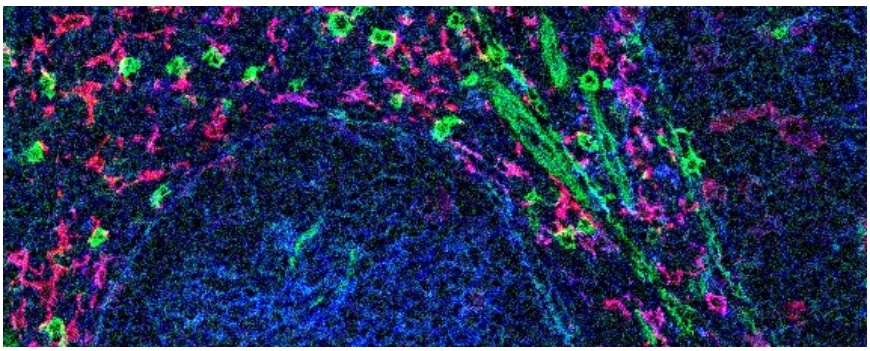


ANNUAL REPORT 2020

BROEGELMANN RESEARCH LABORATORY
UNIVERSITY OF BERGEN

CONTENT

DIRECTOR'S COMMENT

2020 has been a very challenging and different year at Broegelmann Research Laboratory. The Corona pandemic forced us to shut down all laboratory activities not related to Covid-19 research in March. Home-office for everybody was not always easy, especially during the lock-down when all schools were closed. Nevertheless, by having regular meetings via zoom, we managed to keep the spirits up. Also the teaching activities had to be re-organized to a digital format, which was especially challenging for the practical course HUIMM307 (Basic flow cytometry) where we had to send home all students with two more experiments to be run. But our skilled and enthusiastic staff managed to solve this issue so that the students could be credited the course. Many other activities, such as the Day of Immunology, the practical course HUIMM906 and our traditional celebration of St. Lucia had to be cancelled.

On top of all this, our long-standing director Roland Jonsson retired end of March, leaving me as acting head until a new leader is found. Instead of celebrating Roland's achievements over time with an international seminar with many invited guests lecturers, the pandemic forced us to have a digital seminar with only few local people present in the auditorium, and also the dinner was limited to 20 guests only.

In spite of all these challenges the Laboratory also this year contributed to two doctoral degrees: *Carbamylation in an inflammatory and uremic environment* by Brith Bergum, and *Towards stratification of patients with Sjögren's syndrome – single cell analyses and immune profiling* by Irene Sarkar.

One of the more important functions for quality assurance of the PhD-training is the Bergen Research School of Inflammation (BRSI) with a number of immunology courses and regular seminars. These activities were also in 2020 an important arena for networking and scientific interactions, even though we had to move all course activities to a digital platform.

2020 has been a productive year for further cementing our collaborations with major research groups at Karolinska institute. Both Yenan Bryceson and Marie-Wahren Herlenius got a 20% professor II position affiliated with Broegelmann Research Laboratory.

With these introductory words we proudly present our annual report 2020. It is as always not easy to speculate about the future, but with our skilled, enthusiastic and hardworking personnel, we have great expectations for continuous high activity.

Silke Appel, Dr. rer. nat.
Acting Head of Broegelmann Research Laboratory

VISION AND RESEARCH AREAS

Our overarching objective is to improve the quality of life for patients suffering from chronic inflammatory diseases. Also, we aim to consolidate and strengthen our international recognition for the identification, development and promotion of new approaches for diagnosis and treatment of autoimmune and inflammatory diseases.

CURRENT MAJOR FIELDS OF RESEARCH:

- Translational studies in autoimmunity (exocrine glands, joints, skin); autoantibodies and biomarkers
- Functional genomics and genetic basis of the autoimmune exocrinopathy
- Dendritic cells in immunotherapy
- Host-microbe interactions (P.gingivalis – arthritis, Alzheimer)
- Cardiovascular disease

THE BOARD

Bernt Jacob Pettersen

Lars Akslen

Robert Bjerknes

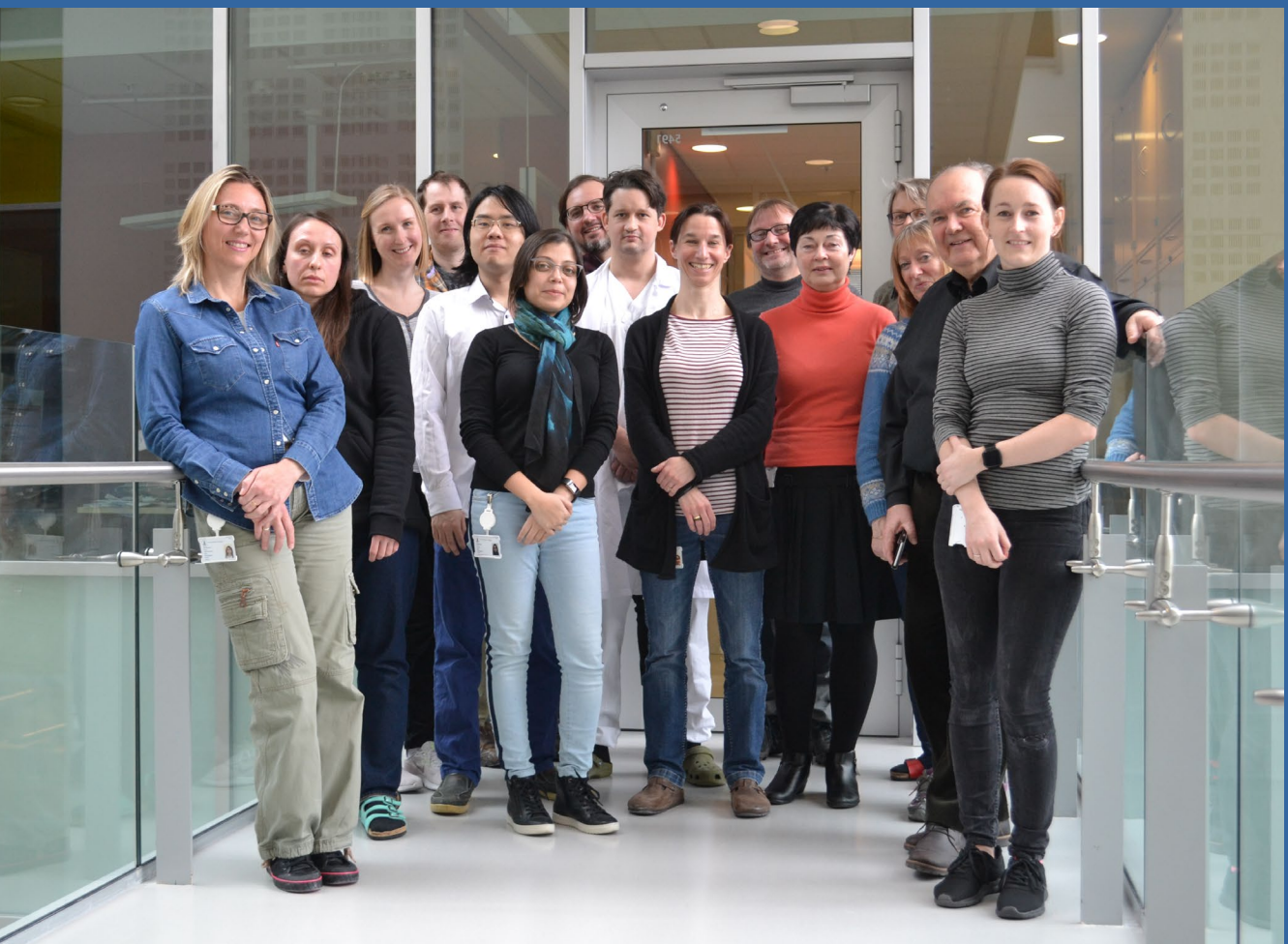
The Broegelmann Foundation Board (2020)
(Kjøbmand J.P. Broegelmanns Legat)

Managing Associate **Bernt Jacob Pettersen**, chairman

Professor **Lars A. Akslen** MD, PhD

Professor **Robert Bjerknes** MD, PhD

OUR RESEARCHERS



HEAD OF LABORATORY

Roland Jonsson DMD, PhD

Professor of Medicine
(The Broegelmann Chair in Immunology)

Acting Head since April 2020
Silke Appel, Dr. rer. nat.
Professor of Immunology

ACADEMIC STAFF/SENIOR RESEARCHERS/ POSTDOCTORAL FELLOWS

Head Bergen Research School in Inflammation (BRSI)
Karl A. Brokstad, PhD
(molecular immunology/cell biology)

Veronika Binder, PhD (post doc)
(biochemistry)

Yenan Bryceson, PhD (prof II)
(cellular/molecular immunology)

Richard Davies, PhD (postdoc)
(cellular/molecular immunology)

Tim Holmes, PhD (post doc)
(cellular/molecular immunology)

Tomasz Kantyka, PhD (post doc)
(biochemistry)

Helga Midtbø, MD, PhD (post doc)
(cardiovascular diseases)

Piotr Mydel, MD, PhD (prof I)
(biochemistry/immunology)

Marie Wahren-Herlenius MD, PhD (prof II)
(rheumatology/immunology)

TRAINEES

RHEUMATOLOGICAL IMMUNOLOGY [SUPERVISOR(S) IN PARENTHESES]

Brith Bergum, MSc, PhD fellow
(Mydel/Jonsson)

Kirsten Lassing, Erasmus student, The Netherlands
(Appel/Sarkar)

Irene Sarkar, MSc, PhD fellow
(Appel/Jonsson)

TUMOR IMMUNOLOGY

Dag Heiro Yi, MD, PhD fellow
(Appel/Jonsson)

DERMATOLOGICAL IMMUNOLOGY

Anders Krogh Aarebrot,
Medical student research program
(Appel/Holmes/Frøyen Sandvik)

Ingvild Øye Bueide, master student
(Petrovic/Bergum/Appel)

Aleksandra Petrovic, MD, PhD fellow
(Jonsson/Appel)

Victoria Marie Samuelsen, master student
(Holmes/Petrovic/Bergum/Appel)

Liz van Bergen, Erasmus student, The Netherlands
(Appel/Petrovic)

MOLECULAR IMMUNOLOGY

Manpreet Kour Hans, master student
(Skavland/Appel)

Magdalena Keindl, MSc, PhD fellow
(Lyssenko/Appel)

ADDITIONAL SCIENTISTS/ KEY-COLLABORATORS AT UIB AFFILIATED WITH THE LABORATORY

Johan G. Brun, Professor,
Department of Clinical Science

Rebecca Cox, Professor
Influenza Centre, Department of Clinical Science

Torgils Fossen, Professor
Department of Chemistry

Eva Gerdts, Professor,
Department of Clinical Science

Stephanie Le Hellard,
Professor, Department of Clinical Science

Erik Johnsen, Professor,
Department of Clinical Medicine

Malin V. Jonsson, Professor,
Department of Clinical Dentistry

Karl-Henning Kalland, Professor,
Department of Clinical Science

Valeriya Lyssenko, Professor, Department of Clinical Science

Rune Kroken, Assoc Professor,
Department of Clinical Medicine

Hans Peter Marti, Professor
Department of Clinical Medicine

Roald Omdal, Professor emeritus,
Department of Clinical Science

Lene Frøyen Sandvik, Assoc Professor,
Department of Clinical Medicine

Kathrine Skarstein, Professor,
Department of Clinical Medicine

Jørn Skavland, PhD
Department of Clinical Science

Silje Solberg, Assoc. Prof.
Department of Clinical Medicine

TECHNICAL AND ADMINISTRATIVE STAFF

Kate Frøland
Office manager

Marianne Eidsheim
Laboratory manager

Kjerstin Jakobsen
Laboratory manager

PRINCIPAL INVESTIGATORS

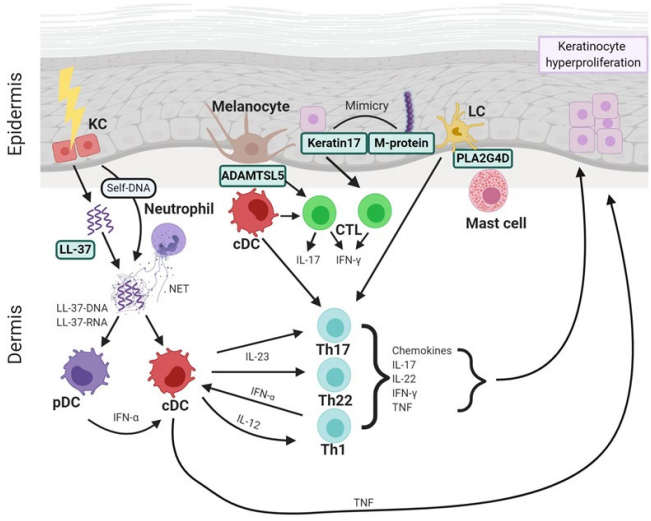
THE DENDRITIC CELL AND PATIENT STRATIFICATION GROUP

THE B CELL GROUP

NK CELL AND IMMUNE REGULATORY GROUP

THE POST TRANSLATIONAL MODIFICATIONS GROUP

THE DENDRITIC CELL AND PATIENT STRATIFICATION GROUP



Ten Bergen *et al.*, *Scand J Immunol* 2020 Oct;92(4):e12945

Due to the outstanding capacity of dendritic cells (DC) to process and present antigenic peptides to T lymphocytes, several approaches have been developed for their application in cancer immunotherapy. DC-based immunotherapy has been shown to be safe, but so far, clinical impact has been lacking. By improving the quality of the DC populations used in the clinic, we hope to succeed in generating better DC-based immunotherapies.

Another focus of our research is single cell network profiling of distinct immune subsets to allow for analysis of pathway specific activity of patient samples at the single cell level. This will enable us to stratify different categories of patients and develop personalized therapies. During the past year, we used mass cytometry analyses of psoriasis patients treated with various biopharmaceuticals (anti-TNF, anti-IL-17 or anti-IL-12/23) to show that immune cell composition and signaling profile differed between responders and non-responders (Solberg *et al.*, *Eur J Immunol, in press*).

The overall aim of our research is to further unravel the mechanisms by which DC modulate T cell responses, both in autoimmune diseases such as Sjögren's syndrome and psoriasis as well as tumor immunity. Our results will lead to a better understanding of the cellular mechanisms involved in antigen presentation, T cell stimulation and tolerance induction, thereby revealing new tools for diagnosis and targets for therapy of patients with cancer, autoimmune and infectious diseases as well as patients undergoing stem cell transplantation. Thus, it might lead to an increased survival and better quality of life for patients.

GROUP LEADER

Silke Appel, PhD

GROUP MEMBERS

Anders Krogh Aarebrot, MD, PhD fellow

Ingvild Øye Bueide, master student

Richard Davies, PhD, postdoc

Manpreet Kour Hans, master student

Roland Jonsson, professor emeritus

Magdalena Keindl, MSc, PhD fellow

Kirsten Lassing, Erasmus student

Aleksandra Petrovic, MD, PhD fellow

Victoria Marie Samuelsen, master student

Irene Sarkar, MSc, PhD fellow

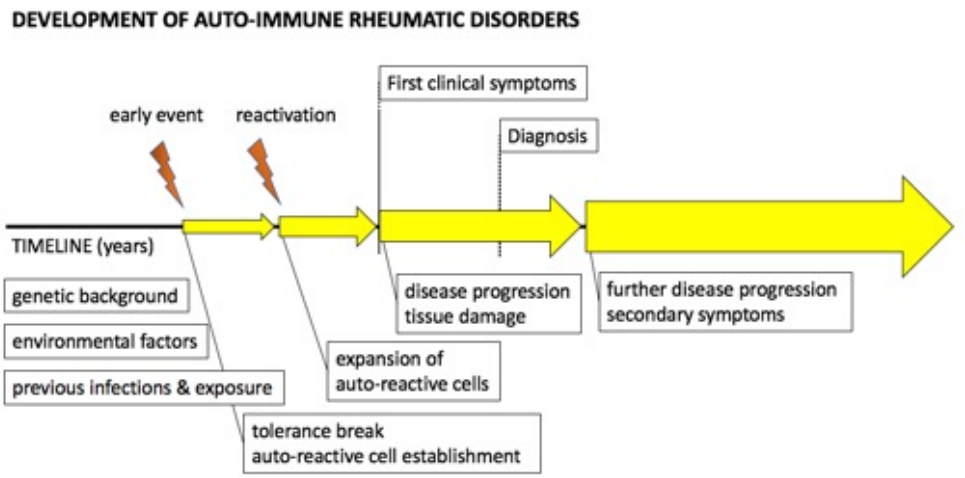
Liz van Bergen, Erasmus student

Dag Heiro Yi, MD, PhD fellow

THE B CELL GROUP

Sjögren's syndrome, Lymphocytes and Autoimmunity

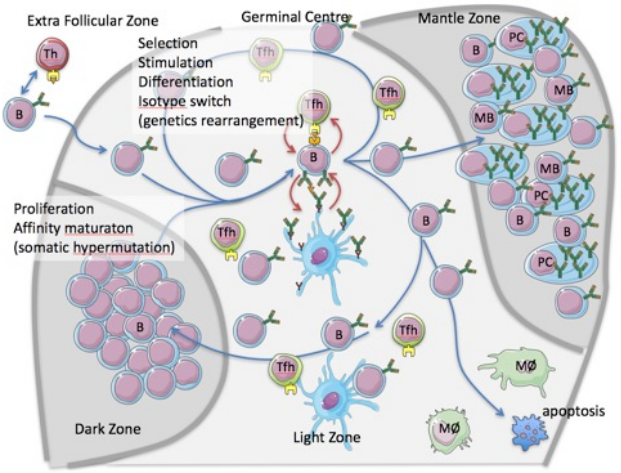
In many auto-immune diseases, there is a strong involvement of the adaptive immune system, manifesting as autoreactive lymphocytes and autoantibodies. Most cells in the immune system do not operate separately but interact with surrounding cells and tissues. The focus of the research project is to uncover some of the details of lymphocyte populations, locally and systemically, their interaction and contribution to disease development. Using an established and well-characterised cohort of primary Sjögren's syndrome patients have been central in these studies.



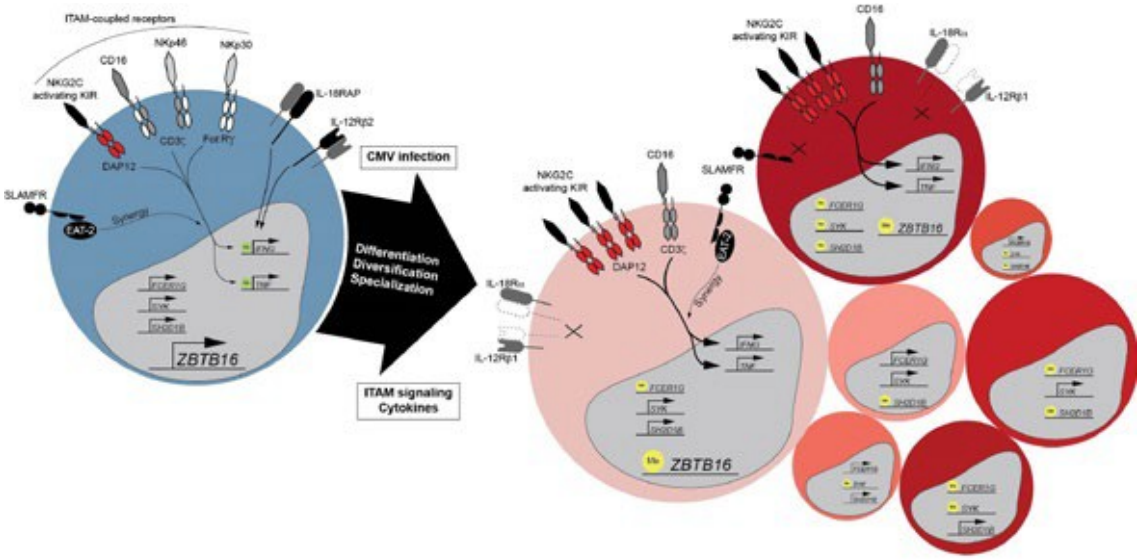
Disease development in Sjögrens syndrome and related diseases. The disease can start many years before the symptoms appear, and it can take years to establish a diagnosis. We don't know how these diseases develop, but multiple factors are involved, and we have no effective cure other than symptomatic relief/treatment.

GROUP LEADER
Karl Albert Brokstad, PhD

Germinal centre. Ectopic germinal centre formations are observed in minor salivary glands (exocrine glands) from patients with Sjögren's syndrome. Important immunological processes are performed in germinal centres and for Sjögren's syndrome patients may be an area where the disease is triggered and progressing.



NK CELL AND IMMUNE REGULATORY GROUP



My laboratory studies cytotoxic lymphocyte function in the context of immunological disease and cancer. Defects in cytotoxic lymphocyte function are associated with often-fatal hyperinflammatory primary immunodeficiency syndromes in infants. Hypomorphic loss-of-function mutations are associated with increased risk of developing certain forms of cancer, in particular hematological malignancies.

GROUP LEADER

Yenan Bryceson, PhD

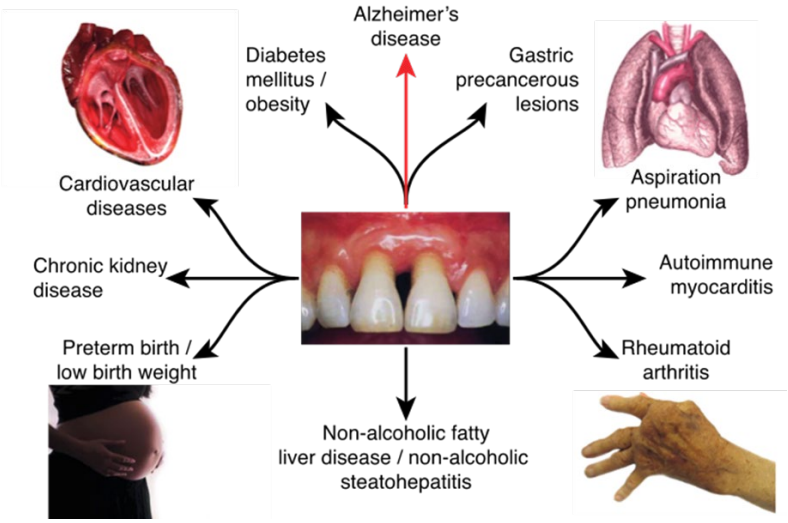
GROUP MEMBERS

Tim Holmes, PhD, post doc

We are working to decipher the molecular regulation of cytotoxic lymphocyte differentiation and function in blood and tissues using cutting-edge techniques, including advanced flow cytometry and sorting combined with high-throughput sequencing. Insights promise to explain severe primary immunodeficiency and provide means for rational design of cellular immunotherapy of cancer.

We thereby focus in particular on transcriptomics and proteomics data obtained from mouse models of disease in combination with similar datasets generated from human specimens collected in biobanks and clinical studies.

THE POST TRANSLATIONAL MODIFICATIONS GROUP



Chronic periodontitis (PD) is a disease of tooth-supporting tissues. It is a chronic disease with inflammatory nature and infectious etiology. It is now understood that anaerobic bacteria (*P. gingivalis*) is a keystone microorganism which initiates a shift in the composition of tooth-surface bacterial flora to pathogenic. In humans, infection with *P. gingivalis* invites *T. denticola* and *T. forsythia* to colonize the subgingival bacterial biofilm. This small consortium of pathogens is described as the "red complex". Proliferation of "red complex" species, especially *P. gingivalis* on the subgingival tooth surface initiates a chronic inflammation of the periodontium, which, if left untreated, last for years causing erosion of tooth supporting structures.

Occupied with heart diseases, cancer and stroke, leading causes of death in industrialized nations, we tend to ignore the reality that chronic periodontitis (PD) is the most prevalent infection-driven chronic inflammatory disease of mankind. The fact that around 30% of the adult population suffers from periodontitis seems to desensitize public opinion and health authorities to morbidity caused by this disease. To take it seriously we should keep in mind that up to 10% of people are loosing teeth due to severe form of the disease. If suffering caused by tooth loss due to advanced PD is not enough, mounting evidence shows a causative link between PD and various chronic inflammatory diseases including rheumatoid arthritis, Alzheimer disease, diabetes, COPD.

.

In our research we examine in detail mechanisms, with special focus on post-translational modifications, responsible for the comorbidity between PD and various chronic inflammatory diseases with special focus on RA and AD. Casting new light on mechanisms will pave the way to novel early diagnostic, preventive, therapeutic and monitoring strategies of the patients suffering from comorbidities.

GROUP LEADER

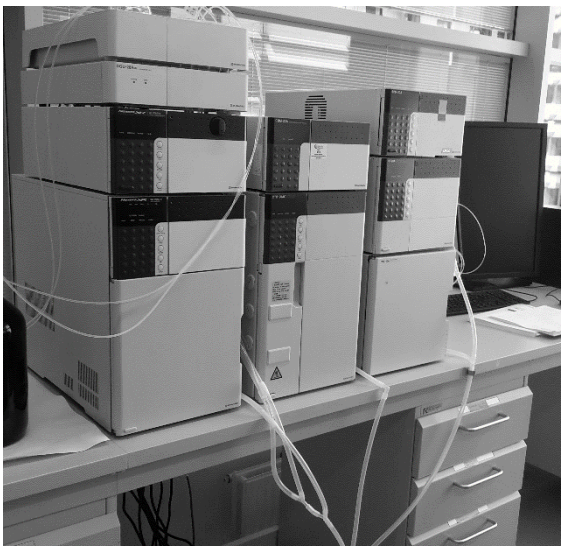
Piotr Mydel, MD, PhD

GROUP MEMBERS

Brith Bergum, MSc, PhD fellow

Veronika Binder, PhD, post doc

Tomasz Kantyka, PhD, post doc



GRADUATIONS

DOCTORAL DEGREES

Brith Bergum

Carbamylation in an inflammatory and uremic environment

Supervisors: Piotr Mydel, Roland Jonsson

Philosophiae doctor (PhD) thesis defence January 22, 2020

Irene Sarkar

Towards stratification of patients with Sjögren's syndrome – single cell analyses and immune profiling

Supervisors: Silke Appel, Roland Jonsson

Philosophiae doctor (PhD) thesis defence November 6, 2020

EXCHANGE STUDENTS

Kirsten Lassing, Erasmus student, Netherlands

Title: TAM receptor expression in patients with primary Sjögren's syndrome

Liz ten Bergen, Erasmus student, Netherlands

Title: Moderate to severe psoriasis: from autoimmune pathogenesis to signs of biological treatment response

EXTERNAL FUNDING – MAJOR GRANTS

2016 – 2021
National Science Centre (Sonata Bis). Carbamylation as a Modulator of Immune Response, project leader Piotr Mydel. Total 330 000 €

2017 – 2020
The European Commission Horizon 2020 contract HarmonicSS (H2020-SC1-2016-RTD/731944) "HARMONIzation and integrative analysis of regional, national and international Cohorts on primary Sjögren's Syndrome (pSS) towards improved stratification, treatment and health policy making"; University of Bergen, partner Roland Jonsson; 2.5 mill NOK

2018 – 2021
Polish National Science Centre (Opus) „Serum PAD-activity: Risk Factor in Development and Novel Biomarker in Rheumatoid Arthritis". Project leader Piotr Mydel; 3.9 mill NOK

2019 – 2024
The European Commission Horizon 2020 contract NECESSITY (IMI2-JU/EU/H2020 nr. 806975) "New Clinical Endpoints in primary Sjögren's Syndrome: an Interventional Trial based on stratifying patients"; University of Bergen, partner Roland Jonsson

2019 – 2024
National Institutes of Health (RO1 DE022597) "Bacterial peptidylarginine deiminase, a link between gums and joint disease", project leader Piotr Mydel. Total 6.4 Mio NOK

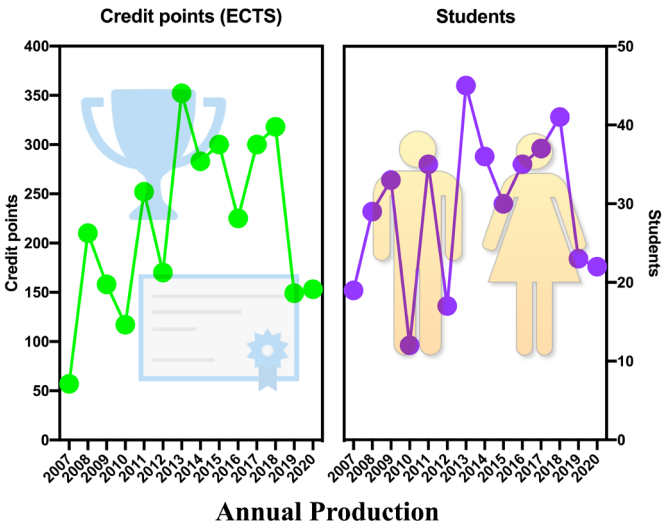
2020 – 2023
National Science Center Poland (2019/33/B/NZ4/01889) "Protein Carbamylation in Hemostatic Dysfunctions in Chronic Kidney Disease"; project leader Piotr Mydel. Total 505 000 €

2020 – 2023
EU Joint Programme – Neurodegenerative Disease Research (EC/JPND; ES655895) "Alzheimer's disease as a co-morbidity of chronic periodontitis with *Porphyromonas gingivalis* as a causative link between both diseases"; University of Bergen, project leader Piotr Mydel. Total 575 000 €

2021 – 2024
EC/Grieg "Novel mechanisms of PAD activity regulation. Substrate specificity and activation of peptidyl arginine deiminases in the context of RA"; University of Bergen, project leader Piotr Mydel. Total 499 000 €

2021 – 2025
Norwegian Research Council "The molecular basis of sex-differenes in Sjögren's syndrome; University of Bergen, project leader Marie Wahren-Herlenius. Total 10 mill NOK

BERGEN RESEARCH SCHOOL IN INFLAMMATION (BRSI)



One of the most complicated organ systems in the body is the immune system. It is involved in a number of processes of the body, in both health and disease. The main focus of Bergen Research School in Inflammation is immunology and how
it interacts with other functions of the body.

The research school is an integrated platform giving students training in formal and translational skills. The core activities are conducted by expe- rienced scientists from Broegelmann Research Laboratory and other research groups.

The training activity established to support PhD candidates in their research training with relevant formal skills, and it has developed into becoming a multi-disciplinary, and multi-level research school.

Due to the lock down, the practical course HUIMM906 was cancelled. Thanks to a quick reorganizing of our staff and a switch to digital platforms, all other courses could be held more or less as scheduled. .

COURSES RUN IN 2020

HUIMM901
Translational Immunology
(Silke Appel)

HUIMM902
Journal Club and Watch
(Karl A. Brokstad)

HUIMM303/903
Human Immunobiology
(Karl A. Brokstad)

HUIMM307
Basic course in flow cytometry
(Silke Appel)

HUIMM320
Basal Immunology
(Silke Appel)

Bergen Research School in Inflammation

MEETINGS AND DISSEMINATION

Corona research

Naturen 01–02 / 2020 (Volum 144)

Vaksinen si historie

av Nina Urke Ertesvåg & Karl Albert Brokstad

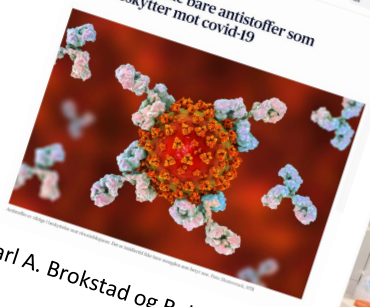
Naturen 04 / 2020 (Volum 144) Artikkel 2 av 7

COVID-19 og jakta på ein vaksine

av Nina Urke Ertesvåg, Rebecca Jane Cox & Karl Albert Brokstad

Aftenposten

Det er ikke bare antistoffer som beskytter mot covid-19



Karl A. Brokstad og Rebecca J. Cox

Derfor vil ikke dødeligheten være stor hvis Wuhan-viruset spres i Norge

Norsk helsevesen er godt forberedt på at viruset kan spre seg til landet.

WUHAN-VIRUSET

Naturen 01–02 / 2020 (Volum 144)

Kva skjer med vaksinen i kroppen?

av Karl Albert Brokstad & Nina Urke Ertesvåg

Artikkel 3 av 12

RETIREMENT CELEBRATION ROLAND November 26

Roland got a well-deserved delayed retirement celebration November 26. Due to the pandemic, the international guests were only present digitally.

Retirement Celebration

Roland Jonsson DMD, odont dr (PhD)

Past Broegelmann Chair in Immunology

University of Bergen (UiB)

29+ years of service

26. Nov, 2020 / 13.00 – ca. 15.00 (1:00 pm – ca. 3:00 pm)

https://uib.zoom.us/j/68668348321?pwd=SEUwcCtNUXU5YlIySStQME5ZTmZDZz09

13.00 WELCOME by Supreme Court Barrister, Bernt Jacob Pettersen, Chair of the Broegelmann Legacy

INTRODUCTION by Professor Per Bakke, Dean Faculty of Medicine

CHAIR: Professor Marit Bakke, Deputy Dean Faculty of Medicine

”The positive guy in the happy research family” by Professor Rikard Holmdahl, Karolinska Institutet

”The inspirational mentor” by Professor Marie Wahren, Karolinska Institutet

“Role model and mentor” by Professor Silke Appel, UiB

“Northern lights - 2011-2020” by Professor Piotr Mydel, UiB

“Rheumatology for ever” by Professor Johan G. Brun, Haukeland University Hospital

Hospital and UiB

“The inspirational friend from across the border” by Professor emeritus Roald Omdal, Stavanger University Hospital and UiB

BREAK (10 min)

CHAIR: Professor Pål Njølstad, Head Department of Clinical Science, UiB

"Endeavors with Roland: 2004-2017" by Dr. Nicolas Delaleu, Switzerland

"Sialadenitis has had its definitive pathologist. Thank you, Roland." by Professor John B. Harley, University of Cincinatti, OH, USA

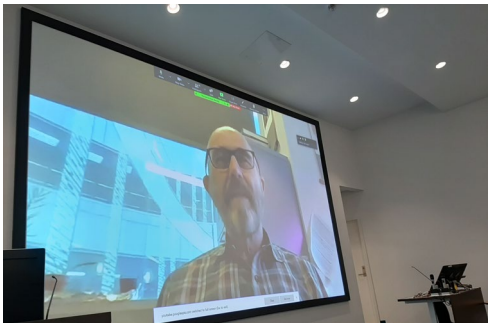
"Scandinavian Immunology: an unparalleled engagement for our society and our journal" by Editor-in-Chief/Professor Petter Höglund, Karolinska Institutet

"Structure and quality in research training – Bologna implemented" by Senior Adviser Torunn Olsnes, UiB

"Doctoral training - a history of 43-years friendship with Roland" by Professor emeritus Rune Nilsen, Gvarv

"My Way" by Professor emeritus Roland Jonsson, UiB

"Concluding remarks" by Supreme Court Barrister emeritus Jan Einar Greve, Bergen



EDITORIAL OFFICE FOR SCANDINAVIAN JOURNAL OF IMMUNOLOGY

Since 1972 the Scandinavian Journal of Immunology, the official journal of Scandinavian Society for Immunology (SSI), has played an active part in promoting the science of immunology as well as being the most important financial contributor to SSI activities.

The editoral office for this journal is since 1999 located at Broegelmann Research Laboratory. Roland Jonsson has been the Editor-in-Chief from 1999 – 2017. The new Editor-in Chief is Petter Höglund from the KI. In 2020, it has been published 12 issues in two volumes (Volume 91/92) of the Scandinavian Journal of Immunology with an average of 10 articles per issue.

The total institutional circulation is >14,000 (out of these nearly 6700 libraries in developing countries), dominated by consortia access. This means that the number of institutions with access to Scandinavian Journal of Immunology has increased during recent years. In 2020 the total submission was 556 (450 in 2019) manuscripts with a rejection rate of 78 % (81 % in 2019).

The impact factor for 2019 has continued to increase to 2.717 (2.563 in 2018).

INTERNATIONAL PUBLICATIONS

- Azeem W, Bakke RM, Appel S, Øyan AM, Kalland KH. Dual Pro- and Anti-Inflammatory Features of Monocyte-Derived Dendritic Cells. *Front Immunol.* 2020 Mar 27;11:438. doi: 10.3389/fimmu.2020.00438. eCollection 2020.PMID: 32292402.
- Bastard P, Rosen LB, Zhang Q, Michailidis E, Hoffmann HH, Zhang Y, Dorgham K, Philippot Q, Rosain J, Béziat V, Manry J, Shaw E, Haljasmägi L, Peterson P, Lorenzo L, Bizien L, Trouillet-Assant S, Dobbs K, de Jesus AA, Belot A, Kallaste A, Catherinot E, Tandjaoui-Lambiotte Y, Le Pen J, Kerner G, Bigio B, Seeleuthner Y, Yang R, Bolze A, Spaan AN, Delmonte OM, Abers MS, Aiuti A, Casari G, Lampasona V, Piemonti L, Ciceri F, Bilguvar K, Lifton RP, Vasse M, Smadja DM, Migaud M, Hadjadj J, Terrier B, Duffy D, Quintana-Murci L, van de Beek D, Roussel L, Vinh DC, Tangye SG, Haerynck F, Dalmau D, Martinez-Picado J, Brodin P, Nussenzweig MC, Boisson-Dupuis S, Rodríguez-Gallego C, Vogt G, Mogensen TH, Oler AJ, Gu J, Burbelo PD, Cohen JI, Biondi A, Bettini LR, D'Angio M, Bonfanti P, Rossignol P, Mayaux J, Rieux-Laucat F, Husebye ES, Fusco F, Ursini MV, Imberti L, Sottini A, Paghera S, Quiros-Roldan E, Rossi C, Castagnoli R, Montagna D, Licari A, Marseglia GL, Duval X, Ghosn J; HGID Lab; NIAID-USUHS Immune Response to COVID Group; COVID Clinicians; COVID-STORM Clinicians; Imagine COVID Group; French COVID Cohort Study Group; Milieu Intérieur Consortium; CoV-Contact Cohort; Amsterdam UMC Covid-19 Biobank; COVID Human Genetic Effort, Tsang JS, Goldbach-Mansky R, Kisand K, Lionakis MS, Puel A, Zhang SY, Holland SM, Gorochov G, Jouanguy E, Rice CM, Cobat A, Notarangelo LD, Abel L, Su HC, Casanova JL. Autoantibodies against type I IFNs in patients with life-threatening COVID-19. *Science.* 2020 Oct 23;370(6515):eabd4585. doi: 10.1126/science.abd4585. Epub 2020 Sep 24.PMID: 32972996
- Bjordal O, Norheim KB, Rødahl E, Jonsson R, Omdal R. Primary Sjögren's syndrome and the eye. *Surv Ophthalmol.* 2020 Mar-Apr;65(2):119-132. doi: 10.1016/j.survophthal.2019.10.004. Epub 2019 Oct 18.PMID: 31634487 .
- Björk A, Da Silva Rodrigues R, Richardsdotter Andersson E, Ramírez Sepúlveda JI, Mofors J, Kvarnström M, Oke V, Svenungsson E, Gunnarsson I, Wahren-Herlenius M. Interferon activation status underlies higher antibody response to viral antigens in patients with systemic lupus erythematosus receiving no or light treatment.*Rheumatology (Oxford).* 2021 Mar 2;60(3):1445-1455. doi: 10.1093/rheumatology/keaa611.PMID: 33006609
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FRONTCOVER ILLUSTRATION:
Tonsils analyzed by imaging mass cytometry.CD14 (blue), CD141 (lime), and CD163 (red). Courtesy of Brith Bergum

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Summer party on Fløyen

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