PERSIMUNE Newsletter

March 2021

Dear all,

After a long hiatus, we are very happy to present to you the latest PERSIMUNE newsletter. As it has been a long time since the last PERSIMUNE newsletter, it will not be possible to go into detail on the myriad of research activities and achievements that have taken place over the last few years. Instead, this newsletter will highlight some important achievements that occurred in 2020 and early 2021.

For a full overview of all the publications resulting from PERSIMUNE affiliated researchers, please see the website, and 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 Sustarsic, Project Coordinator – PERSIMUNE

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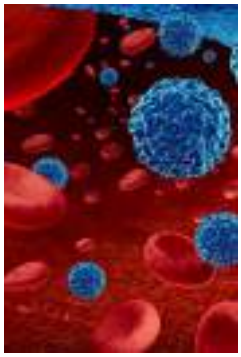
Key Research Highlights

MATCH

The MATCH (MAnagement of post-Transplant infections in Collaborating Hospitals) program has been the cornerstone of PERSIMUNE research for a number of years. MATCH utilises real time data harvesting from the PERSIMUNE data lake and predefined algorithms overseen by trained clinicians to guide personalised surveillance and treatment of transplant patients. The benefit of this personalised approach to clinical care was highlighted in a 2020 publication by Ekenberg et al. (Transpl Infect Dis), who showed that the risk of CMV disease was significantly reduced for non-lung transplant recipients in the years since MATCH was introduced. This publication provides a great overview of how the data infrastructure developed by PERSIMUNE and relevant clinical expertise can be utilised to improve patient outcomes.

About MATCH >>

Machine Learning to predict infectious outcomes in CLL patients



An increasing focus area of PERSIMUNE researchers is the use of Machine learning (ML) algorithms to analyse clinical data. One project in this field, led by Rudi Agius and Carsten Niemann, utilised clinical data from over 4000 patients and an ensemble machine learning algorithm to predict persons recently diagnosed with CLL who are at high risk of infections. The results of this study were published in Jan 2020 (Nat Commun). This algorithm (called CLL-TIM) is now completing its translational cycle and will form the basis of a clinical trial – PreVent-ACaLL (NCT03868722). PreVent-ACaLL will assess, in patients predicted to be at high risk of infections (using the CLL-TIM algorithm), whether a combination of two cancer drugs can reduce the risk of infection and mortality. This trial is led by Carsten Utoft Niemann, sponsored by Rigshospitalet and will involve clinicians and researchers from multiple centres across the Nordics and the Netherlands.

Microbiome

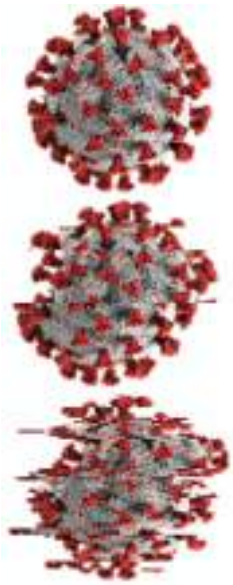
Over the last few years, PERSIMUNE has quietly built one of the largest and best characterised clinical cohorts with matching microbiome data. The collection and analysis of this cohort has been driven by Emma Ilett as part of her PhD project together with guidance from Joanne Reekie, Henrik Sengeløv and Daniel Murray, as well as with bioinformatic support and analysis from the Bioinformatics group led by Mette Jørgensen and Cameron MacPherson. The extent of the work that has been put in by this group can be seen in the recent study by Ilett et al. (Blood Adv). This study utilised biological samples collected from patients and clinical data from the PERSIMUNE data lake to explore the dynamics of the microbiome pre- and post-allogeneic stem cell transplantation and associations with acute Graft versus Host Disease (GVHD). The group used state of the art shotgun metagenomic sequencing to show that microbial diversity in the gut decreases post-transplant and certain aspects of the gut microbiome are associated with increased risk of aGVHD.

COVID-19

PERSIMUNE was perfectly placed to respond to the COVID-19 pandemic, with many associated researchers contributing with aplomb to the global and domestic research agenda. The COVID response has really built upon the previous work in a number of areas of PERSIMUNE research, including (but not limited to):

CATCH

A clinical application, led by Kasper Moestrup, that utilised IT infrastructure and clinical expertise that was developed as part of MATCH and other data lake activities. CATCH provides a clear and succinct overview of key clinical data relating to COVID-19 that, at the height of the first wave, was introduced in the clinic to better allocate clinical resources.



COVIMUN

A national cohort of SARS-CoV-2 positive individuals, led by Sisse Ostrowski and Carsten Utoft Niemann, that utilised ML expertise developed as part of the CLL-TIM project and immunological characterisation developed as part of the Immune-Mo project to better understand immunopathogenesis of SARS-CoV-2 infection and predict clinical outcomes in infected Individuals.

INSIGHT clinical trials

A number of PERSIMUNE researchers are also involved in COVID-19 observational and treatment trials. These large, multi-centre, multi-country trials have and will continue to inform treatment strategies and clinical outcomes in COVID-19 patients. Additionally, these trials will generate huge amounts of data that can then be used for secondary research.
More details on INSIGHT >>

ENFORCE

Danish National Cohort Study of Effectiveness and Safety of SARS-CoV-2 vaccines

ENFORCE

The data infrastructure and expertise developed as part of PERSIMUNE will now be utilised as a part of the ENFORCE study. This study will collect data and samples from vaccinated individuals in order to answer key public health questions regarding the safety and efficacy of SARS-CoV-2 vaccines.
More about ENFORCE study >>
If you are interested in participating >>

Funding Highlights

The major funding highlight of 2020 was the extension of the DNRF grant. PERSIMUNE was awarded an additional 40 million DKK over 4 years to continue its work on personalised medicine in persons with immune dysfunction.

Danmarks Grundforskningsfond
Danish National Research Foundation

In addition to this, PERSIMUNE associated researchers

- **Kasper Moestrup, Jens Lundgren and The CATCH team** received 4,940,985 DKK from Novo Nordisk Fond to develop a Patient Database for Overview and Treatment of COVID-19 patients.
- **Sara Mørup** received 25,000 DKK from the Department of infectious diseases/Bjørn Aastrups fond til unge lægers AIDS forskning i Epidemiafdelingen på Rigshospitalet for her project on HIV genetics.
- **Sisse Ostrowski and Carsten Utoft Niemann** received 7,350,000 DKK from The Ministry of Higher Education and Science and the Ministry of Health for the COVIMUN project, “Machine learning in COVID-19: Assessing immunopathology and genetics for tailored care and optimised resource usage”.
- **Dorthe Raben** received 7,604,604 DKK from the EU Commission for the Horizon 2020 project MISTRAL (Microbiome-based stratification of individuals at risk of HIV-1 acquisition, chronic clinical complication, antimicrobial drug resistance, and unresponsiveness to therapeutic HIV-1 Vaccination).

Graduations

Emma Ilett successfully defended her PhD thesis titled “Assessment and Associated Clinical Impact of Gut Dysbiosisin Transplant Recipients” on the 20th of October 2020.

Michael West successfully defended his MSc thesis titled "Genome wide association of host genetic control of HIV in a meta-analysis of the five INSIGHT HIV+ cohorts" on 15th of September 2020.

Christina Ekenberg successfully defended her PhD thesis titled "The Immune-Dysfunctional Host—From Clinic to Bench" on the 24th of February 2020.

Lars Peters successfully defended his DMSc thesis titled “Viral hepatitis in HIV: determinants of liver injury and clinical outcomes” on the 3rd of December 2019.

Theis Aagaard successfully defended his PhD thesis titled "Prediction of and outcomes after febrile neutropenia in patients with cancer" on the 7th of October 2019.

Michael Asger Andersen (from the group of Carsten U Niemann) successfully defended his PhD thesis “Real-world evidence on the risk, type and treatment of infectious complications in chronic lymphocytic leukaemia” on the 15th of January 2021.

New Staff and Students

- Cecilie Wain, bioinformatics MSc student

- Cornelia Geisler Crone, MATCH doctor and PhD student
- Georgi Ovalov, IT MSc student
- Kirstine Rasmussen, bioinformatics MSc student
- Nora Forbes, PhD student
- Preston Leung, postdoc
- Ramtin Zagari Marandi, machine learning engineer
- Riia Sustarsic, PERSIMUNE project coordinator
- Sadaf Zahid, IT MSc student
- Sara Bohnstedt Mørup, MATCH doctor and PhD student
- Sebastian Moretto Krog, MATCH doctor and PhD student
- Wendy Bannister, biostatistician

Please forgive us and let us know if we missed someone!

Upcoming presentations, conferences etc.

(contact Riia Sustarsic for more details)

- **Research and science meetings** – internal research presentations for ongoing PERSIMUNE associated research, next ones scheduled for 16 April and 18 June, 14:00-16:00
- **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 May, 16:00-17:00
- **2-6 May 2021 Copenhagen Bioscience Conference: Precision medicine - from patient to lab and back again**. If you wish to attend the

conference, submit an abstract by 18 March 2021. Instructions and more information can be found here>>

- **The Ultrathon,** organised by Cameron MacPherson and his group, is a six week competitive hackathon addressing important medical AI questions – to get more information or participate please visit the website>>

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