

# Exogenous nicotine replacement in symptomatic schizophrenia

## Opinion

Although there is compelling evidence for the consideration of nicotine as a determinant in symptomatic schizophrenia,<sup>1,2</sup> It remains surprising that this avenue has not been further explored as a therapeutic possibility. This is especially the case when it is known that people suffering from schizophrenia smoke more than their peers with other enduring mental illnesses.<sup>3</sup> An appropriate explanation for why this is the case is that nicotine is determinant in sensory gating at the CA3 area of the hippocampus.<sup>4</sup>

Disrupted sensory gating leads to the pathognomonic symptoms of schizophrenia such as hearing one's thoughts spoken out loud (Gedankenlautwerten), for example.<sup>5</sup> People with schizophrenia who smoke heavily are attempting to rectify their deficient cerebral nicotine level<sup>6</sup> and thus alleviate their deficient sensory gating.<sup>2</sup> The deleterious health effects of heavy smoking are well-known. As well as the familiar ill-effects on the cardiovascular and respiratory systems, there is an important additional consideration for people who take neuroleptic medication. The aromatic hydrocarbons in cigarette smoke induce the hepatic enzyme systems which catabolize neuroleptic drugs. Heavy smokers thus require higher doses of antipsychotic medication. Consequently, there are a number of reasons to explore differing modes of exogenous nicotine replacement for people suffering from schizophrenia.

Other methods of exogenous nicotine delivery systems would include the nicotine replacement therapy (NRT) used in smoking cessation. However, not all of these are suitable for people with schizophrenia who smoke for symptomatic relief. The involved nicotine receptor, the hippocampal  $\alpha 7$  receptor<sup>7</sup> desensitises rapidly.<sup>1</sup> Thus, the most appropriate mode of endogenous nicotine delivery would be something which replicates the short and distinct increase in nicotinic transmission achieved by cigarette smoking-which, as hypothesised here, is a mode of self-medication by the affected person to rectify their deficient cerebral nicotine levels. The slow-release nicotine skin patch would unfortunately not be a suitable option, although very convenient, because its duration of action would desensitise the hippocampal  $\alpha 7$  receptor. In theory, nicotine inhalators or nicotine chewing-gum should provide exogenous nicotine in a manner analogous to cigarettes. The recent arrival of the e-cigarette as an exogenous nicotine delivery system would appear to have solved the problem of how to safely deliver nicotine in a manner analogous to cigarettes, because nicotine inhalators have not been widely successful as a delivery mechanism for exogenous nicotine. However, because e-cigarettes are such a new development, little was known about their potential harm. The issue of eventual smoking cessation does not arise here, because people with schizophrenia are not necessarily able to stop smoking easily for the reasons outlined above. Working on the principle of harm reduction, it then becomes imperative for the clinician to find a safer method of nicotine delivery.

The issue with e-cigarettes is not the fact that they deliver nicotine, but that the method of nicotine delivery might be harmful. While

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tobacco cigarettes carry carbon monoxide, carbon dioxide and tar as constituents, the solvents used in e-cigarettes are also toxic, and some solvents are potentially carcinogenic.<sup>8</sup> However, it is still possible that the cumulative amount of harm from use of an e-cigarette is less than that of a tobacco cigarette. As we are at the commencement of e-cigarettes as a tool for exogenous nicotine delivery, we have the opportunity now to design safer systems. It should be possible for e-cigarettes to become far better alternatives for nicotine delivery for people who find it extremely difficult to stop smoking, such as those who suffer from schizophrenia. We may therefore reach the day when tools such as e-cigarettes become adjuncts to the treatment of chronic schizophrenia. If it is possible to accommodate these in the clinical context, this adjunct could lead to fewer disruptive incidents in an in-patient setting and a more harmonious ward atmosphere.

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## Conflict of interest

The author declares no conflict of interest.

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