# Cigarette smoke boosts virulence in Staphylococcus aureus

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Exposure to cigarette smoke has long been associated with increased frequency of respiratory infections—which are harder to treat in smoke-exposed people than in those who lack such exposures. Now Ritwij Kulkarni of Columbia University, New York, NY, and colleagues show that cigarette smoke actually boosts virulence of *Staphylococcus aureus* bacteria. Their study appears in the November 2012 issue of the journal Infection and Immunity.

S. aureus is a normally harmless inhabitant of the upper respiratory tract, but one which can morph into a dangerous pathogen capable of causing severe, and even fatal infections, says Kulkarni. The new research shows that cigarette smoke can aid and abet that transformation.

Cigarette smoke does so by enhancing S. aureus' ability to form biofilms, which are an important virulence factor, according to the study. The research showed further that reactive oxygen species, such as H2O2, which are concentrated in cigarette smoke, drive biofilm formation, says Kulkarni.

Kulkarni notes that a recent paper, from another group, showed that reactive oxygen species suppress the gene regulator, "Accessory Gene Regulator," or agr for short. "That fits nicely with our story," he says. "We think control of biofilm formation [and of numerous other virulence factors in S. aureus] proceeds via agr."

**More information:** R. Kulkarni, S. Antala, A. Wang, F.E. Amaral, R.

Rampersaud, S.J. LaRussa, P.J. Planet, and A.J. Ratner, 2012. Cigarette smoke increases Staphylococcus aureus biofilm formation via oxidative stress. *Infect. Immun.* 80:3804-3811.