

# Boston subway system covered in microbes, but they're not harmful

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Boston's subway system, known as the T, might be just as bacteria-laden as you'd expect but organisms found there are largely from normal human skin and incapable of causing disease, according to a study published June 28 in *mSystems*, an open access journal of the American Society for Microbiology.

The work, which looked at microbial samples taken from various train car and ticketing machine surfaces, found that the levels of microbes affecting antibiotic resistance were "much lower than what you'd find in a normal human gut," said senior study author Curtis Huttenhower, PhD, an associate professor of computational biology and bioinformatics at the Harvard T.H. Chan School of Public Health. "They're exactly what you'd run into shaking somebody's hand."

"We were surprised by how normal a lot of the samples looked," Huttenhower added. "Even when we looked closely, there was nothing unusual or dangerous about the microbes we found. It shows that, in the absence of something like flu season, all of the germs you run into, even in a crowded environment like the T, are normal."

To characterize the microbial profile of the Boston [subway](#) system, Huttenhower's team collected nearly 100 microbial samples from train cars and stations on three dates in 2013. Train car samples were collected from the red, orange and green lines of the subway and comprised six surface types: hanging grips; horizontal and vertical poles; seats; seat backs; and walls. Station samples were collected from the

touchscreens and sides of ticketing machines. They used laboratory techniques called 16S amplicon and shotgun metagenomic sequencing of the samples to profile the microbial communities found on these surfaces.

Overall, through 16S sequencing, researchers found surface type was the major driver in variation of microbes, with the highest amount of microbes found on hanging grips, followed by seats or touch screens. All surfaces were dominated by normal human skin microbes, with the bacterial families Firmicutes, Proteobacteria, and Actinobacteria each responsible for over 20% of the microbial community. The team found low levels of gut and oral microbes such as Lachnospiraceae, or those from the Veillonella and Prevotella families.

"I didn't expect the grips to have that much DNA on them, because they're relatively small and seem to be used less often," said lead study author Tiffany Hsu, a graduate student at the school. "But porous surfaces can collect microbes more efficiently than something solid like a metal pole."

Outdoor exposures played a role in microbes seen on ticketing machines, with those located by outdoor stations being rich in Alphaproteobacteria while those located indoors having more Acinetobacter and those located underground having increased Corynebacterium and microbes from the Tissierellaceae family.

The team performed shotgun metagenomic sequencing, a more in-depth look at the microbes, on 24 mass transit samples, including 15 from the train cars and nine from stations. This testing found the most abundant species of bacteria seen across all samples to be the skin bacteria *Propionibacterium acnes*.

Little variation was seen between the train lines or stations serving

different demographics. In addition, researchers found minimal microbes capable of causing disease or associated with antibiotic resistance.

"This indicates that the real pathogenic potential detected in the Boston subway is very low," Huttenhower said.

More work is needed to understand whether the microbes found are just lying dormant or actively growing, and under what circumstances they can be transferred from one individual to another, the authors said. A follow-up study will look at whether the [microbes](#) identified on the subway system are from living or dead organisms.

Provided by American Society for Microbiology

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