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PERSIMUNE Newsletter

December 2021

Dear all,

Another year has passed and on behalf of PERSIMUNE leadership, Riia and myself are happy to share with you another PERSIMUNE newsletter. Despite the continued challenges with COVID-19, the PERSIMUNE network has continued on its mission to better understand mechanisms of disease and to improve clinical outcomes for patients with varying degrees of immune dysfunction. In 2021, 13 proposals have been submitted to use PERSIMUNE resources, a total of 20 manuscripts that reference the PERSIMUNE Danish National Research Foundation grant (DNRF126) have been published (see **[Key Research Highlights](#)**) and **[six people](#)** have completed research theses in collaboration with PERSIMUNE. An amazing effort considering all the challenges the year has thrown at us.

Furthermore, the network continues to work hard to promote various aspects of precision medicine. There were a number of **[research events hosted at PERSIMUNE](#)** itself, and on 2-6 May many PERSIMUNE affiliated researchers, contributed to the successful conference "Precision medicine – from patient to lab and back again". In November, some of the bioinformatics team even managed to attend a conference in person! A rare treat in this COVID affected world. A **[summary of the bioinformatics conference](#)** attended can also be found in this newsletter.

As we approach the holidays, we would like to thank you all for your continued commitment to engaging with PERSIMUNE and **wish you all and your families a very merry Christmas and a super godt nytår**. We look forward to seeing you all next year - good luck with your research and clinical activities in the meantime.

To stay up to date with ongoing and upcoming PERSIMUNE research activities, do not forget to follow PERSIMUNE on Twitter.

*Sincerely,
Daniel Murray
Deputy Centre Leader – PERSIMUNE*

*Riia Karoliina Sustarsic
Project Coordinator – PERSIMUNE*

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Key Research Highlights

There have been a number of excellent research outputs in 2021. A full list of manuscripts published can be found on the **PERSIMUNE website**, but we wanted to take this opportunity to highlight some specific projects and the excellent work they are doing in certain patient populations.



Blood type & sepsis mortality

The PERSIMUNE affiliated Sepsis scientific interest group, under the leadership of Jens-Ulrik Jensen and Theis Itenov have, in recent

years, worked extensively on a number of high impact clinical trials aimed at improving clinical outcomes for this patient group. In addition to informing clinical care of sepsis patients, these trials have generated large amounts of data that can be used for secondary analyses. One such study utilising data from these trials explored the association between blood types and sepsis mortality (***Ann Intensive Care***). This study observed a small, but significantly decreased risk of mortality in individuals with blood type B. Associations with other biomarkers, including Soluble thrombomodulin and syndecan-1 concentrations, suggest this decreased risk may be due to lower endothelial damage in patients with this blood type. While this exposure is unmodifiable, this study has helped unveil a critical risk factor for sepsis clinical outcomes which may assist risk stratification in the future.



MATCH

The MATCH clinical program continues to highlight the benefit of having access to good quality clinical data when conducting precision medicine research. A number of projects have utilised these data, and in particular the nationwide follow-up of the MATCH cohort, to better understand infectious outcomes in these populations. These data have been used to conduct a wide variety of research projects in 2021, including a study assessing the incidence and impact of parvovirus B19 infection in solid organ transplant recipients (***J Infect Dis***), one exploring Cytomegalovirus UL97 resistance (***Open Forum Infect Dis***) and another looking at the nationwide occurrence of bacterial and fungal bloodstream infections in solid organ transplant recipients (***Clin Microbiol Infect***).

Furthermore, in line with one of the key MATCH principles, to always leave the data in a better state than you've got it, one research project led by Neval Wareham has sought to systematically classify causes of death for individuals who died after their transplant (***Medicine***). These causes of death are clinically validated and are now available for inclusion in other research projects

(with appropriate approvals) that may benefit from these data.



PERSIMUNE biobank and biomarker research at the department of haematology

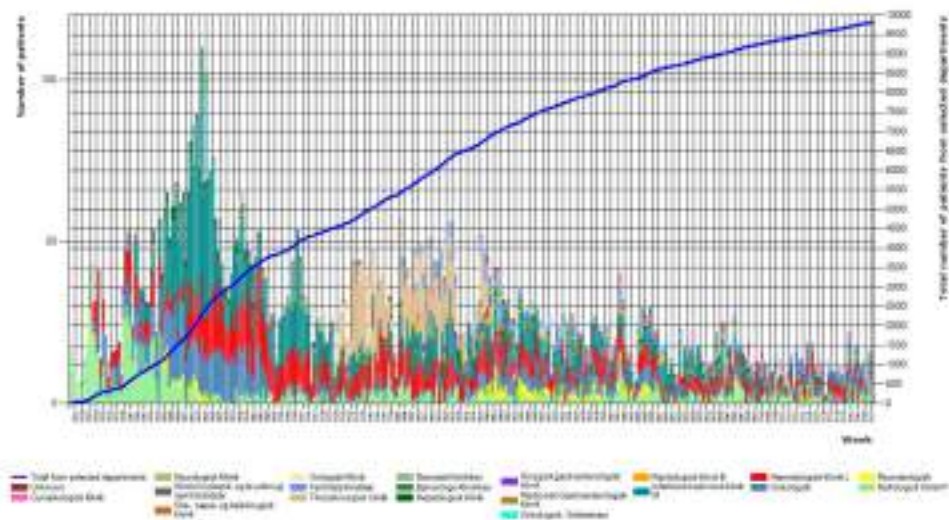
As you may know, PERSIMUNE manages a large **biobank** of biological samples from patients seen at collaborating departments, including whole blood, plasma and faeces. These patients have provided informed consent for the use of their samples in future research and these samples are available for research with an appropriate PERSIMUNE proposal and ethical approval. In line with the precision medicine aims of PERSIMUNE, the stored samples can be readily used for biomarker or omics-studies combining biochemical measurements with clinical data from the PERSIMUNE data warehouse. This platform has been used by Lars Klingen Gjørde in his PhD studies about patients undergoing allogeneic hematopoietic cell transplantation at Rigshospitalet, guided by supervisors Henrik Sengeløv and Sisse Rye Ostrowski. Thanks to the very high level of completeness in the inclusion of patients and the collection of longitudinal plasma samples over the course of the transplantation, Gjørde and colleagues have been able to test specific hypotheses about the influence of the immunoregulating vitamins A (**Bone Marrow Transpl**), E (**Eur J Haematol**) and D (**Transpl Immunol**), and the transfusion burden after transplant (**Transplant Cell Ther**) on the risk of acute-graft-versus-host disease, a feared immunological complication to transplant. In a collaboration between the Department of Hematology, the Department of Clinical Immunology and PERSIMUNE, the group is now further exploring a wider range of biomarkers for prediction of outcomes after allogeneic transplantation.

Update from PERSIMUNE Biobank

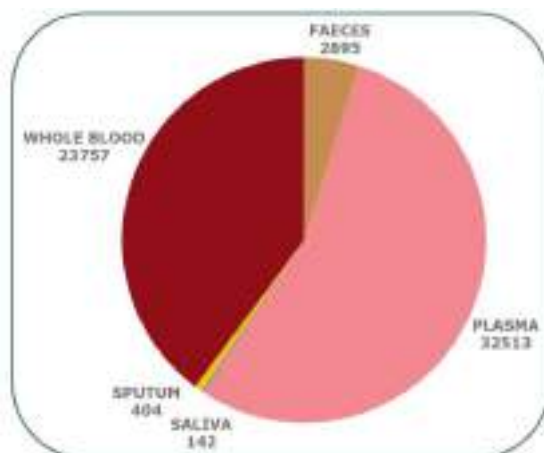
Almost 10,000 patients have been enrolled in the PERSIMUNE biobank so far (see graph A), and close to 60,000 samples have been collected. The majority of the samples are whole blood and plasma, but faeces, saliva, BAL and sputum (ekspektorat) are also collected by certain clinical departments (graph B). Recent collection rate by department is presented in graph C.

We would be very happy to see more PERSIMUNE specimens used as part of research projects. You are always welcome to **[contact us](#)** to find out what is available for a patient cohort of your interest. For clinical departments interested in collecting more samples or additional sample types, please contact us and we can discuss how best to support this.

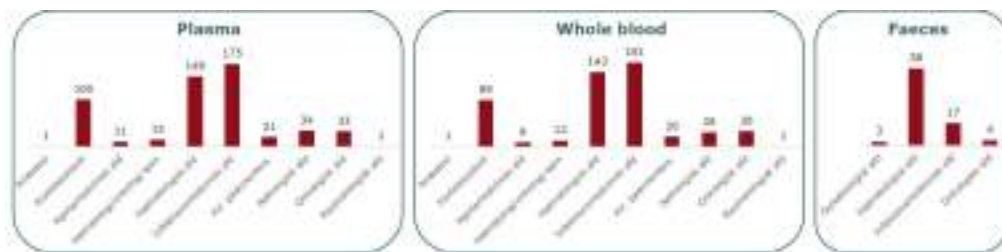
A) Overview of patients enrolled 2015-2021



B) Distribution of all samples collected 2015-2021



C) Sample collection 01-OCT-2021 to 14-DEC-2021



Funding Highlights

Emma Ilett received a postdoc fellowship in the BRIDGE Translational Excellence Program at KU for her project "An In-depth Understanding of Gut Microbiota and Immunity Through Stem Cell Transplantation and Its Adverse Effects". Her three supervisors are Jens Lundgren at CHIP, Mani Arumugam at the Center for Basic Metabolic Research at KU and Henrik Bjørn Nielsen at Clinical Microbiomics. Emma will start the project in September 2022.

Graduations



- **Kirstine Krøyer Rasmussen** successfully defended her MSc thesis titled "Network analysis of metabolomics data to identify biologically relevant pathways associated with CMV disease in haematopoietic stem cell transplantation patients" on 2nd of July 2021. Kirstine was supervised by Daniel Murray, Susanne Dam Poulsen at Rigshospitalet, and Susanne Brix Pedersen at DTU.
- **Andreas Søborg** successfully defended his MSc thesis titled "Trends in underlying causes of death in solid organ transplant recipients" on 7th of September 2021. Andreas was supervised by Neval Wareham and Jens Lundgren.
- **Lene Ryom Nielsen** successfully defended her DMSc thesis titled "Comorbidities and Adverse Drug Effects in People Living with HIV in a Modern Treatment Era: Risk Factors and Prognosis" on 26th of November 2021. Major support for the thesis was provided by Jens Lundgren and Amanda Mocroft.

- **Marc Bennedbæk** successfully defended his PhD thesis titled “Next-generation sequencing of HIV-1 in a global clinical trial cohort, phylogenetics and genotype-phenotype associations” on 6th of December 2021. Marc was supervised by Rasmus Lykke Marvig and Jens Lundgren.
 - **Nick Normann** and **Frederik “Viggo” Esmann** completed their bachelor’s theses for medicine with titles “The Influence of Mild Induced Hypothermia on Respiratory Physiology in Septic Shock: Secondary Outcomes from a Randomised Clinical Trial” and “Influence of Mild Induced Hypothermia on Circulatory Physiology in Septic Shock – Results from a Randomized Controlled Trial”, respectively. They were supervised by Jens-Ulrik Jensen, Theis Itenov and Daniel Murray.
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New Staff and Students

- **Jamshed Gill**, Research data manager at PERSIMUNE
Jamshed joined PERSIMUNE in September to support the ongoing work in improving the quality and usability of our Data Warehouse. He has a master’s in bioinformatics from the University of Copenhagen and experience working with data from the Danish National Register, and helping to assess clinical workflows, data delivery, mapping and documentation.
 - **Signe W. Krøyer**, Head of IT at CHIP
 - **Kirstine K. Rasmussen**, PhD student at PERSIMUNE
 - **Tereza Faitová**, PhD student in the Carsten U Niemann group (co-supervised at PERSIMUNE)
 - **Sadaf Zahid**, Data manager at CHIP
 - **Charlotte Aakerman**, Data protection and GDPR officer at CHIP
 - **Maria Vinh Thuy Tien Ta**, bioinformatics MSc student
 - Medical students **Signe Marie Wulff**, **Harald Vindahl Andersen**, **Christian Møller Jensen**, **Andreas Søborg** and **Sophia Lisbeth Hejndorf**
 - PhD students in cohort studies **Erich Tusch** and **Nadine Jaschinski**
-

Past and Future Events

PERSIMUNE Reinvigoration Kickoff meeting

On 5 October, the PERSIMUNE community gathered to discuss how to use PERSIMUNE as a platform for precision medicine research. The following action items were agreed upon:

1. Restart hackathons and professionalise data cleaning within PERSIMUNE,
2. Collaborate with other regional/national data providers to ensure synergy between QA/cleaning process here and what can be done using other platforms,
3. Develop a data catalogue to make it clear what data is available for research, and
4. Work on outreach strategy to increase awareness of PERSIMUNE and benefits for engaging.

PERSIMUNE Biochemistry Hackathon

On 10 November, Jamshed Gill and Daniel Murray organized an all-day hackathon that focused on biochemistry data. Action items from the day include updating Work instructions for data cleaning and reintroducing Data Warehouse meetings.

PERSIMUNE Research Presentations

Internal research presentations for ongoing PERSIMUNE associated research, next one scheduled for **17 December**, 14:00-16:00.

Let **Riia** know if you would like to join but have not received the Outlook invite.

PERSIMUNE Basic and Translational Research Colloquia

Presentations from persons outside PERSIMUNE with an aim to improve connections between basic and translational researchers, next one planned for **20 January**, 16:00-17:00.

The Ultrathon

Organised by Cameron MacPherson and his group, the Ultrathon is a six-week competitive hackathon addressing important medical AI questions. To get more information or participate please visit the **website**.

PERSIMUNE conference stories – 6th Annual Danish Bioinformatics Conference in Aalborg

It has been a long time since the PERSIMUNE bioinformatics team has been able to physically attend a conference together. However, this year on the 18th of November, Mette Jørgensen, Ramtin Zagari Marandi, Preston Leung, Adrian Zucco and Kirstine K. Rasmussen participated at the two-day 6th Annual Danish Bioinformatics Conference held in Aalborg. Each member showcased the PERSIMUNE bioinformatics research and development through posters of their own projects.

In addition, Mette gave an oral presentation about her work on the PERSIMUNE Gut Profiler (PGP); a tool for analysing microbiome sequencing data. The conference featured multiple prominent researchers from around the world and explored topics in evolution & population genomics, computational mass spectrometry & proteomics, machine & deep learning, personalised medicine & systems biology, and lastly RNA biology & transcriptomics. Workshops were also organised to introduce participants to deep learning tools, fairness and bias in machine learning, multiomics data integration, CRISPR bioinformatics and Computerome.

Read more about the conference [here](#).



Meet PERSIMUNE researchers

A video series featuring PERSIMUNE researchers was launched earlier this year. The first researcher you get to meet is Emma Ilett. If you would like to be featured or have ideas of researchers you would like to see featured, **please let us know.**



PERSIMUNE
CENTRE OF EXCELLENCE FOR PERSONALIZED MEDICINE
OF INFECTIOUS COMPLICATIONS IN IMMUNE DEFICIENCY

MEET PERSIMUNE
RESEARCHERS

Emma Ilett MD

Meet PERSIMUNE researchers - Emma Ilett MD, PhD

Find out more about the research taking place at PERSIMUNE - Centre of Excellence for Personalized Medicine of Infectious Complications in Immune Deficiency.

SEASONS GREETINGS



Feel free to distribute this newsletter and to send us potential news items and other ideas for the next one.

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