

Scientists elucidate which bacteria block artificial bile ducts

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A consequence of the different cancers of the hepatobiliary system is blocked bile ducts. However, artificial catheters known as "stents" can remediate this problem. Stents are medical implants which reopen narrowed bile ducts to allow the outflow of bile. However, bacteria colonize these catheters forming dense communities, so-called biofilms. Inside these biofilms, bacteria are not only protected from the immune response initiated by the host but also from antibiotics.

Since the bacterial community is unable to be controlled via [antibiotics](#), the catheters become blocked by the biofilms, which then have to be exchanged on a regular basis, an invasive process.

Scientists of the Helmholtz-Centre for Infection Research (HZI) in Braunschweig have analyzed biliary stents from patients being treated at the medical clinics in Salzgitter and Braunschweig. They would like to know which bacteria inhabit these stents so that such knowledge can facilitate the development of medications tailored to combat against development of these biofilms. The HZI-Scientists identified specific bacterial species as main colonizers of these stents. In addition they statistically evaluated the composition of the bacterial communities of the catheters. Their results have now been published by the scientific journal *International Society for Microbial Ecology Journal*.

The Scientists of the HZI Department "Microbial Pathogenesis" used material from biliary stents of patients where old catheters had been replaced by new ones. For this reason, they collaborated with the Surgery

Clinic of the Braunschweig General Hospital and the Department of Internal Medicine of the Klinikum Salzgitter. The Klinikum Salzgitter is the most specialized and experienced clinic for biliary stent replacement in the region, where each week patients receive new biliary stents.

"This had the advantage that we could compare a huge set of samples" Dietmar Pieper, Group leader in the Department of Microbial Pathogenesis said. "This huge set of samples could only be analyzed as we did not try to culture the bacteria on plates, but used sophisticated culture-independent methods" Pieper said. The main goals of the scientists were to determine the composition of the bacterial communities in different biliary stents, their interactions with each other and which bacteria most often occur.

"Certainly, there are significant differences between the patients and consequently between the communities" Pieper said. In general, however, the Scientists could identify recurrent dominant colonizers, such as the bacterium *Streptococcus anginosus*. Interactions and dependencies among the bacteria were gathered by statistical means. "We could show that the colonization of the stents followed principles resembling those known for biofilm development of dental plaques" Pieper said.

In the future, the scientists will analyze the influence of different environmental factors such as a healthy lifestyle on the composition of such communities. "With these results an important cornerstone was laid towards the development of new methods and medications", Pieper said.

More information: Characterization of the complex [bacterial communities](#) colonizing biliary stents reveals a host-dependent diversity. Britta K Scheithauer, Melissa L Wos-Oxley, Björn Ferslev, Helmut Jablonowski and Dietmar H Pieper. *ISME J* advance online publication, April 9, 2009; doi:10.1038/ismej.2009.36

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