MARSHALING THE EVIDENCE FOR GREATER REGULATION AND CONTROL OF TOBACCO PRODUCTS: A CALL FOR ACTION

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ABSTRACT

Cigarette smoking remains the greatest single cause of preventable death in contemporary society. The health consequences of tobacco use have been documented in thousands of studies. We are at a critical juncture in U.S. tobacco control history. The nation is poised on the brink of momentous changes in the health care system and in public policy regulating the use and marketing of tobacco products. This article will make four recommendations to help us capitalize on these changes.


INTRODUCTION

Cigarette smoking remains the greatest single cause of preventable death in contemporary society. The health consequences of tobacco use have been documented in thousands of studies. Although cigarette smoking has declined in the United States and the United Kingdom within recent years, the worldwide trend is toward increased use of tobacco products (1). Peto and colleagues (2) project that worldwide there will be ten million tobacco-related deaths per year by the year 2010. Current estimates suggest that tobacco use in the U.S. is responsible for 434,000 deaths each year (3). These include 37,000 deaths from cardiovascular disease resulting from exposure to tobacco smoke in the environment. Further, smoking is responsible for poor pregnancy outcomes. Estimates suggest that 17% to 26% of low birth weight deliveries are associated with maternal tobacco use and that 5% to 6% of prenatal deaths can be attributed to maternal tobacco use (4-7). McGinnis and Foege (3) suggest that about 25,000 deaths in the U.S. can be attributed to motor vehicle crashes, and about 20,000 deaths can be attributed to illicit drug use. In contrast, deaths associated with tobacco use account for over 20 times the number associated with drug use, 16 times the number associated with auto crashes, and 15 times the number of homicides.

The public is very concerned about dramatic causes of death such as homicide, being killed in an accident at work, or being killed by a drunk driver. However, for each person killed by a drunk driver, nearly 74 active smokers die prematurely. Many aggressive public policies for reducing unintentional injury or reducing illicit drug use are justified on the basis of public health threat. Driving an automobile in excess of the speed limit or using heroin are not regarded as personal rights. However, despite the more serious public health consequences of tobacco use, smoking has been regarded as a right and public policies have been less restrictive.

Because of the overwhelming evidence that nicotine is harmful, we believe that significant policy actions are required. On August 2, 1994, a U.S. Food and Drug Administration (FDA) advisory panel agreed, stating that nicotine "is likely to lead to addiction in the typical smoker." This vote is an important step along the path toward greater regulation. In this article, we address four issues: (a) the regulation of tobacco as a drug by the U.S. Food and Drug Administration; (b) the enactment of a federal excise tax on tobacco products; (c) a ban on tobacco advertising directed at children and youths; and (d) support for policies that would allow providers to be reimbursed for smoking cessation services. Each of the first three issues has been challenged on legal, ethical, or constitutional grounds. Certainly any such policy change should be well-justified by appropriate data, and the intent of this article is to review some of the relevant evidence. One important foundation for policy proposals is that cigarette smoking is an addictive habit. Thus, we will devote disproportionate space to a review of the addiction issue. For each issue, we indicate a policy currently under consideration and review the evidence in support of the policy change.

ISSUE 1: TOBACCO SHOULD BE REGULATED AS A DRUG BY THE FOOD AND DRUG ADMINISTRATION

The U.S. Food and Drug Administration has broad authority to regulate drugs. Pharmaceutical products must be shown to be safe and efficacious, and there are strict limitations on the distribution and marketing of controlled substances. Tobacco products have been excluded from these regulations. Currently,
Congress is reconsidering this exemption. In part, the new
debate was aroused by the Coalition on Smoking or Health which
argues that tobacco companies intentionally manipulate
the amount of nicotine in cigarettes in order to make them more
addicting. Under the Food, Drug, and Cosmetic Act, the FDA
has the responsibility to assure that drugs are safe. Since the
evidence is overwhelming that cigarettes and other tobacco
products are not safe, classification of tobacco products as drugs
would force the FDA to either extend their regulatory authority
over the tobacco industry or to ignore the law. Recognizing the
political nature of this issue, the FDA Commissioner David
Kessler requested that Congress give his agency specific direc-
tion. In this report, we consider the scientific evidence justifying
reclassification of tobacco products as drugs.

Are Cigarettes Addicting?
The term “addiction” generally refers to the ability of a
drug to produce physical and/or psychological dependence, also
called a drug’s abuse liability (4,8). The Diagnostic and Statis-
tical Manual-IV of the American Psychiatric Association lists
seven specific objective criteria by which to determine whether
an individual is dependent on any drug (9). Briefly, these criteria
are: (a) tolerance (need for increased amounts or diminished
effect with continued use of same amount); (b) withdrawal signs
and symptoms upon cessation of use; (c) use of larger amounts
or use over a longer period of time than intended; (d) unsuc-
cessful efforts to control use; (e) great deal of time spent to obtain
or use the substance or to recover from its effects; (f) impor-
tant activities given up because of use; and (g) continued use despite
knowledge that use will cause or exacerbate physical or psy-
chological problems. The first two criteria describe physical de-
pendence and the last five criteria describe psychological de-
pendence, although the two types of dependence are sometimes
difficult to differentiate. Dependence is diagnosed if any three
of these criteria are present.

Cigarettes are addictive since the vast majority of smokers
meet criteria for dependence (10). Specifically, smokers become
tolerant to many effects of smoking, such as nausea and dizziness
[criterion (a)], cessation of use produces well-defined tobacco
withdrawal [criterion (b)], most smokers are unsuccessful when
they try to quit [criterion (d)], and smokers with significant
smoking-related health problems often continue to smoke [crite-
rian (g)]. Furthermore, there is evidence (4) that young smokers
believe they will not be smoking five years later, but few
quit as they expected [criterion (e)]. Finally, in contrast to most
illegal drugs, the easy access to cigarettes and continued relative
acceptance of their use may preclude criteria (e) and (f). How-
ever, Hughes (10) describes examples of smokers going to great
lengths to obtain tobacco when scarce [critereon (e)] and notes
that some smokers will avoid or leave activities in which smok-
ing is restricted so that they can smoke [criterion (f)]. Therefore,
according to formal psychiatric criteria for drug dependence,
cigarettes are clearly addictive.

Critical Role of Nicotine
Having established that cigarettes are addictive, it is useful
to consider what about cigarettes makes them so. The main
psychoactive ingredient of tobacco is nicotine (4,8). Tobacco
use in humans has been studied for most of this century (11),
but only recently has the role of nicotine intake in reinforcement
of smoking behavior been determined. As recently as the late
1970s, it was believed by many that reinforcement of smoking
behavior was determined by oral sensations of puffing, stimuli
associated with tobacco flavoring, or other non-nicotine aspects
of tobacco use, while intake of nicotine from smoking was con-
sidered incidental and unimportant (12). This is still the per-
spective promoted by tobacco companies. However, it is now
clear that, although some of these non-nicotine aspects contribu-
te to smoking reinforcement (13), delivery of nicotine to the
brain is absolutely essential to maintaining smoking behavior
(4,14–16). The most important piece of evidence in evaluating
the abuse liability of nicotine or any drug is the degree to which
it is self-administered (i.e. consumed freely by the subject) (17).
Relevant research on nicotine self-administration with animals
and humans will be briefly reviewed.

Animal models of drug self-administration can contribute
important information in evaluating any drug’s abuse liability
in humans (18,19). Drug self-administration in animals is typi-
cally demonstrated by training animals with indwelling cath-
eters to respond on one lever for drugs and another lever for
saline, and then determining that responding on the drug lever
exceeds responding on the saline lever (18). It was partly the
failure of researchers to develop animal models of nicotine self-
administration in the 1970s, in contrast to successful efforts at
training animals to self-administer many other drugs (e.g. mor-
phine, heroin, cocaine) (18), that called into question the ad-
dictiveness of nicotine (12). By the early 1980s, several groups
had presented evidence that nicotine could be self-administered
by animals but only under relatively specific conditions, such
as in conjunction with food reinforcement following a period
of food deprivation (19) or in conjunction with lengthy and
complex schedules of reinforcement (20–24).

An important advance came in the late 1980s when Cor-
rigall and colleagues (25) demonstrated that rats would readily
self-administer nicotine under simple reinforcement schedules.
A critical feature of this procedure was making nicotine avail-
able in lower doses than those previously used. As will be dis-
cussed, there is a relatively low and narrow range of nicotine
doses that are reinforcing, and doses just above this range tend
to be aversive. Notably, the doses most readily self-administered
by rats, dogs, and monkeys (26) are virtually identical to those
typically obtained by humans when smoking cigarettes (after
correcting for body weight differences), on the order of 0.01 to
0.03 mg/kg (4). Larger doses result in decreased responding to
obtain the drug by animals (25,26) and in toxic effects in hu-
mens, such as nausea and lethargy (4). Thus, it is now clear that
animals not only can learn to self-administer nicotine but do so
in patterns very similar to humans. It was recently revealed that
the tobacco industry discovered in 1983 this critical influence
of dose in inducing rats to self-administer nicotine, but publi-
cation of this important knowledge was withheld (27).

Evidence from several sources that humans will also self-
administer nicotine complements the research on animal self-
administration of nicotine. Specifically, humans have been shown
to select intravenous nicotine injections more frequently than
saline injections (28), demonstrating reinforcement from nico-
tine. (Although self-administration of nicotine by gum is modest
(29), this is in no way inconsistent with the high abuse liability
of nicotine by tobacco smoking for reasons noted below (30).) Fur-
thermore, manipulation of nicotine availability from smoking
generally produces alterations in smoking behavior designed
to maintain a certain amount of nicotine intake (4). For example,
decreasing the nicotine yield per cigarette tends to produce greater
smoking behavior, while increasing nicotine yield decreases