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PREFACE: RDI ACTIVITIES IN CLEANROOM TECHNOLOGY AND CONTAMINATION CONTROL AT THE 51ST R³NORDIC SYMPOSIUM 2022

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The sessions in this cleanroom and contamination control symposium deal with cleanroom technology in the pharmaceutical environment, hospital wards and health care as well as food processing and hospitality management. Each of these themes are approached based on RDI activities and new sustainable solutions in the areas covered. The aim is to generate RDI activities, which can generate innovations promoting both well-being for stakeholders and cooperation between the university and industrial actors. These articles provide insights in RDI activities carried out mainly in the Nordic countries with enlarged influence from European colleagues and in a global cooperation environment.

Hospitality Management in contamination control is mainly considered as surface hygiene and cleaning. The importance of cleaning has been more obvious during COVID-19 pandemic disease. All countries have updated cleaning instructions and they are mainly based on WHO instructions. In Finland, the Finnish Institute of Occupational Health (FIOH) has published guidelines regarding cleaning for preventing COVID-19 infections and they can be applied in general cleaning to prevent the spread of communicable diseases and protect cleaning staff from infections. The guidelines of the FIOH are drawn up together with the Ministry of Social Affairs and Health (Sosiaali- ja terveystieteiden ministeriö = STM) and the Finnish Institute for Health and Welfare (Terveyden ja hyvinvoinnin laitos = THL). We also follow the publications of the European Centre for Disease Prevention and Control (ECDC) and the

World Health Organization (WHO). In Europe Germany and England has developed National guidelines. For Germany it is a new guideline published as a standard (DIN 13063), for England it is an update of the previous guideline. Both recommendations were published in 2021 and describe i.a. the requirements for hospital cleaning, how compliance with the requirements can be demonstrated and the distribution of responsibilities between cleaning and nursing staff. Finnish standard SFS 5967 determines cleanroom cleaning as a cleaning carried out in a room with a standardized level of cleanliness and cleaning as cleaning, protection, and care of surfaces, as well as various arrangement work in which cleanliness is produced professionally indoors. Cleaning is dealt with this Symposium on Wednesday afternoon programme.

In food manufacturing the process hygiene is important. This task is dealt with through risk management in which both external and internal risks are included. This issue is regulated through the European food safety laws, e.g., EC regulations no. 178/2002 on food safety matters, no. 852/2004 on the hygiene of foodstuffs and 2021/382 on food allergen management, as well national food laws e.g., the Finnish food act 297/2021 and food safety decree 318/2021. The risk analysis is based on risk assessment, risk management, and risk communication. In the programme, the focus is on hygienic design, on surfaces used in food and biotech including pharma environments. The growth of microbes as biofilms can be counteracted through proper cleaning procedures, hygienic design of equipment and motivated workers, who know what to do and who work according to good production rules. In the 1-day food & biotech session, the focus is on sustainability in designing, and building processes, on hygienic quality of food contact surfaces in RDI and in practice, on surface hygiene in small hospitality entities as well as waste-minimizing cleaning techniques in cleanrooms. Proper hand and clothing hygiene is of utmost importance in the food processing and services, e.g., cleaning and maintenance, in the food industry.

The importance of hygiene is obvious in hospital areas. The biggest Cleaning Fair, which is held in Amsterdam every second year, has a side programme The Healthcare Cleaning Forum. This spring the forum focused on the importance of cleaning in the fight against healthcare-associated infections. According to current estimates, 50–70% of

healthcare-associated infections originate from contaminated hands. There is no exact information about what causes the remaining 30-50%, but the proportion of surfaces is estimated at 20 –40%. The conclusion of the forum was expected: more high-quality research is needed. But in the meantime, a lot can be done, such as careful cleaning of surfaces, measuring the quality of result obtained and, if necessary, changing working methods. Thus, one part is the high-quality research presented at this Symposium.

Assadian et al. (2021) compiled a review focusing on routine environmental cleaning and disinfection including areas with a moderate risk of contamination, such as general wards. The review provides expert guidance for healthcare workers in their daily practice. There are some studies about different wipes and wiping techniques one example of that is Boyce (2021). S. J. Dancer has published several articles concerning hospital hygiene and one example is Dancer and Kramer (2018). This topic is dealt with in the 2-day hospital session with eleven presentations, some presentations is in news as well as the keynote presentations of Associate Professor Veli Jukka Anttila from HUS and Industry Professor Piia Sormunen from University of Tampere. And at last, but not at least the 2-day pharma session, which is dealing with many aspects good manufacturing practice (GMP) given in the draft documents on manufacture of sterile medicinal products (Annex 1 Draft 2020). In this session there are also presentations focusing on facility design and contamination control strategies.

The expert editors, Gun Wirtanen and Leila Kakko, are senior actors in hygienic design, cleanroom technology and contamination control in both food safety and hospitality management. The authors of the articles are cleanroom technology experts, who are working with RDI activities in both universities and industry. Leila Kakko has been part of research and development projects mainly in Finland in a focus area of indoor environment and surface hygiene. The latest project was “The development of surface hygiene in a changing epidemic situation” In hospital hygiene one project to combine indoor environment and hygiene was “the hospital wards surface cleanliness while cleaning of the ventilation systems”. Gun Wirtanen has in her RDI studies focused on surface hygiene, i.e., biofilm formation and its elimination

in food processing. This includes aspects of cleaning, disinfection, and hygienic design. Gun Wirtanen has also been involved in hospital hygiene studies. We, all editors would like to extend our warm thanks to all the authors for their valuable contribution to this publication. The R³Nordic symposium is an annually occurring Nordic event, which has been on hold for two years due to the COVID-19 pandemic. With this event's Proceedings based on presentations given at Naantali Spa on 30th–31st of August 2022 we seek to inspire and challenge the Nordic cleanroom society to continue to work with sustainable RDI solutions. We hope you will enjoy the reading of the articles in this publication.

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