

## PERSIMUNE SCIENTIFIC ANNUAL REPORT 2021

### Annual highlights:

One research area which highlights the multidisciplinary nature of PERSIMUNE is that of microbial sequencing. Microbial sequencing is the study of the genetics of different microbes (e.g. viruses, bacteria and fungi). When carefully combined with high quality clinical data, the study of the microbial genetics can reveal crucial mechanisms of infectious disease pathogenesis. Through microbial sequencing we have the possibility of advancing knowledge across a variety of immune dysfunctional patient groups. The portfolio of microbial sequencing projects within PERSIMUNE is wide ranging and includes:

- Bacterial evolution and resistance profiles in patients with cystic fibrosis
- Antiviral resistance in both CMV and HIV infected persons
- Phylogenetic analysis of HIV and SARS-CoV-2 genetics to map transmission networks across borders
- Analyses of the gut microbiome to reveal changes in bacterial species in the gut and how these associate with clinical outcomes

Additional studies are also underway in this area and will explore the evolution of antibacterial resistance and EBV infection in transplanted recipients. Together, this is an exciting area of research that brings together, biobanking, molecular omics analyses, novel bioinformatics and biostatistical methodologies as well as good quality clinical data and phenotyping.

Over the years PERSIMUNE has invested in all aspects of this research area and the aforementioned research outputs highlights the benefit of this approach. The global response to the COVID-19 pandemic required enormous collaborative effort. Researchers who were actively engaged in other areas were required to pivot and focus on this new threat.

The effectiveness of the response to COVID-19 was in no small part due to the ability of these researchers to rapidly apply knowledge and expertise from their work on other diseases to answering key questions regarding COVID-19. A number of clinical trials of global significance to identify new therapeutics for the treatment of COVID-19 were initiated and will continue to inform treatment strategies and clinical outcomes in COVID-19 patients.

Additionally, these trials have generated huge amounts of data that are being used for secondary precision medicine research to better understand disease pathogenesis and improve treatment for COVID-19 patients. PERSIMUNE researchers support the analyses of these secondary data, and the results of these studies will be of benefit to Danish patients and those infected with COVID-19 around the world.

Further, the data infrastructure developed as part of the PERSIMUNE grant has been utilized as part of a national project investigating key questions regarding the safety and efficacy of SARS-CoV-2 vaccines (ENFORCE). This project is supported by the Danish Ministry of Health and highlights the importance and utility of the infrastructure developed by PERSIMUNE. These COVID-19 activities are outlined in more detail in the main report.

More details on the individual projects highlighted here, as well as other selected PERSIMUNE research activities, including updates on the tracer project, are further detailed in the main report.

During 2021, 33 articles were published. During the first 7 years of its life cycle, the centre has produced a total of 238 publications, of which 56 are in A (13 in A+) journals (see annex 1).