

# Double-blind study suggests humans have olfactory defense against contagious disease

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(Medical Xpress)—A European team of researchers working at Sweden's Karolinska Institutet has found evidence that suggests that humans have an olfactory defense against contagious diseases. In their

paper published in *Proceedings of the National Academy of Sciences*, the group describes experiments they conducted with volunteers undergoing fMRI scans while viewing photos and sniffing body odor samples from people experiencing induced immune response.

Humans have developed a wide assortment of survival skills over a long evolutionary period, which by most accounts has been quite successful for species survival. One of those survival skills may have gone unnoticed until now, however—the ability to smell sickness in other people so as to avoid them and thus prevent infection. In this new effort, the researchers tested this theory by enlisting the assistance of volunteers to serve in one of two main roles—a person made to appear sick, or as someone attempting to judge the health of another person by either looking at them or by sniffing a sample of their body odor.

The experiments consisted of asking a group of 22 volunteers to allow the researchers to inject them with a type of harmless bacteria that would activate their immune systems. The researchers then obtained body odor samples from each, and photographed their faces. Another group was injected with a placebo. A second group of volunteers was then asked to undergo fMRI analysis as they looked at the photographs and sniffed the body odor samples.

In the experiment, the brains of the volunteers activated when sniffing body odors from subjects with activated immune systems, in what the researchers described as a multisensory reaction. Furthermore, they also found that the volunteers rated the people in the photographs with activated immune systems as less attractive. They did so even when sniffing body odor samples of "sick" people, but were shown photographs of "healthy" people. The [researchers](#) therefore suggest that humans have a disease avoidance model that includes olfactory mechanisms.

**More information:** Christina Regenbogen et al. Behavioral and neural correlates to multisensory detection of sick humans, *Proceedings of the National Academy of Sciences* (2017). [DOI: 10.1073/pnas.1617357114](https://doi.org/10.1073/pnas.1617357114)

## Abstract

Throughout human evolution, infectious diseases have been a primary cause of death. Detection of subtle cues indicating sickness and avoidance of sick conspecifics would therefore be an adaptive way of coping with an environment fraught with pathogens. This study determines how humans perceive and integrate early cues of sickness in conspecifics sampled just hours after the induction of immune system activation, and the underlying neural mechanisms for this detection. In a double-blind placebo-controlled crossover design, the immune system in 22 sample donors was transiently activated with an endotoxin injection [lipopolysaccharide (LPS)]. Facial photographs and body odor samples were taken from the same donors when "sick" (LPS-injected) and when "healthy" (saline-injected) and subsequently were presented to a separate group of participants (n = 30) who rated their liking of the presented person during fMRI scanning. Faces were less socially desirable when sick, and sick body odors tended to lower liking of the faces. Sickness status presented by odor and facial photograph resulted in increased neural activation of odor- and face-perception networks, respectively. A superadditive effect of olfactory–visual integration of sickness cues was found in the intraparietal sulcus, which was functionally connected to core areas of multisensory integration in the superior temporal sulcus and orbitofrontal cortex. Taken together, the results outline a disease-avoidance model in which neural mechanisms involved in the detection of disease cues and multisensory integration are vital parts.

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