

Dental filling failure linked to smoking, drinking and genetics

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New research shows that people who drink alcohol or men who smoke are more likely to suffer a failed dental filling. Strikingly, the research team also found that a genetic difference in some patients is associated with increased filling failure rates. The study, published today in open-access journal *Frontiers in Medicine*, also shows no major difference in filling failure rates between traditional amalgam and newer composite resin fillings. The results suggest that genetic analysis might help dentists to personalize treatments for their patients, which could lead to improved outcomes.

Fillings can fail for a variety of reasons, including reemergence of the initial tooth decay or the filling becoming detached. Until now, the jury has been out on whether newer composite resin fillings are as durable as traditional amalgam fillings, which have been in use for more than 150 years but which contain mercury, a toxic metal.

To investigate this, researchers from America and Brazil accessed a large repository of dental

records from a dental school in Pittsburgh, which contained information on patient fillings and rates of failure up to five years after the filling procedure.

The researchers found that overall, there were no major differences between [patients](#) receiving amalgam or composite fillings in terms of filling failure rates. This suggests that composite fillings are at least as durable as amalgam fillings, and offer a viable alternative with no toxic ingredients.

The repository also contained information about patient lifestyles, including smoking and drinking habits, and a DNA sample from each patient—allowing the team to investigate whether patient lifestyle and genetic factors could affect the failure rate of composite fillings.

The team found that within two years of the procedure, fillings failed more often in patients who drank alcohol, and the overall filling failure rate was higher in men who smoked. Furthermore, a difference in the gene for matrix metalloproteinase (MMP2), an enzyme found in teeth, was linked to increased filling failure.

The researchers hypothesize that MMP2 might be able to degrade the bond between the filling and the tooth surface, potentially leading to failure. While this link and preliminary hypothesis are intriguing, the researchers have not yet confirmed whether differences in the MMP2 gene are responsible for failed fillings, and will need to investigate this further. However, the results suggest that personal factors for each patient appear to influence their chance of filling failure, rather than the filling material their dentist used.

"A better understanding of individual susceptibility to dental disease and variation in treatment outcomes will allow the dental field to move forward," says Alexandre Vieira, a researcher involved in the study. "In the future, genetic information may be used to personalize dental

treatments and enhance treatment outcomes."

More information: *Frontiers in Medicine*, [DOI: 10.3389/fmed.2017.00186](https://doi.org/10.3389/fmed.2017.00186)

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