr. Kaye, research director of the eating disorder program at the University of Pittsburgh.

In a separate fMRI study, the taste of sugar produced blunted responses in the insula (the primary taste cortex) of recovered anorexic patients, compared with healthy controls. Unlike in the healthy patients, however, there was no correlation between the taster's rating of pleasantness and the insula's response to sugar in recovered anorexic individuals, he noted.

Even before these data can be used to develop new treatments, it will be useful to let patients understand that this particular temperament is wired into their brains and that they might be able to learn to modulate their feelings and thoughts and develop adaptive coping strategies, said Dr. Kaye, also of the University of California, San Diego. ■

CPAP Withdrawal Alters Brain Function in Apnea Patients

BY KATE JOHNSON
Montreal Bureau

MONTREAL — Sleep apnea patients receiving continuous positive airway pressure therapy have changes in brain function that can be seen with functional magnetic resonance imaging when the therapy is withdrawn for just 2 consecutive nights.

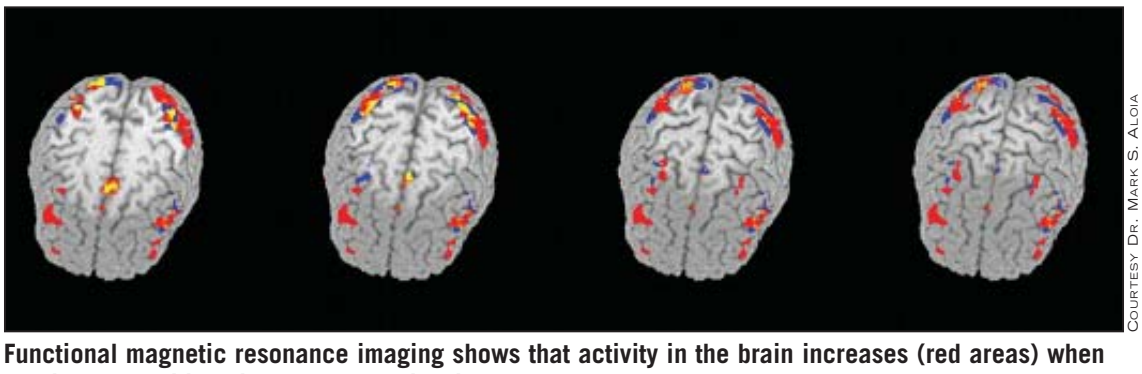
"The brains of these patients must work harder, and possibly in less efficient ways, to perform at the same level [as when they are on the therapy]," said Mark S. Aloia, Ph.D., who reported the findings at the 8th World Congress on Sleep Apnea.

His study included eight subjects with moderate to severe sleep apnea who were compliant with continuous positive airway pressure (CPAP) therapy. The subjects were asked to complete a cognitive function test called the N-back test while undergoing functional magnetic resonance imaging (fMRI) of their brains. The testing was performed both when patients were compliant with CPAP (at least 2 consecutive nights) and when the therapy had been withdrawn for 2 consecutive nights.

While subjects performed similarly both on and off CPAP therapy (because of extensive task training), the fMRI showed significant differences in which regions of their brains were activated in the presence or absence of CPAP, said Dr. Aloia, who serves as director of sleep research at National Jewish Medical and Research Center in Denver.

Specifically, there was significantly greater activation of the left middle frontal gyrus and a trend toward greater activation of the right inferior parietal regions when CPAP was withdrawn. In contrast, when patients had been treated with CPAP, there was significantly more activation of the right middle frontal gyrus.

The findings lend support to the hypothesis that untreated sleep apnea creates an inefficiency in brain function, Dr. Aloia said. "There seems to be a compensatory response of the brain off CPAP such that subjects are using more brain resources to perform at the same level," he said in an interview.



COURTESY DR. MARK S. ALOIA

Functional magnetic resonance imaging shows that activity in the brain increases (red areas) when continuous positive airway pressure is withdrawn.

In addition to altering brain function, there is also evidence that sleep apnea impairs certain cognitive functions—and CPAP can reverse some of this impairment, Dr. Aloia added. In another study currently in press, he found that sleep apnea patients with impaired memory were eight times more likely to normalize their memory if they received adequate CPAP therapy—defined as 3 months of 6 or more hours per night—compared with patients who were less compliant with CPAP, averaging 1 hour or less a night.

Dr. Aloia and his colleagues also have done imaging studies that show differences in white matter in the brains of patients with severe sleep apnea, compared with those with mild disease—suggesting that some of the changes in brain functioning among sleep apnea patients could be caused by microvascular damage.

"From a neuropsychological perspective, we see fine motor discoordination, memory, and executive problems in microvascular disease," he said. "So, we posited the idea that the relationship we know between apnea and cardiovascular disease probably extends to vessels in the brain."

It is possible that CPAP therapy might reverse some of this ischemia, Dr. Aloia said. ■