



## Review

## Smoking, quitting, and psychiatric disease: A review

Henri-Jean Aubin<sup>a,b,c,\*</sup>, Hans Rollema<sup>d</sup>, Torgny H. Svensson<sup>e</sup>, Georg Winterer<sup>f</sup><sup>a</sup> Hôpital Emile Roux, Assistance Publique-Hôpitaux de Paris, Limeil-Brévannes, France<sup>b</sup> Centre d'Enseignement, de Recherche et de Traitement des Addictions, Hôpital Paul Brousse, Univ Paris-Sud, Paris, France<sup>c</sup> INSERM, U669, Paris, France<sup>d</sup> Biomedical Consulting, Mystic, CT 06355, USA<sup>e</sup> Department of Physiology and Pharmacology, Karolinska Institutet, S-171 77 Stockholm, Sweden<sup>f</sup> Cologne Center for Genomics, University of Cologne, Weyertal Str. 115b, 50931 Cologne, Germany

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## ABSTRACT

Tobacco smoking among patients with psychiatric disease is more common than in the general population, due to complex neurobiological, psychological, and pharmacotherapeutic mechanisms. Nicotine dependence exposes smokers with co-occurring mental illness to increased risks of smoking-related morbidity, mortality, and to detrimental impacts on their quality of life. The neurobiological and psychosocial links to smoking appear stronger in certain comorbidities, notably depression and schizophrenia. Through its action on the cholinergic system, nicotine may have certain beneficial effects across a range of mental health domains in these patients, including improved concentration and cognition, relief of stress and depressive affect, and feeling pleasurable sensations. Despite the availability of effective smoking cessation pharmacotherapies and psychosocial interventions, as well as increasing evidence that individuals with psychiatric disorders are motivated to quit, nicotine dependence remains an undertreated and under-recognized problem within this patient population. Evidence suggests that provision of flexible and individualized treatment programs may be successful. Furthermore, the complicated relationship observed between nicotine dependence, nicotine withdrawal symptoms, and mental illness necessitates integration of close monitoring in any successful smoking cessation program.

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\* Corresponding author at: Centre d'Enseignement, de Recherche et de Traitement des Addictologie, Hôpital Paul Brousse 12, avenue Paul-Vaillant-Couturier, 94804 Villejuif Cedex, France. Tel.: +33 145 59 39 51; fax: +33 145 95 83 27.

E-mail addresses: [henri-jean.aubin@pbr.aphp.fr](mailto:henri-jean.aubin@pbr.aphp.fr) (H.-J. Aubin), [hans.rollema@gmail.com](mailto:hans.rollema@gmail.com) (H. Rollema), [torgny.svensson@ki.se](mailto:torgny.svensson@ki.se) (T.H. Svensson), [georg.winterer@uni-duesseldorf.de](mailto:georg.winterer@uni-duesseldorf.de) (G. Winterer).

## 1. Introduction

The detrimental health effects of smoking were first reported in 1950 when the behavior was established as a cause of lung cancer (Doll and Hill, 1950). Since then, there have been a large number of studies showing the widespread and serious health consequences of tobacco smoking, and the issue has been addressed in 30 U.S. Surgeon General Reports on smoking published between 1964 and 2010. The 1979 Surgeon General Report defined smoking for the first time as nicotine addiction, and the 1988 Report concluded that “the pharmacologic and behavioral processes that determine tobacco addiction are similar to those that determine addiction to drugs such as heroin and cocaine” (U.S. Department of Health and Human Services, 1988). Tobacco dependence is now acknowledged as a chronic condition that accounts for nearly half a million premature deaths each year in the U.S. alone (Centers for Disease Control and Prevention (CDC), 2005; Fiore et al., 2008). Furthermore, the global health burden of cigarette smoking is huge, with the recent incidence of smoking-related mortality being estimated at over 5 million people annually and predicted to increase to approximately 1 billion smoking-related deaths during the twenty-first century (Jha, 2009).

While all smokers risk tobacco-associated morbidity and mortality, the close and complex relationship between smoking and psychiatric disorders exposes smokers with mental illness to increased smoking-related risks. For instance, the prevalence of cigarette smoking is significantly higher among patients with psychiatric illnesses than among the general population (de Leon et al., 1995; Grant et al., 2004; Lasser et al., 2000; Lising-Enriquez and George, 2009; Pomerleau et al., 1995).

Based on the 2001–2002 sample from the National Epidemiologic Survey on Alcohol and Related Conditions in the US (US-NESARC), it is estimated that between 21% and 31% of individuals with a current nicotine dependence also have a current mood, anxiety, psychiatric, or alcohol use disorder and that nicotine-dependent psychiatric patients, although they made up 7% of the population, consume about 34% of all cigarettes smoked in the U.S. (Grant et al., 2004). The lifetime smoking rate in patients diagnosed with a psychiatric disorder in the previous month was even higher at 59% (Lasser et al., 2000). In certain specific diagnostic groups, very high smoking prevalence rates have been estimated, such as 60.6% for bipolar disorder (Lasser et al., 2000) and 65–90% for schizophrenia (Kalman et al., 2005; McCreadie, 2002; Williams and Ziedonis, 2004).

Psychiatric patients experience combined factors that together increase the impact of smoking in this group compared with non-psychiatric groups. For example, individuals with depression and schizophrenia have been observed to have higher mortality rates from vascular disease and a greater prevalence of cancers (Hennekens et al., 2005; Kisely et al., 2008). Additional negative consequences arise from the close link between smoking prevalence and mental health disorders, such as poorer overall health (Pack, 2009), higher levels of non-compliance with drug regimens (Marder, 2003; Taj and Khan, 2005), and suboptimal cardiovascular care (Hennekens et al., 2005). Many individuals with a serious mental illness are already financially compromised and this is only worsened by their addiction to cigarettes; for instance, smokers with schizophrenia were found to spend almost 30% of their income (mainly received from public assistance) on cigarettes each month (Steinberg et al., 2004). There is also evidence that psychiatric patients with nicotine dependence are more likely to have a lower social status than psychiatric patients who are not nicotine dependent (Montoya et al., 2005) and that in adolescents there is a higher incidence of illicit drug use among those who smoke compared with those who do not smoke (Brown et al., 1996).

Another important issue complicating the assessment of smoking behaviors and initiation of cessation in smokers with psychiatric illnesses relates to periods of hospitalization because during periods of inpatient treatment smoking habits can change, which in turn can alter the presentation of their psychiatric disorder and its pharmacological treatment (Olivier et al., 2007). In addition, staff often use cigarettes to reinforce certain behaviors in the inpatient setting leading to some alterations in social interactions focused around smoking, thus it is important to address staff concerns about smoking cessation in psychiatric units (Olivier et al., 2007). A further issue that has created a barrier to tackling smoking in psychiatric populations is the hypothesis that smoking is a form of ‘self-medication’ for certain psychiatric symptoms, which may discourage clinicians from promoting smoking cessation in their patients and reduce the understanding of nicotine dependence in this population (Ziedonis et al., 2008). Indeed, smoking has for many years been tolerated and, in some ways, encouraged by the mental health treatment community (Schroeder and Morris, 2010).

Unfortunately, it appears that the difference in smoking prevalence among those with and without psychiatric illness is widening. Successful antismoking campaigns and smoking cessation programs have helped reduce the proportion of smokers in the general population of Western Countries from 45% in the 1960s to between 23% and 30% in the 2000s, but many patients with psychiatric illness keep smoking (Adams and Stevens, 2007; Andreas and Loddenkemper, 2007; de Leon et al., 1995; Dervaux and Laqueille, 2008). For example, in the 2007 U.S. National Health Interview Survey smoking prevalence in adults with mental illness ranged from 34% for those with phobias and fears to 59% for those with schizophrenia versus 18% for adults with no mental illness (McClave et al., 2010). The health benefits of stopping smoking are immediate and long-lasting (U.S. Department of Health and Human Services, 1990). Treating smoking and smoking-related problems in psychiatric patients is therefore an important responsibility of mental health clinicians and primary care physicians. Furthermore, mechanisms involving both neurobiological and psychological elements have been identified as contributors to higher smoking prevalence among individuals with mental health disorders (Morisano et al., 2009), but the negative health impact of smoking in psychiatric patients is often under-recognized and undertreated.

## 2. Underlying mechanisms of nicotine dependence

Nicotine (or tobacco) dependence is an addiction to tobacco products characterized by tolerance and withdrawal symptoms that are associated with the pharmacological effects of nicotine; the 1988 Surgeon General Report lists the three primary criteria for drug dependence, including nicotine dependence as: highly controlled or compulsive use, psychoactive effects, and drug-reinforced behavior (U.S. Department of Health and Human Services, 1988). Although tobacco products contain over 4000 chemicals (U.S. Department of Health and Human Services, 2010), some of which could contribute to dependence, nicotine is the major dependence-forming constituent of tobacco products (U.S. Department of Health and Human Services, 1988).

When using tobacco products, nicotine rapidly distributes from the lungs to the brain (Benowitz et al., 1988; Rose et al., 1999) where it interacts with high-affinity nicotinic acetylcholine receptors (nAChRs), resulting in rapid, pulsatile increases in the release of several neurotransmitters, notably dopamine in the mesolimbic system (Nisell et al., 1994; Picciotto et al., 1998; Pontieri et al., 1996; Rose et al., 1999). This neuronal pathway is thought to be important in the development of dependence to nicotine and other drugs of abuse, as the dopamine-induced activation engenders feelings

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