# ALCOHOL ALERT

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## *Craving Research: Implications for Treatment*

Many researchers and clinicians consider craving an important contributor to the development and maintenance of alcoholism (1). Craving has been described as a powerful urge to drink or as intense thoughts about alcohol. The *International Classification of Diseases (ICD–10)* includes craving as an optional diagnostic criterion for addiction to alcohol or other drugs, defining the term as a strong desire or sense of compulsion to take the drug[1](2,3). Understanding the exact nature of craving has been difficult. Nevertheless, scientists have accumulated a large amount of data on its mechanisms and manifestations. This *Alcohol Alert* reviews how this information has stimulated the development of psychological and pharmacological approaches for maintaining abstinence among alcoholics during and after treatment.

[1]*The lack of consensus in this area is indicated by the omission of craving from the diagnostic criteria for alcoholism in the Diagnostic and Statistical Manual of Mental Disorders (DSM–IV) (3).*

## *Models of Craving*

Many theoretical models attempt to explain the phenomena associated with craving. Although no single model accounts for all aspects of craving, each has elements that may eventually contribute to an overall, comprehensive model. Key characteristics of selected models are described below.

- The reinforcement model is based on alcohol's ability to produce an elevated mood or to help relieve an unpleasant mental state such as stress or anger. An unconscious learning process called reinforcement leads to repetition of the behavior (i.e., drinking) that produces the positive experience (4). Eventually, objects, environments, or emotions consistently associated with alcohol consumption can produce a similar response as powerfully as can alcohol itself. Such stimuli (i.e., cues) may include the sight of a bar, liquor store, or beverage advertisement; the company of friends who drink; or exposure to alcohol itself. An abstinent alcoholic exposed to appropriate cues will experience a conscious urge, or craving, for alcohol (5).

- According to the social learning model, cue-elicited craving during or after treatment can trigger conscious coping strategies aimed at maintaining abstinence. The success of coping depends on the drinker's confidence in his or her ability to resist the urge to drink (6). This model acknowledges craving as only one of several factors necessary to induce relapse (7).

- The cognitive processing model postulates that alcohol use becomes a habit which requires little conscious effort or attention, just as driving down a familiar road can become automatic. In this model, craving represents the effort involved in mobilizing conscious problem-solving skills needed to block

the automatic drinking behavior. Such a situation may occur when a drinker finds that his favorite bar is unexpectedly closed. Similarly, following treatment, an alcoholic who is motivated to remain abstinent might experience craving while consciously attempting to avoid cue-induced relapse (7,8).

### *Measuring Craving*

Reliable methods for measuring craving are required to support meaningful experimental results or clinical evaluations. Many studies simply ask the subject to rate the intensity of his or her desire to drink, sometimes in the presence of an alcohol-related cue (9). To add objective measures to this method (10), researchers began recording changes in specific physiological functions thought to accompany craving (e.g., changes in heart rate, blood pressure, or sweat gland activity) (11). Because physiological changes such as these are not specific to craving, they have not correlated consistently with self-reported urges to drink (7). In addition, some tests rely on the self-rating of only one selected item out of the many aspects of craving, thereby providing an incomplete basis for comparison (11).

Researchers have developed multi-item scales to make self-report instruments more precise. The scale items on such tests not only cover multiple aspects of craving, but often overlap by asking essentially the same question different ways. This technique helps counter errors introduced by differences in the way individuals interpret subjective questions (12). One of the best known multi-item scales is based on the observation that at least some aspects of craving appear to resemble features of obsessive-compulsive disorder (OCD), a condition characterized by repetitive or obsessive thoughts and impulsive or compulsive repetitive behaviors (13). The Obsessive Compulsive Drinking Scale (OCDS) was developed from existing questionnaires for assessing nonalcohol-related OCD. A key item measured by the OCDS is a person's ability to resist or suppress urges to drink. The strength of this ability may be crucial for initial treatment success and the subsequent maintenance of abstinence. Preliminary experimental data suggest that the OCDS can help to assess the severity of alcoholism (14,15), monitor the progress of patients in treatment, and assess treatment outcomes (13,14,16).

### *Craving and the Brain*

To understand craving, scientists must identify the brain mechanisms that lead to urges. This information is necessary to support the development of new and improved alcoholism treatment approaches. To account for all manifestations of craving, both conscious and unconscious processes must be taken into account (13).

Alcohol consumption may initiate the process of reinforcement by activating a "reward center" located deep within the brain. The reward center is linked to other brain areas involved in aspects of emotion, learning, and memory. Interactions among these sites could account for the processes by which (1) emotion-laden memories of past positive drinking experiences become associated with cues, and (2) exposure to such cues can activate the reward center in the absence of alcohol, potentially leading to craving during abstinence. These processes are unconscious. However, the reward center also communicates with brain areas that appear to underlie higher intellectual (i.e., cognitive) functions such as judgment and decisionmaking. Because of this, heavy drinking may ultimately impair conscious processes that support the ability to cope with drinking urges (6).

A contrary view suggests that exposure to cues may lead to the *activation* of certain "automatic" cognitive functions, resulting in repetitive, unwanted thoughts about alcohol. These automatic thoughts are the cognitive equivalent of unconscious craving (13).

Craving also may arise in part from persistent nervous system changes (i.e., neuroadaptation) that leave the alcoholic's brain vulnerable to relapse drinking (17). These changes persist in the absence of alcohol, and may result in conscious or unconscious physical and mental distress. This phenomenon could account for the craving alcoholics experience soon after the cessation of drinking, and which makes them vulnerable to relapse for a protracted period of time.

A comprehensive picture of craving requires the integration of unconscious and cognitive mechanisms (7). Among the concepts of craving discussed here, both the social learning and cognitive processing models implicate cognitive learning in the development of harmful drinking patterns and stress the importance of teaching conscious coping strategies in alcoholism therapy. Both of these models also are consistent with the involvement of other causal mechanisms, including reinforcement and other unconscious processes (6,8).

***Imaging Studies***. Few craving studies have been conducted using imaging techniques, which allow

scientists to locate areas of brain cell activity in living subjects with minimal risk. Some craving studies based on imaging of humans have identified specific regional changes in brain cell activity in response to alcohol-related cues (18-20). However, these findings alone do not prove that the observed brain changes cause the subjective sensation of craving (9). Additional research is needed to understand the neurobiology of craving.

### *Treatment*

Despite the difficulties involved in the study of craving, research results have contributed significantly to our knowledge base for developing and validating alcoholism therapies for achieving and maintaining abstinence.

***Psychological Therapy***. Treatment programs often use relapse prevention approaches that incorporate some of the principles of cognitive-behavioral therapy. In alcoholism treatment, this approach helps the patient recognize the cues that lead to drinking so as to be better prepared to deal with them when encountered. Patients develop the skills and self-confidence to cope with high-risk situations such as negative emotional states (e.g., anger or depression), interpersonal conflict, and social pressure to drink (7,21). The informal use of similar coping strategies may contribute to the success of 12-step self-help programs (22).

***Pharmacotherapy***. The results of craving research have spurred the development of new medications to supplement verbal alcoholism therapies. Among the most promising of such medications are naltrexone (ReViaT) and acamprosate.

Naltrexone is the only commercially available medication in the United States that targets alcohol's effects on the brain. When combined with various treatment programs, naltrexone has been found to decrease drinking rates, prolong abstinence, and hinder relapse to uncontrolled drinking among abstinent alcoholics who sampled alcohol during treatment (23,24,15,16,25,26). Sinclair suggests that naltrexone could be administered to actively drinking alcoholics during treatment and subsequently on an as-needed basis only when drinking is anticipated (i.e., targeted treatment) (27). Some data to support this idea recently have been produced (28). Targeted use of naltrexone also may be effective for decreasing alcohol consumption levels among nonalcoholic problem drinkers (29).

Evidence suggests that acamprosate may diminish craving by helping to restore the physiological balance of the brain after abstinence has been achieved (26). Acamprosate improved various measures of abstinence in 14 of 16 European studies (26,30) and in a 21-site multicenter trial in the United States (31,32). Acamprosate is available by prescription in Europe and is awaiting approval by the U.S. Food and Drug Administration for use in this country.

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### *Craving Research: Implications for Treatment- A Commentary by NIAAA Director Enoch Gordis, M.D.*

To practicing clinicians, the topic of craving seems so self-evident; patients often report wanting or craving alcohol when they are abstinent or as a reason for relapse. In this issue of *Alcohol Alert*, however, readers can see how complex the topic of craving turns out to be as a subject for study. As we await greater scientific understanding of how the brain produces the alcoholic person's desire to drink, the various models of craving continue to be useful in clinical trials and in clinical practice as a means of assessing a patient's risk for relapse.

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