1. No.
   2021T009

2. Title
   Smoking Behaviors: Factors and Mechanisms Mediating the Transition to Addiction

3. Period
   2021-2025

4. Summary

We were tasked with bridging the basic and clinical domains within this research group. Although smoking-related research is extensive, few studies have comprehensively examined smoking motivation, and virtually none have included heated tobacco products (HTPs), which now account for nearly 40% of the market.

We therefore selected representative measures of nicotine dependence—the Fagerström Test for Nicotine Dependence (FTND) and the Tobacco Dependence Screener (TDS)—together with the Autonomy over Smoking Scale (AUTOS), which incorporates craving-related elements, and said to be applicable to various tobacco products. In addition, we developed a 33-item smoking motivation scale covering both nicotine-related and non-nicotine-related factors. These were combined with demographic variables to construct a 70-item questionnaire.

Using crowdsourcing, we obtained responses from 812 smokers aged 21 years or older (mean age 40.4 years; 57% male; 33% HTP users). Factor analysis identified six motivational factors: stress coping, relaxation, enjoyment of smoking, activation, automaticity, and social facilitation. While the factor structure did not differ between cigarette smokers and HTP users, “enjoyment of smoking” was significantly higher only among cigarette smokers.

In animal experiments, focusing on social factors, nicotine produced conditioned rewarding effects in a conditioned place preference (CPP) paradigm. This effect was attenuated when a tube test (TT), which assesses social hierarchy (dominance), was conducted prior to CPP. Furthermore, nicotine administration to the lowest-ranked mouse (in a group of four) prolonged the latency to determine contest outcomes in the TT, suggesting enhanced resilience; Nicotine enhances “resilience” in socially subordinate animals, and this effect appears to be mediated by dopamine D2, rather than D1, receptors.

To examine whether similar effects occur in humans, male smoker esports players performed a competitive interpersonal task. Smoking was associated with a tendency toward an increased win rate.