Staphylococcus capitis subsp. _capitis_ ISS isolate as a model organism for evaluating antimicrobial surfaces within the upcoming space flight experiment BIOFILMS

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Long-term human missions to space require methods for sustaining the health and safety of the crew. Therefore, microbiological monitoring and reduction of contamination is necessary. Microbial biofilms are of special interest because they can cause damage to spaceflight equipment and are difficult to eliminate due to their increased resistance to antibiotics and disinfectants. The introduction of antimicrobial surfaces for medical, pharmaceutical, and industrial purposes has shown a unique potential for reducing and preventing biofilm formation. The European Space Agency (ESA) launched the BIOFILMS-project, which is evaluating the effect of microgravity on biofilm formation on non-inhibitory surfaces, such as steel, and on antimicrobial metal surfaces. These surfaces are composed out of different metals with and without nanostructures. For the project, human-relevant bacterial strains were selected. One of the selected strains is *Staphylococcus capitis* subsp. *capitis* K1-2-2-23, which was isolated from the International Space Station (ISS) on V2A steel and is forming strong biofilms. A comparison of this strain to the DSMZ type strain revealed several differences that include colony pigmentation, increased growth, and tolerance to desiccation. Furthermore, tests with *S. capitis* subsp. *capitis* strain K1-2-2-23 within the BIOFILMS hardware revealed that the hardware is biocompatible and allowed biofilm formation on steel surfaces. Additionally, the use of pure copper and brass surfaces inside the hardware led to a significant reduction in growth and biofilm formation, whereby nanostructured copper surfaces were observed to be more effective. The obtained results lay the foundation for the BIOFILMS spaceflight project that will be conducted aboard the International Space Station and may provide suitable antimicrobial surfaces for spaceflight purposes.