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Commentary

Nicotine Addiction and Its Assessment

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It is now acknowledged that cigarette smoking is maintained primarily by dependence on nicotine. Individuals who attempt to give up cigarettes experience an array of withdrawal symptoms. Both the ease by which a smoker is able to give up cigarettes and the severity of resultant withdrawal symptoms are related to the smoker's degree of dependence on nicotine. The six-question Fagerstrom Test for Nicotine Dependence (FTND) is a valid self-reporting measure of nicotine dependence and can assist physicians in determining appropriate cessation treatment. High scorers on the FTND have the greatest difficulty refraining from smoking and receive the greatest therapeutic benefits from nicotine substitution (i.e. nicotine gum). When time or resources are limited, two questions from the FTND (time of the first cigarette of the day and number of cigarettes smoked per day) can be used to determine dependence, although the full scale should be used if time permits. The FTND can help tailor treatment to the individual smoker's need and can therefore increase the likelihood of successful long-term smoking cessation.

Introduction

Although there was sufficient scientific evidence in 1964 for the Surgeon General of the United States to assess the role of nicotine in tobacco use,[1] research has advanced greatly since then, with the advent of such investigative tools as plasma assays for nicotine and cotinine (the major metabolite of nicotine)[2] and nicotine-containing gum.[3] It is now well established that cigarette smoking for many smokers is an addiction or dependence on nicotine.[4,5]

Although some expert committees prefer the term "dependence"[6] and others prefer the term "addiction"[4,5] it is clear that the same basic underlying syndrome is being observed. After reviewing the terminology applied to drug addiction, the recent Royal Society of Canada committee, offered the following working definitions:[5] "Drug addiction is a strongly established pattern of behavior characterized by (1) the repeated self-administration of a drug in amounts which reliably produce reinforcing psychoactive effects and (2) great difficulty in achieving voluntary long-term cessation of such use, even when the user is strongly motivated to stop."

The notions of "physical dependence" (physical withdrawal symptoms: and "tolerance" are no longer viewed as critical features of a drug addiction, but rather are usual accompaniments of a drug addiction. Tolerance is however easily observed. In the very beginning only fractions of a mg cause strong effects, e.g. nausea. After some time an average smoker may need about 20mg over a day to ensure normal functioning, while heavy smokers may consume doses of 40-60mg/day, which is the lethal dose if taken instantaneously.[4]

The addiction to nicotine is manifest in the difficulty which many smokers have in stopping smoking permanently. It is the difficulty in quitting that makes cigarette smoking such a deadly activity.[7] If smokers could easily stop when presented with the health risks of smoking,[8] then the health costs of smoking would be dramatically decreased.

The dependence on nicotine is a factor that must be dealt with if physicians are to do their best at helping their patients stop smoking. It has implications for how the smoking is best treated and it has implications for how smokers view themselves. So far, most approaches used by physicians have been motivation-increasing approaches, e.g. medical education rather than disease-related, i.e. treating withdrawal symptoms. Despite the clear evidence that cigarettes are addictive, there are some common misunderstandings about what it means to be addicted.

Myth 1. Drug dose becomes the key determinants of intake

This is not true for any known addictive drug. In the case of nicotine it is clear that nicotine intake is regulated

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within fairly broad limits. Kozlowski and Herman[9] have described a boundary model for nicotine and regulation, in which nicotine levels are seen to vary within a large zone bounded by a lower biological boundary ("nicotine withdrawal") and upper biological boundary ("acute nicotine toxicity"). An array of social and situational factors have a powerful effect on just how much drug is used by any individual. If the environment encourages smoking in that those with whom you live and work are likely to be smoking, then the intake of cigarettes and nicotine is likely to be well above the lower boundary level. Benowitz et al.[10] have shown that blood levels of nicotine can vary dramatically, yet no withdrawal discomfort is seen until the levels drop to a very low level.

Myth 2. It is much easier to give up cigarettes than giving up other addictive drugs.

Everybody has heard the story of someone who smoked 20 cigarettes per day for 20 years and just gave up smoking without any apparent difficulty. Such an example does not prove that nicotine is not addictive; rather it demonstrates the similarity of nicotine to other forms of drug addiction. An addiction means that it may be harder to give up the use of the drug, but in no way means that it is impossible to do so. Robins landmark on heroin addiction scientifically dispelled the myth for heroin of "once an addict, always an addict." Yet it seems that in the popular imagination the myth of unbreakable addiction persists.[11] One indication of the seriousness of addiction to cigarettes is that multiple drug abusers generally rate their "strongest urges" for cigarettes as at least as strong as their strongest urges for drugs such as cocaine, heroin, and alcohol, and the majority of these multiple drug users say it would be harder to give up cigarettes than their other drug use problems.[12]

In the American Psychiatric Association's classification (6) two diagnoses involving nicotine are listed: nicotine dependence (305.10) and nicotine withdrawal (299.00). The withdrawal symptoms listed are : craving for nicotine, irritability, frustration or anger, anxiety, difficulty concentrating, restlessness, decreased heart rate and increased appetite or weight gain. Four of these symptoms need to be present for satisfying the criterion of the diagnosis. The nicotine withdrawal is by no means fixed and easily defined. It varies strongly between individuals, and other symptoms not included in the present classification may well be withdrawal symptoms. In the preparation for a new edition it has been suggested that insomnia, impatience, and disrupted sleep, should be included (Hughes, personal communication).

Clinical use of the Fagerstrom Test for Nicotine Dependence

The Fagerstrom Test for Nicotine Dependence (FTND) is designed to indicate the strength of this dependence. It has been developed to be a cheap, non-invasive, easy way to rapidly assess nicotine dependence. The questionnaire has been widely used in many countries, and recently Fagerstrom and Schneider[13] have reviewed about 50 studies on the Fagerstrom test. Heatherton et al.[14] have developed a revised version of the Fagerstrom test that deals with some of the deficiencies of the earlier scale and builds on some of the strengths of the earlier scale. Here we present the new version and discuss its use (Table 1).

Table 1. Items and scoring for Fagerstrom Test for Nicotine Dependence (FTND).

Questions	Answers	Points
1. How soon after you wake up do you smoke your first cigarette?	Within 5 minutes 6-30 minutes	3 2
2. Do you find it difficult to refrain from smoking in places where it is forbidden, e.g. in church, at the library, in cinema etc?	Yes No	1 0
3. Which cigarette would you hate most to give up?	The first one in the morning All others	1 0
4. How many cigarettes/day do you smoke?	10 or less 11-20 21-30 31 or more	0 1 2 3
5. Do you smoke more frequently during the first hours after waking than during the rest of the day?	Yes No	1 0
6. Do you smoke if you are so ill that you are in bed most of the day?	Yes No	1 0

Clinically, FTND can help the physician determine the degree to which a patient is nicotine dependent. It relates to a number of variables associated with dependency such as plasma levels of nicotine, cotinine (the major metabolite) and withdrawal symptoms, but most strongly and consistently it predicts ability to stop smoking. The stronger the dependence the less likely the person will be to manage cessation. The disadvantage of the higher dependent smokers becomes nonexistent when appropriate nicotine gum treatment is given.[13] It may also suggest dose, which in everyone has been either 2mg or 4mg.[15] More recently the scale has also been found to relate to success in quitting when nicotine is delivered transdermally.

In two studies it has been shown that transdermally delivered nicotine alone may not be optimal for high-dependent smokers.[16,17] Allowing some dose titration with nicotine gum may be very helpful for this group of addicts.

The scorers on this scale (or the earlier version) are not distributed bi-modally, as would be the case if one could identify clearly separate groups of "non-dependent" and "dependent" smokers. The higher the score, the greater the likelihood of nicotine dependence. We do not feel able to recommend any fixed cut-off point that separates the smokers into just high and low dependent categories.(Fig 1).

Figure 1 shows the distribution of FTND scores for adults attending a low cost group smoking cessation program in Ontario (64% were females, mean age = 40±-11 years). The distributions were similar to males and females. Most scores were between three and seven (71%). A five-level categorization may be desirable ranging from very low dependence to very high dependence. These classes have been scored as very low (0-2), low (3-4), medium (5), high (6-7), and very high (8-10). For physicians who do not have the opportunity to use the 6-question scale, we recommend that just questions one and four be used to gauge nicotine dependence. Research has shown that these two questions are the most important on the FTND.[14,18] To break these two questions[19] into approximate quintiles, we suggest that scores 0-2 be grouped ("very low"), and that scores of 3,4,5, and 6 be considered "low", "moderate", "high" and "very high" respectively.

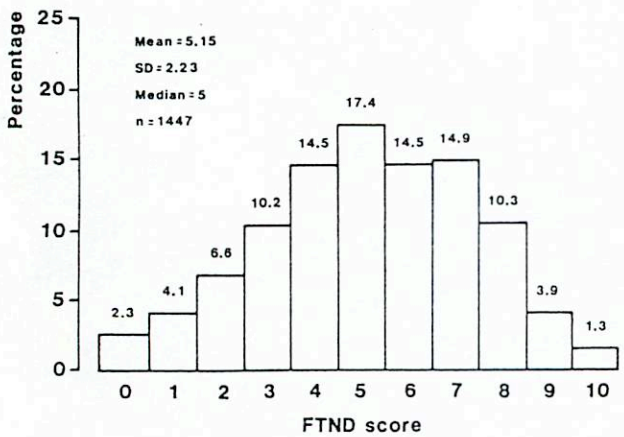

FIG. 1. Distribution of FTND scores.

When the time permits, however, we think that the full scale is preferable because the additional questions may have a useful cognitive and motivational effect on the patient increasing the patient's awareness of certain negative aspects of being nicotine dependent.

Nicotine and alcohol

We also recommend that those with higher dependence scores should be evaluated for excess alcohol intake. Cigarette intake in general is positively associated with alcohol intake.[19] If a patient is a heavily nicotine dependent smoker, this individual is also more likely to drink alcohol to excess. It has been found that 90% of alcohol abusers smoke and that their nicotine dependence is much higher than for the average non-alcoholic smoker.[20] This issue deserves special attention for two reasons. First, given the increased risk of oral cancers in those who both smoke and drink heavily,[21] it may be possible to increase the motivation to stop smoking in these individuals. Second, the treatment of two drug problems may be in order rather than just the separate treatment of smoking.[22]

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