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Design and preliminary test of a personalized genetic risk tool to promote smoking cessation

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Genetic variation in nicotinic receptor subunits explains differences in smoking behaviors and risk of smoking-related diseases. Returning genetic susceptibility results may motivate smoking cessation, personalize treatment, and reduce disease risk. However, research is needed to optimize the design and communication of genetics-informed interventions. This study engaged stakeholders in participatory co-design of a personalized genetics-informed risk tool for smoking and tested its feasibility and potential to change smoking behaviors.

We developed an algorithm that integrates genetic (*CHRNA5* variants) and phenotypic (cigarettes per day) factors to estimate one's risk of lung cancer, COPD, and difficulty quitting smoking. To communicate this risk, we designed a personalized intervention, the "genetics and smoking risk profile". In two prototype studies, we conducted brief participatory design interviews (n=110) followed by quantitative surveys (n=100) with potential end-users to confirm acceptability of iterative design changes. In current smokers from the community (n=108), we conducted genetic testing, returned the personalized genetics-informed risk profiles, and assessed feasibility and efficacy of the risk profile to change smoking behavior.

Current smokers agreed it was important to learn their smoking-related genetic risk (91%) and planned to share their risk results with others (80%). Although data collection is ongoing following return of results, current smokers demonstrated comprehension of the risk profile (>90%) and expected that the risk profile will help them quit or reduce smoking (>80%) and use an FDA-approved medication to quit smoking (>70%).

Iterative co-design with current smokers yielded a highly acceptable personalized genetics-informed risk profile that demonstrated promise for supporting smoking cessation.