MedicalXpress

Study uncovers genetics of motion sickness

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23andMe, Inc. today announced the publication of the first ever genome-wide association study of motion sickness.

Published in Oxford Journals' *Human Molecular Genetics*, this study is the first to identify genetic variants associated with motion sickness, a condition that affects roughly one in three people. Motion sickness has been shown to have high heritability, meaning genetics accounts for a large part of why some are more prone to motion sickness than others. Estimates indicate that up to 70 percent of variation in risk for motion sickness is due to genetics.

"Until now there's been a poor understanding of the genetics of motion sickness, despite it being a fairly common condition," said 23andMe Scientist Bethann Hromatka, lead author of the study. "With the help of 23andMe customers we've been able to uncover some of the underlying genetics of this condition. These findings could help provide clues about the causes of motion sickness and other related conditions, and how to treat them, which is very exciting."

The study, which involved the consented participation of more than 80,000 23andMe customers, found 35 genetic factors associated with motion sickness at a genome-wide significant level. Many of these factors, referred to as single-nucleotide polymorphisms (SNPs), are in or near genes involved in balance, and eye, ear, and cranial development (e.g., PVRL3, TSHZ1, MUTED, HOXB3, HOXD3). Other SNPs may affect motion sickness through nearby genes with roles in the nervous system, glucose homeostasis, or hypoxia. The study shows that several of

these SNPs display sex-specific effects, with up to three times stronger effects in women.

The work also confirmed previously known links with other conditions, finding that people with motion sickness are more likely to have experienced migraines, vertigo, and morning sickness as well as postoperative nausea and vomiting (PONV). The study also found new phenotypic associations between motion sickness and altitude sickness as well as many gastrointestinal conditions. Two of these related conditions (PONV and migraines) were found to share underlying genetic factors with motion sickness.

The results point to the importance of the nervous system in motion sickness and suggest a role for glucose levels in motion-induced nausea and vomiting—a finding that may provide insight into other nausea-related conditions like PONV. Because the study also identified associations between motion sickness and lifestyle—for instance, there is an association between being a poor sleeper and having a propensity for motion sickness—the findings could also help researchers identify risk factors for the condition and future treatments.

More information: Genetic variants associated with motion sickness point to roles for inner ear development, neurological processes, and glucose homeostasis. Bethann S. Hromatka; Joyce Y. Tung; Amy K. Kiefer; Chuong B. Do; David A. Hinds; Nicholas Eriksson *Human Molecular Genetics* 2015; DOI: 10.1093/hmg/ddv028

Reavley,C.M., Golding,J.F., Cherkas,L.F., Spector,T.D. and MacGregor,A.J. (2006) Genetic Influences on Motion Sickness Susceptibility in Adult Women: A Classical Twin Study. *Aviat. Space Environ. Med.*, 77, 1148-1152.

Provided by 23andMe