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Polygenic Scores For Substance Use Disorder: Uses For Prevention and Treatment

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Background: Genetic factors associated with substance use disorder have been identified across many substances. Genome-Wide Association Studies on smoking behaviors allow for the creation of polygenic scores (PGS) to measure an individual's genetic liability. Here, we assess the predictive power of PGS for smoking cessation using the UK Biobank dataset.

Methods: We analyzed data from 170,000 UK Biobank participants with a history of smoking. PGS for persistent smoking (failed smoking cessation) was constructed using GWAS and Sequencing Consortium of Alcohol and Nicotine Use (GSCAN2) summary statistics. Survival analysis was used to assess the probability of quitting smoking and the median age of quitting across PGS groups, using the median age as a clinically interpretable proxy for smoking cessation prognosis.

Results: The PGS for persistent smoking showed a significant association with quit outcomes, with higher scores linked to reduced cessation success and later age of quitting. Individuals in higher PGS groups demonstrated significantly lower cessation success rates and quit smoking at an older age.

Conclusion: Individuals with higher PGS are less likely to quit smoking successfully and quit at a later age. This high PGS group is a greatest risk for developing adverse health outcomes for smoking. One goal of precision medicine is to guide and support individuals in taking preventative measures and treatment decisions. These findings underscore the clinical utility of incorporating genetic information into smoking prevention and cessation strategies, promoting more personalized and effective interventions.