CONSUMER AND ENVIRONMENTAL MICROBIOME EFFECTS OF DOMESTIC PROBIOTIC CLEANING PRODUCTS

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Abstract

The use of viable bacterial spores in Microbial-Based Cleaning Products (MBCPs) is becoming more common in the UK and elsewhere. For instance, SCD probiotic® all-purpose cleaning concentrate and Greenspeed probiotic multi-surface cleaner are licenced and available to buy in the UK. However, whilst there is research on MBCP use in hospitals, their use in the domestic environment is not well documented. It is not clear how *Bacillus* spores in these products affect the resident microbial community on kitchen surfaces or whether *Bacillus* from kitchen surfaces can transfer and colonise the hands of kitchen users. The research addresses the impact of MBCPs on the microbial communities of kitchen hard surfaces, and their potential effects on the human skin microbiome. The outcome will inform future microbiome safety risk assessments for home care products.

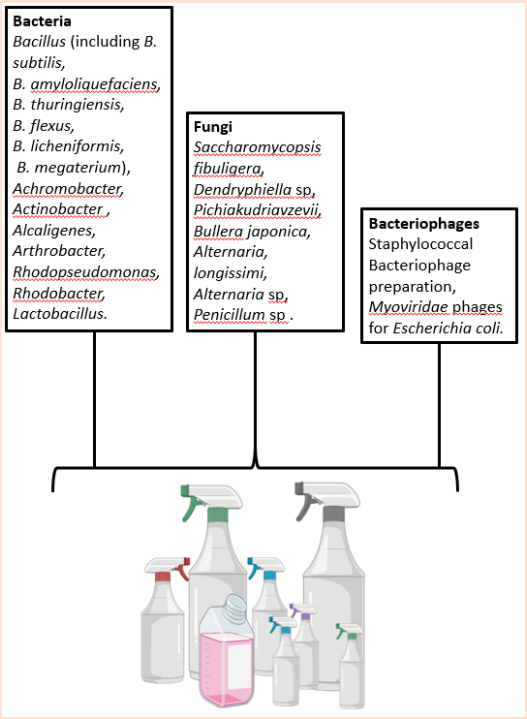


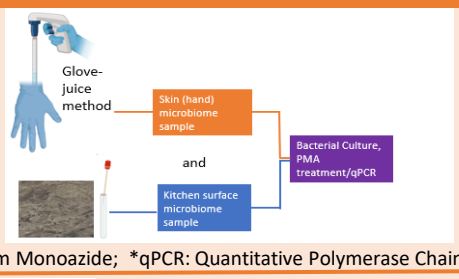
Figure 1: Microbial composition of probiotic cleaning products – Bacteriophages, bacteria, and fungal species reportedly identified in MBCPs [a,b,c].

Research objectives

We will test to what extent MBCP application in domestic settings could:

- Lead to persistent *Bacillus* colonisation on tested kitchen surface.
- Alter the microbiota of the application surfaces.
- Transfer to users via direct contact (kitchen surfaces) or the airborne route.
- Modify the human (skin) microbiome through direct contact or via colonised surfaces.

Methods



*PMA: Propidium Monoazide; *qPCR: Quantitative Polymerase Chain Reaction

Probiotics on a surface ecosystem – hypothesised process of invasion

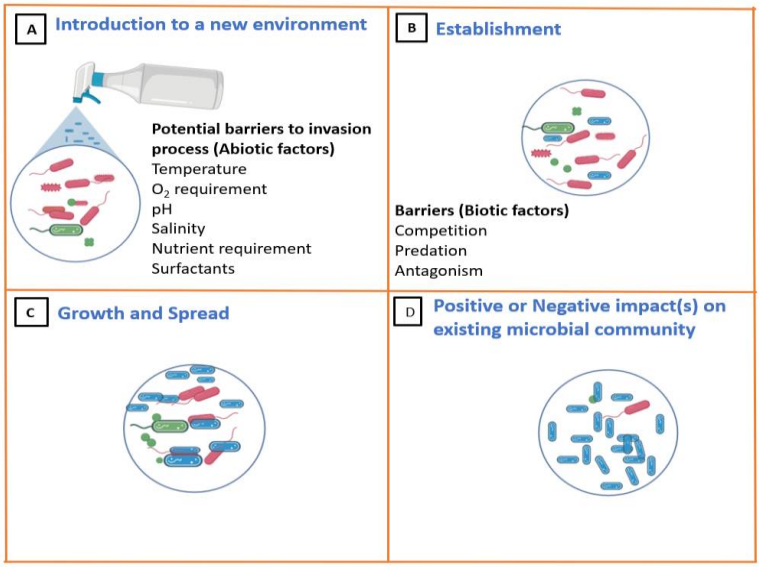


Figure 2: The four stages of microbial invasion process – shows the invader (i.e., probiotic microorganism - blue) with mixed resident microorganisms (red & green coloured microbes)

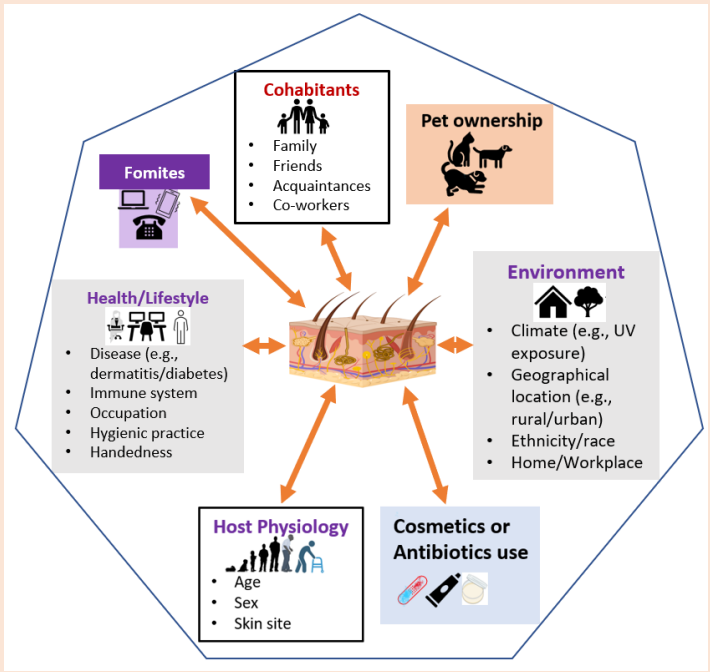


Figure 3: Endogenous and exogenous factors that can influence the skin microbiome

Conclusion

- Various species of microorganisms used as probiotics have been identified in probiotic cleaning products.
- If probiotic species are able to invade, they may impact the environment by altering the function of existing microbial communities.
- Further study will explore the effect that probiotics within MBCPs will have on microbial communities occupying kitchen surfaces and the human skin microbiome.
- This will provide tangible evidence of the impact of MBCPs on consumer safety.

References

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c. Abuladze, T., Li, M., Menetrez, M. Y., Dean, T., Senecal, A., & Sulakvelidze, A. (2008). Bacteriophages reduce experimental contamination of hard surfaces, tomato, spinach, broccoli, and ground beef by Escherichia coli O157:H7. *Applied and Environmental Microbiology*, *74*(20), 6230–6238. doi: 10.1128/AEM.01465-08

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