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Center for Molecular Medicine

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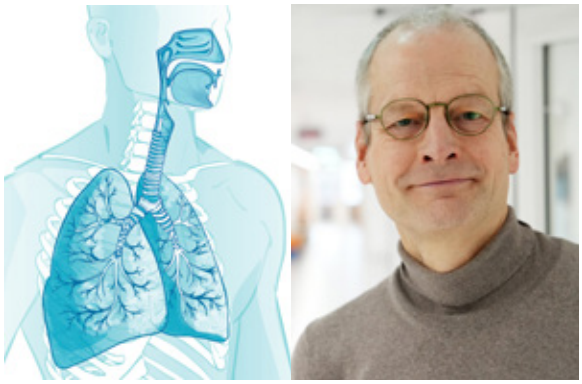

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Protein in the nose provides information about lung disorder

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Editor: Magdalena Lindén
Layout: Edna Fagerstedt

CMM

CMM Research Day 2025: Perspectives and bright future

Translational research at CMM – from bench to bedside

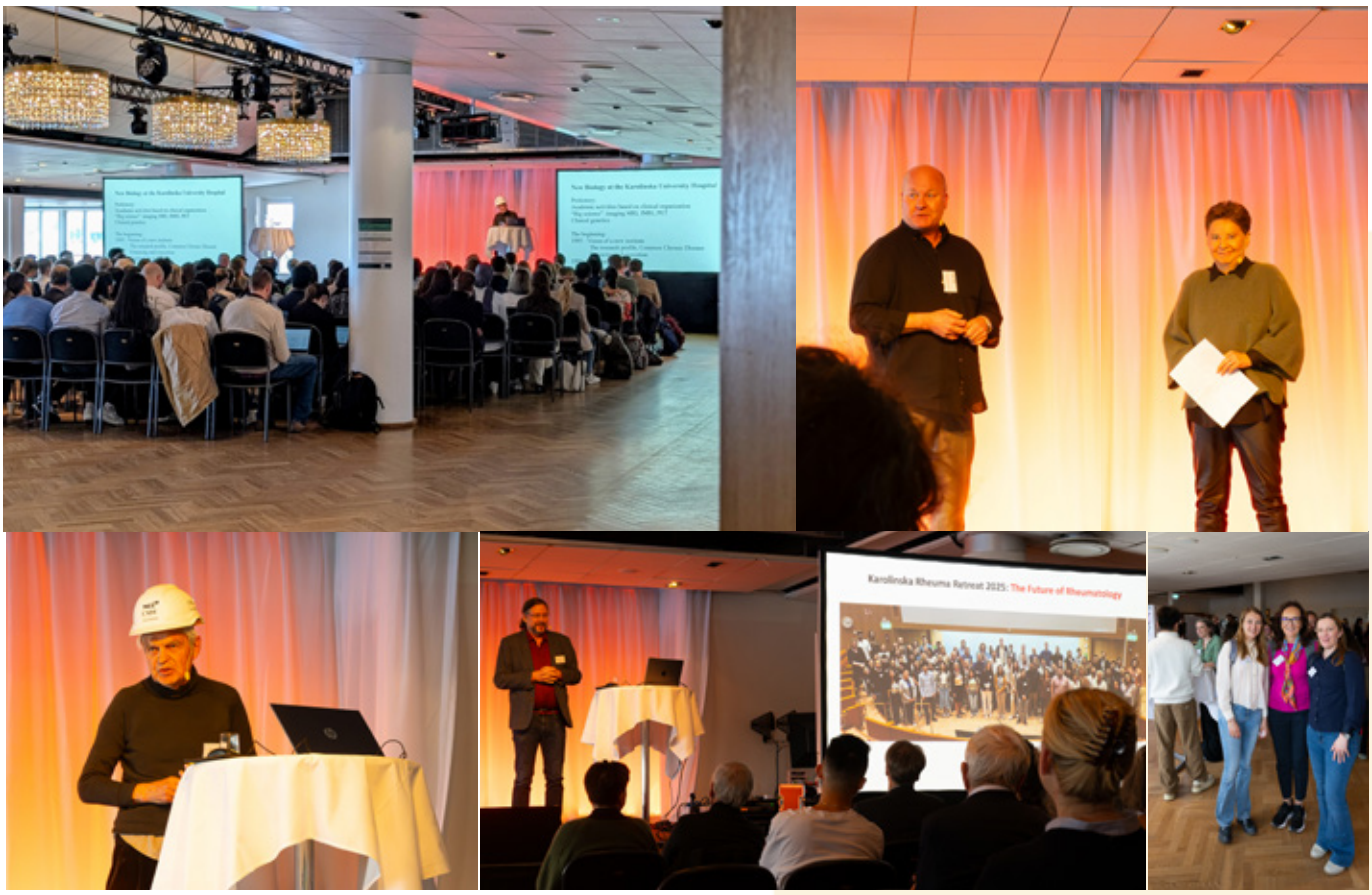
During the CMM Research Day 2025, held on May 14th at Münchenbryggeriet, CMMers from different research groups and teams gathered to network and get deeper insights into the legacy and promising future of translational research at CMM.

Opening reflections and future visions

The day began with a warm welcome from CMM Director Michael Sundström, setting the tone for a celebration of scientific excellence, collaboration and sense of community. Former CMM Director and one of the pioneers and founders of CMM, Lars Terenius, took the audience on a journey back to the foundations and history of CMM over the past three decades. The Chair of the Board of the CMM Foundation, Liselotte Jansson, brought the perspective further into CMM in the present and future developments. Upcoming is a fundraising project that Liselotte asked the entire CMM to consider how they can contribute to by showcasing their research.

Presentation of cutting-edge translational research

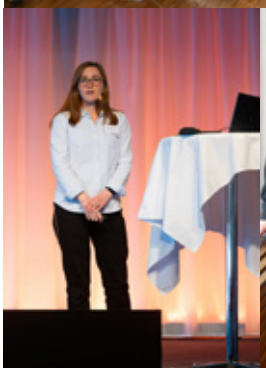
The subsequent presentations gave an insight into the major CMM



groups' research in areas such as rheumatology, neuropharmacology and movement disorders, dermatology, immunology and respiratory medicine, translational psychiatry, infectious diseases, autoimmunity, development of autonomic control, personalized medicine and drug development, neuroimmunology and cardiovascular medicine.Vladana Vukojevic, Litika Vermani and Cecilia Söderberg Naucler gave masterful flash talks on their respective research areas and expertise.

In the middle of the day, an appreciated talk about research, education and development at Karolinska University Hospital, was given by Olof Akre, the FoUU Director at the hospital.

Poster session, dinner, and awards
The buzzing atmosphere and eager scientific conversations during the poster session continued as participants took their seats at the dinner tables set up in the large Mälarsalen overlooking the Stockholm City Hall. During the three-course dinner, the CMMers put their relevant and less relevant knowledge about CMM to



the test during a quiz where the excitement was high until the very end when the winning couple took home the victory and the precious prize: a coffee mug each with the print "I love CMM".

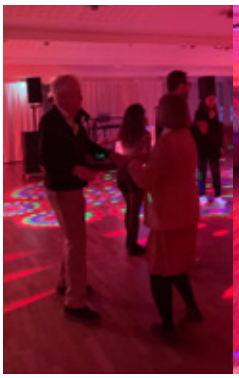
Another prize awarded during the dinner was the best scientific poster award, consisting of SEK 10,000 to be used for a conference or course, which went to PhD student Francisca Castillo for the abstract, poster and presentation entitled "An oxysterol-producing enzyme tunes mucosal healing in ulcerative colitis."

Dancing into the future of translational research at CMM

The dance floor and the bar opened after dinner and the evening ended with tunes from DJ Jorge and dance steps by those who still had some energy left after this intense and fruitful day.

Big thanks to the organizing committee*, the speakers and everyone who contributed to making the CMM Research Day 2025 interesting, fun, memorable and hopefully contributing to further collaborations and excellent development in the field of translational medicine.

Text: Magdalena Lindén
Photos: Erik Holmgren



*CMM Research Day organizing committee: Begum Horulouglu, Gustavo Monasterio, Ida Nilsson, André Ortlieb, Nicolas Ruffin, Elin Rönnberg Höckerlind, Vladimir Shavva, and Olivia Thomas. CMM Research Day main coodinator: Kristina Edfeldt.

New CMMers during spring 2025

Julia Backman joined Carolina Hagberg's Group as a PhD student. She is originally from Stockholm and completed her MSc in Nutrition science at Karolinska Institutet in last year. Her research interests include obesity and the role of overnutrition in metabolic dysregulation. In her doctoral project, she will be studying lipid-induced adipocyte growth and the intracellular crosstalk between adipocytes and endothelial cells and macrophages.

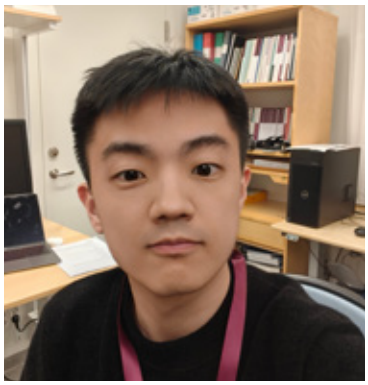
Marije van Rijswijk is a Master's degree student at the University of Utrecht. She is doing a six months internship in the lab of Sebastian Lewandowski where she is studying the phenotype of arteriole dysfunction in ALS patient and mouse model data.

Buse Yel Bektash joined the Translational Psychiatry group at CMM as a PhD student under the supervision of Catharina Lavebratt. Buse holds a MSc in Biomedicine from Karolinska Institutet and has gained valuable experience as a research assistant in the Department of Neuroscience over the past year. Driven by a passion for translational research, her PhD project focuses on identifying inflammatory biomarkers in psychosis patients and exploring the effects of physical exercise. Her ultimate goal is to unravel the intricate interactions between the brain and the body. Buse is working toward defending her thesis in the autumn of 2028.

New CMMers during spring 2025

Dinesh Nirmalan is second year master student in Drug Discovery and development from Uppsala University. He joined Per Johan Jakobsson group for his master thesis project until Summer 2025. He was working on Investigating mechanisms behind JAK inhibitiors induced cardiovascular events under supervision of Helena Idborg and Sabreen Alabbasi.

Fatima Amer Mehdi, a student at the Master of Pharmacy program at Uppsala University. During Spring, she was working on her Master's thesis in Per-Johan Jakobsson's research group.

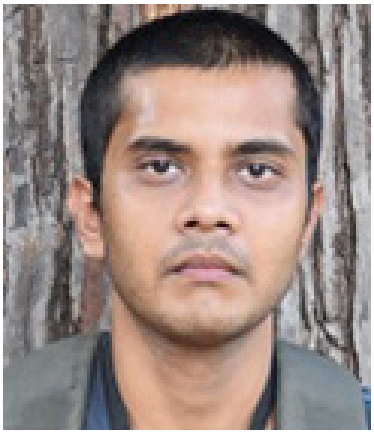


Qingyu Sun is an M.D. student at Shandong University in China. During Spring he joined Per-Johan Jakobsson's group as an exchange student. During this period he studyed the mechanisms of osteogenesis and osteoclast related to PGE2 in inflammatory condition.

New CMMers during spring 2025

Yogesh Todarwal holds a PhD in Computational Science from KTH 2024 with a specialisation in data analysis and computational modelling. He has joined as a postdoc at KTH/KI-Eric Herlenius group at CMM supported by Digital Futures Stockholm. He further develops the clinical decsion support system DeepNEWS, utilising neonatal vital sign data to build predictive models aimed at the early detection of adverse health events.

Alireza Salehi M. Senior researcher and Project Manager, Research Institutes of Sweden (RISE), Department of Digital Health, Stockholm and in Eric Herlenius group since December 2024. AI service provider for health and pharma, EU-project leader at RISE, AI-Implementation expert, teaching and supervision for PhD-students and postdoctoral-researchers involved n Implementation of the DeepNEWS CDSS (Clinical Decsion Support System).



Kanjar De is a computer scientist with a PhD, specializing in AI and machine learning with a strong focus on healthcare applications. Employed at RISE and senior researcher in Herlenius research team since Dec 2024. His proficiency spans computer vision, including medical images, as well as natural language processing and recommendation systems. He is particularly interested in developing robust, adversarial-resistant models and optimizing their deployment in real-world healthcare scenarios.

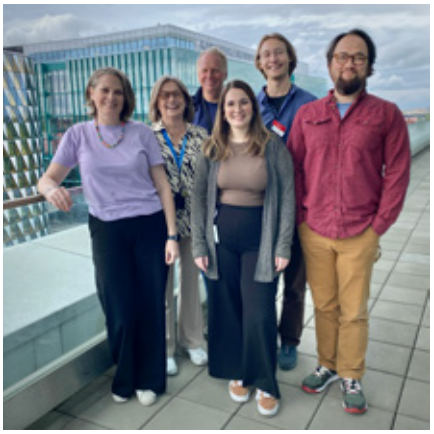
New CMMers during spring 2025

Alana Frias is a visiting postdoc in Eric Herlenius's group. She holds a PhD in Pharmacology and Physiology from State University of Sao Paulo/Brazil, and is currently contributing to studies investigating brainstem mechanisms involved in respiratory regulation, with a focus on astrocytes and chemosensitivity to CO2. Her work involves histological analysis, image processing, electrophysiological analysis and potentially transcriptome data analysis. She is particularly interested in how specific neuronal populations and glial cells contribute to homeostatic responses under different environmental challenges.

Qingyang Qiu is a first-year master's student in Medical Engineering at KTH Royal Institute of Technology, . She recently joined Eric Herlenius's group at CMM for a research internship, focusing on analyzing physiological signals to follow and to predict neonatal maturation.

New appointments

Hanna Björck is a new CMM Group Leader

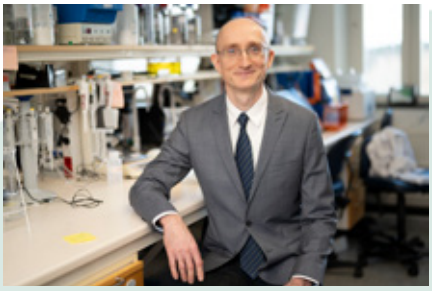


Hanna Björck, Group leader, Karin Lång, Biomedical scientist, Per Eriksson, Senior professor, Claudia Reyes Goya, Postdoc, David Freiholtz, PhD-student, Otto Bergman, Senior research infrastructure specialist.

The research interest of Hanna Björck's group lies within the field of ascending aortic disease, a silent yet potentially life-threatening condition it the aortic wall rupture or dissects. Their primary focus is to understand the molecular and genetic mechanisms behind its development, and how it relates to different types of valvular disease, but they also perform clinical outcome and prognosis studies. Together with colleagues at the thoracic surgical clinic at NKS, they have built unique patient cohort (>2,900 patients) and biobank of aortic biopsies, vascular cells, plasma/serum/blood and DNA, a tremendous resource and source of inspiration.

Sebastian Lewandowski is a new CMM Team Leader

Sebastian Lewandowski's team studies cellular mechanisms of cerebrovascular injury mechanisms in ALS neurodegeneration to find novel clinical biomarkers and therapeutic solutions.



Sebastian Lewandowski.
Photo: Ulf Sirborn.

Other appointments

Kyla McKay.
Photo: Brian Wheeler.

Kyla McKay, affiliated to the Department of Clinical Neuroscience and Jan Hillert's CMM Group, was appointed as docent in public health, global health and social medicine on the 29 of April 2025. Her research focuses largely on the causes and consequences of multiple sclerosis.

Honorary doctorate awarded to Ingrid Lundberg

AWARDS

CMM Group Leader Ingrid Lundberg, senior physician and professor of rheumatology, has been awarded the title of honorary doctor at Universitat Autònoma de Barcelona (UAB) for her significant contributions to myositis research.

At a solemn ceremony on March 25, she was appointed honorary doctor at Universitat Autònoma de Barcelona (UAB). In his speech, UAB's rector, Javier Lafuente, praised both her academic career and her empathy, generosity, and altruism towards patients and colleagues.

Ingrid Lundberg was also commended for her ability to bring together clinicians and researchers from around the world and engage them in projects that impact clinical practice, which have been crucial for the knowledge and treatment of inflammatory myopathies today.

Ingrid Lundberg and Javier Lafuente, rektor at the UAB. Photo: UAB

Anna-Greta & Holger Crafoord´s Fund for Polyarthritis

Kittikorn Wangriatisak (postdoc) and Begum Horuluoglu (assistant professor) at the division of rheumatology, received the Anna-Greta and Holger Crafoord´s Fund for Polyarthritis. The aim of the award is to promote basic scientific research worldwide in the discipline. Kittikorn Wangriatisak and Begum Horuluoglu will use the funds for their projects “Functional Characterization of Autoreactive B-Cells in SLE: Insight into Disease Mechanisms and Therapeutic Implications” and “Pathogenic Role of Autoantibodies in Myositis Associated Interstitial Lung Disease”

The award was presented at the same event as the Crawford Prize in May 2025.

Begum Horuluoglu and Kittikorn Wangriatisak receiving the award from HM King Carl XVI Gustaf. Photos: Private

Olle Kämpe gets extension as Wallenberg Clinical Scholar

FUNDING AND GRANTS

In 2025, five Wallenberg Clinical Scholars have been granted an extended grant for another five years. Among these is CMM Group Leader Olle Kämpe, who will thus receive support for a total of ten years for his research into the causes of autoimmune diseases.

The immune system is supposed to protect us from viruses, bacteria and other microorganisms, but in some people, the system goes wrong and it starts to react against their own body. This causes autoimmune diseases such as type 1 diabetes or Addison's disease.

Professor Olle Kämpe wants to understand what is happening and be able to alleviate and in the long term perhaps stop the effect. The grant as a Wallenberg Clinical Scholar is now being extended by five years and SEK 15 million. The support is of great importance for the continued work.

"This grant provides stability in the long term, something that we wish other funders would emulate. This will give us the conditions to study autoimmune conditions that are self-limiting, in order to better understand which physiological mechanisms can interrupt an attack on the body's own tissue," says Olle Kämpe, professor at the Department of Medicine, Solna, Karolinska Institutet and research group leader at CMM.

Knut and Alice Wallenberg Foundation is investing almost SEK 600 million over a ten-year period in the research programme Wallenberg Clinical Scholars.

Olle Kämpe. Photo: Private.

The aim of the programme is to strengthen Swedish clinical research by means of identifying the best clinical researchers, providing them with good conditions to undertake their work, and facilitate the impact of research results in the scientific and healthcare communities.

Wallenberg Clinical Scholars is part of a ten-year initiative undertaken by the Knut and Alice Wallenberg Foundation to strengthen medical research and the life sciences.

This text is based on an article from Karolinska Institutet news site.

Funding and Grants

Novo Nordisk Foundation grant for development of novel therapeutics targeting adipose tissue

Carolina Hagberg. Photo: Private.

Carolina Hagberg is a co-applicant on the awarded Novo Nordisk Foundation Open Discovery Innovation Network (ODIN) grant of DKK 6 000 000 in total (~SEK 9 000 000) together with Assoc. Prof. Zach Gerhart-Hines (CBMR, Denmark) and Thomas Pedersen (Novo Nordisk), of which about half of the budget is allocated to the Carolina Hagberg lab, titled Engineering Adipose Tissue Organoids For Developing Novel Therapeutics (ADIPOTECH).

Marie Skłodowska-Curie Actions (MSCA) postdoc grant to Angélica Díaz Basabe

Angélica Díaz Basabe, postdoc in Eduardo Villablanca's group, has received the prestigious Marie Skłodowska-Curie Actions (MSCA) Postdoc Fellowship. The grant is open to younger, successful researchers and provides opportunities for them to build an international career and to develop their skills in their particular discipline. MSCA is the EU's flagship programme to promote international mobility among leading young researchers.

Angelica's postdoc project is titled 'GUTMATES – Exploring the impact of gut microbiota-derived octadecanoids on mucosal healing'.

This is a collaborative project between Eduardo Villablanca's and Craig Wheelock's research groups at CMM. Eduardo Villablanca is the main research leader of the project.

Angelica Diaz Basabe. Photo: Private.

Funding for ALS research

Sebastian Lewandowski's research team was awarded a grant from the Ulla-Carin Lindquist Foundation for ALS research. The project called "The role of brain fibroblasts in ALS neurodegeneration" was funded with a total of SEK 1 200 000 over two years (2025-2026).

Funding and Grants

Generous allocation from the Swedish Rheumatism Association

The Swedish Rheumatism Association (Reumatikerförbundet) has granted funding to 87 research projects for 2025. A total of SEK 13,689,000 was awarded to projects across the country. 18 of the projects are run by researchers at CMM, funded with a total of SEK 3,480,000 for 2025.

A large proportion of this year's projects investigate different aspects of how a rheumatic disease can affect the individual - everything from pain and fatigue, to lung disease, neuropsychiatric changes, cancer, cardiovascular disease and osteoporosis.

The Swedish Rheumatism Association is one of the largest private donors to rheumatological research in Sweden. This is thanks to donations from the public.

CMMers among the Swedish Rheumatism Association grantees 2025:

Erik Sundberg: Utveckling av register för barn med myositsjukdomar för ökad kunskap och vårdkvalitet: SEK 100 000.

Helena Idborg: Mekanismer bakom kardiovaskulära biverkningar vid behandling med JAK-hämmare: SEK 75 000.

Antonella Notarnicola. Lungengangemang vid myositsjukdomar:huvudsaklig drivkraft för prognos och behandling: SEK 100 000.

Karin Lodin: Biomarkörer och patientrapporterade utfallsmått för klinisk förbättring och behandlingssvar vid myosit: SEK 100 000.

Lina Marcela Diaz Gallo Norlén: Att reda ut den genomiska bakgrunden för SLE-undergrupper definierade av kända autoantikroppar: SEK 100 000.

Begum Horuluoglu: Undersökning av funktionen och bidraget av autoreaktiva T-celler vid autoimmunitet: SEK 125 000.

Dionysis Nikolopoulos: Precisionsmedicin vid neuropsykiatrisk systemisk lupus erythematosus (PreNeuroLup): SEK 125 000.

Fabricio Espinosa Ortega: Karakterisering av patienter med reumatisk muskelinflammation (myosit) negativa för myositspecifika-och associerade antikroppar: SEK 125 000.

Jon Lampa: Kvarstående smärta och trötthet trots antireumatisk behandling, en epidemiologisk och mekanistisk kartläggning vid tidig RA: SEK 150 000.

Natalia Sherina: Biomarkör forskning inför utveckling av CAR-NK-cell behandling för systemisk lupus erythematosus: SEK 150 000.

Caroline Grönwall: B-celler och autoantikroppar vid reumatisk sjukdom – kartläggning av komplexa interaktioner: SEK 200 000.

Helena Erlandsson Harris: Att förstå orsakerna till ledgångsreumatism hos barn: SEK 250 000.

Ioannis Parodis: Precisionsdiagnostik och individanpassad behandling vid systemisk lupus erythematosus (PREDICT-LUPUS): SEK 330 000.

Ingrid Lundberg: Sjukdomsmekanismer och behandlingseffekter vid kronisk reumatisk muskelinflammation, myosit: SEK 350 000.

Marie Wahren-Herlenius: Sjögrens syndrom - kliniska och immunologiska studier: SEK 350 000.

Per-Johan Jakobsson: Tidig diagnostik och tidig behandling vid reumatisk sjukdom: SEK 250 000.

Karine Chemin: Hur överlever T-celler vid inflammation?- Metabolisk kartläggning av vävnadsinfiltrerande T-celler i reumatiska sjukdomar: SEK 300 000.

Vivianne Malmström: Lymfocyters betydelse vid inflammatorisk reumatisk sjukdom: SEK 300 000.

Funding and Grants

Image: iStock.

ALF grants

Every year, the publicly financed health-care provider, Region Stockholm funds clinically oriented research projects within the Stockholm area. This year, 22 CMMers received these so called ALF grants within different categories.

Clinical postdoc

Angeles Shunashy Galindo Feria received SEK 1,000,000 over two years for the project Decoding Immune Enigmas: Immune cell Phenotyping and antibody profile in inflammatory myopathies, myositis.

Johannes Mofors received SEK 1,000,000 over two years for the project Identifiering av prediktiva faktorer för utfall och vård vid primärt Sjögrens syndrom.

Clincal researcher

Ioannis Parodis received SEK 1,000,000 over two years for the project Precision Diagnoscs and Medicine in Systemic Lupus Erythematosus (PREDICT-LUPUS).

Senior clincal researcher

Hanna Brauner received SEK 800,000 over two years for the project Hudlymfom - kliniska och experimentella studier av sjukdomsmekanismer, samsjuklighet, diagnostiska verktyg och effekten av behandling.

NSV project funds

Ann Nordgren received SEK 900,000 over two years for the project Optimerad vård för vuxna med genetiskt orsakade syndrom inom primärvården.

Resident researcher (forskar ST)

Monica Torres received SEK 800 000 over two years for the project Metabolism in psoriasis and wound healing.

Theodora Ntetsika received SEK 800,000 over two years for the project Studier om kopplingen mellan glukoshomeostas och Parkinsons sjukdom.

Funding and Grants

ALF grants

Project funds

Martin Schalling received SEK 1,900,000 over three years for the project Farmakokinetiska, genetiska, cellbiologiska och molekylära studier av litium för optimerad effekt och minskad somatisk sjukdomen translationell studie med ny teknik.

Catharina Lavebratt received SEK 1,600,000 over three years for the project Skyddar probiotika mot kärlinflammation hos barn med ADHD?

Ola Nilsson received SEK 300,000 over one year for the project Precisionsmedicin för barn med tillväxt och skelettsjukdomar.

Anna Lindstrand eceived SEK 1,500,000 over three years for the project Studier av strukturella kromosomavvikelser med helgenomsekvensering i klinisk diagnostik.

Richard Rosenquist Brandell received SEK 1,200,000 over three years for the project Charting the complex molecular landscape in chronic lymphocytic leukemia: the path towards precision medicine.

Lou Brundin received SEK 1,100,000 over three years for the project Allvarlig neuroinflammation -Studier av Neuromyelitis Optica och Neurosarkoidos.

Tomas Olsson received SEK 1,500,000 over three years for the project Multipel Skleros: tvärdisciplinära studier av orsaker, patogenes och behandlingsstrategier.

Lars Alfredsson received SEK 1,400,000 over three years for the project The significance of environmental and lifestyle factors for the onset and course of multiple sclerosis.

Vivianne Malmström received SEK 900,000 over three years for the project Development and evaluation of tools for monitoring autoreactive and pathogenic lymphocytes in rheumatic disease.

Caroline Grönwall received SEK 1,050,000 over hree years for the project Impact of cytokine-targeted therapy on autoreactive B cells in rheumatoid arthritis.

Wheelock Åsa received SEK 900,000 over three years for the project Integration of eHealth and molecular phenotyping of patients with post-acute sequele of COVID-19 (PASC) for sub-grouping and elucidation of molecular mechanisms.

Marie Wahren-Herlenius received SEK 1,900,000 over three years for the project Sjögrens syndrom - kliniska och patogenetiska studier.

Magnus Sköld received SEK 2,100,000 over three years for the project Lungfibros: Kliniska och translationella studier.

Rebecka Hultgren received SEK 2,400,000 over three years for the project Patogenes vid Aortasjukdom.

Magnus Bäck received SEK 1,200,000 over three years for the project Återställande av kroppsegna anti-trombotiska skyddsmekanismer för att förebygga aortastenos och motverka komplikationer efter klaffbyte.

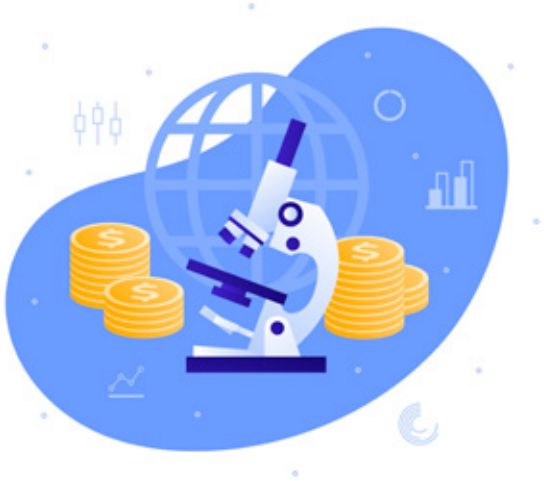


Image: iStock.

Some publications

CMMers IN BOLD

Prenatal exposure to maternal hypertension and higher body mass index and risks of neurodevelopmental and psychiatric disorders during childhood. Nivins S, Kumar P, Chen X, Gissler M, **Lavebratt C**. *Acta Obstet Gynecol Scand.* 2024 Nov 29.

Identification of subgroups of early-stage mycosis fungoides patients with increased itch and impaired quality of life. **Nenonen J**, Winther AH, Jonsson P, Ivert LU, **Brauner H.** *Front Oncol.* 2025 Feb 28;15:1524353. doi: 10.3389/fonc.2025.1524353. eCollection 2025.

Antibody reactivity against EBNA1 and GlialCAM differentiates multiple sclerosis patients from healthy controls. Sattarnezhad N, **Kockum I, Thomas OG, Liu Y,** Ho PP, Barrett AK, Comanescu AI, Wijeratne TU, Utz PJ, Alfredsson L, Steinman L, Robinson WH, **Olsson T**, Lanz TV. *Proc Natl Acad Sci U S A*. 2025 Mar 18;122(11):e2424986122. doi: 10.1073/pnas.2424986122. Epub 2025 Mar 10.

Spatiotemporal single-cell roadmap of human skin wound healing. **Liu Z, Bian X, Luo L,** Björklund ÅK, Li L, Zhang L, Chen Y, Guo L, Gao J, Cao C, Wang J, He W, Xiao Y, Zhu L, Annusver K, Gopee NH, Basurto-Lozada D, Horsfall D, Bennett CL, Kasper M, Haniffa M, Sommar P, Li D, **Landén NX**. *Cell Stem Cell*. 2025 Mar 6;32(3):479-498.e8. doi: 10.1016/j.stem.2024.11.013. Epub 2024 Dec 26.

Diffuse large B cell lymphoma in rheumatoid arthritis patients is associated with elevated B-cell driving factors including CXCL13. **Euler N**, Hellbacher E, Klint EA, Hansson M, Larsson A, Enblad G, **Malmström V,** Baecklund E, **Grönwall C**; AUTO-LYMPHOMA study group. *Clin Immunol*. 2025 Mar 19;275:110476. doi: 10.1016/j.clim.2025.110476. Online ahead of print.

Recognition of glycine versus non-glycine citrulline motifs dictates the HLA class II association of anti-citrullinated protein antibodies - insights from autoantibody profiling of 6900 Scandinavian rheumatoid arthritis patients. Alm LM, Westerlind H, Gehring I, Hansson M, Ghasemzadeh N, Rojas-Restrepo J, Saevarsdottir S, Sexton J, Lillegraven S, Haavardsholm E, Glintborg B, Hammer HB, Kvien TK, Hetland ML, **Padyukov L**; Swedish Rheumatology Quality Register Biobank Study Group (SRQb), The Danish Rheumatologic Biobank Study Group; Askling J, **Grönwall C**. *Arthritis Rheumatol*. 2025 Mar 21. doi: 10.1002/art.43161. Online ahead of print.

JAK Inhibitors and B Cell Function: A Comparative Study of Their Impact on Plasma Cell Differentiation, Cytokine Production, and Naïve B Cell Activation. Huang W, de Vries C, Sharma RK, Wangriatisak K, Chatzidionysiou K, Malmström V, Grönwall C. *Eur J Immunol.* 2025 Mar;55(3):e202451437. doi: 10.1002/eji.202451437.

Decreased levels and function of dendritic cells in blood and airways predict COVID-19 severity. Österberg B, Falck-Jones S, Vangeti S, Åhlberg E, Yu M, Granja D, Snik ME, Falck-Jones R, Barros GW, Charles A, Lepzien R, Johansson N, Holmes TH, Maecker H, Czarnewski P, Bell M, **Färnert A, Smed-Sörensen A.** *Clin Transl Immunology*. 2025 Mar 3;14(3):e70026. doi: 10.1002/cti2.70026. eCollection 2025.

An international consensus on the use of asthma biologics in pregnancy. Jennifer Naftel, David J Jackson, Matthew Coleman, Grainne d'Ancona, Liam G Heaney, Paddy Dennison, **Apostolos Bossios**, Hitasha Rupani. *The Lancet Respiratory Medicine,* Volume 13, Issue 1, 80 – 91.

A novel model of cardiovascular-kidney-metabolic syndrome combining unilateral nephrectomy and high-salt-sugar-fat diet in mice. Carvalho LRRA, Shimari M, Boeder AM, Zhuge Z, Cai M, Leijding C, Gastaldello S, Kleschyov AL, Schiffer TA, Guimarães DD, Picozzi G, Lund LH, Fellström B, Weitzberg E, Lundberg JO, **Hagberg CE**, Pironti G, Andersson DC, Carlström M. *Lab Anim* 53, 336–346 (2024). https://doi.org/10.1038/s41684-024-01457-5

Vascularized Adipose Spheroids: An Organotypic Model for Thermogenic Adipocytes. Davidsen LI, **Hagberg CE**, Goitea V, Meinild Lundby S, Larsen S, Frendø Ebbesen M, Kornfeld JW. *Frontiers in Endocrinology* 15:1396965 (2024).

Some publications

Mini abstract

Image: iStock.

Suppressing recurrence in Sonic Hedgehog subgroup medulloblastoma using the OLIG2 inhibitor CT-179

CMM researchers Sho Oasa, Lars Terenius and Vladana Vukojevic participated in an international collaboration focusing on the mechanism of action of a promising drug candidate for the Sonic Hedgehog (SHH) subgroup of medulloblastoma (MB), a severe pediatric brain tumor. The study, published in Nature Communications, demonstrates the effectiveness of CT-179, a selective small-molecule inhibitor of oligodendrocyte transcription factor 2 (OLIG2), in disrupting tumor stem cell function.

The researchers applied fluorescence cross-correlation spectroscopy (FCCS) to characterize in live cells the impact of CT-179 on OLIG2 homodimerization and DNA binding, providing key mechanistic insights into its mode of action. The findings support OLIG2 as a therapeutic target and highlight CT-179, a brain-penetrant, orally administered drug, as a promising candidate to improve treatment outcomes for SHH-driven MB.

PUBLICATION:
"Suppressing recurrence in Sonic Hedgehog subgroup medulloblastoma using the OLIG2 inhibitor CT-179". Li Y, Lim C, Dismuke T, Malawsky DS, **Oasa S,** Bruce ZC, Offenhäuser C, Baumgartner U, D'Souza RCJ, Edwards SL, French JD, Ock LSH, Nair S, Sivakumaran H, Harris L, Tikunov AP, Hwang D, Pauneto CDMA, Maybury M, Hassall T, Wainwright B, Kesari S, Stein G, Piper M, Johns TG, Sokolsky-Papkov M, **Terenius L, Vukojević V,** McSwain LF, Gershon TR & Day BW. *Nat Commun* 2025 16:1091. https://doi.org/10.1038/s41467-024-54861-3

New mechanism for vascular damage in type 2 diabetes

Small vesicles from red blood cells can transfer harmful molecules to blood vessels, contributing to damage and impairing their function in type 2 diabetes. The findings are reported by researchers affiliated with CMM in a new publication in the *Journal of Clinical Investigation*.

PUBLICATION:
"Erythrocyte-derived extracellular vesicles induce endothelial dysfunction through arginase-1 and oxidative stress in type 2 diabetes."
Collado A, **Humoud R**, Kontidou E, Eldh M, Swaich J, Zhao A, Yang J, Jiao T, Domingo E, Carlestål E, Mahdi A, Tengbom J, Végvári Á, Deng Q, Alvarsson M, **Gabrielsson S, Eriksson P, Zhou Z, Pernow J**. *J Clin Invest* 2025 Mar 20;135(10):e180900. doi: 10.1172/JCI180900.

Image: iStock.

HIGHLIGHTED PUBLICATION

Blood vessel damage is a common complication in type 2 diabetes, and it is associated with cardiovascular diseases such as heart attacks and strokes. The mechanisms behind blood vessel damage in diabetes are not well understood but a new study conducted by CMM Group Leader and Professor at Karolinska Institutet, John Pernow, reveals that extracellular vesicles from red blood cells contribute to this damage.

John Pernow and his research team found that vesicles from red blood cells in type 2 diabetes patients are more readily taken up by blood vessel cells than in healthy individuals. They discovered that these vesicles carry the signaling molecule arginase, which causes the formation of free oxygen radicals, impairing blood vessel dilation and contributing to diabetes-related vascular complications.

The study found that inhibiting vesicle uptake and blocking arginase activity can counteract harmful effects on blood vessels.

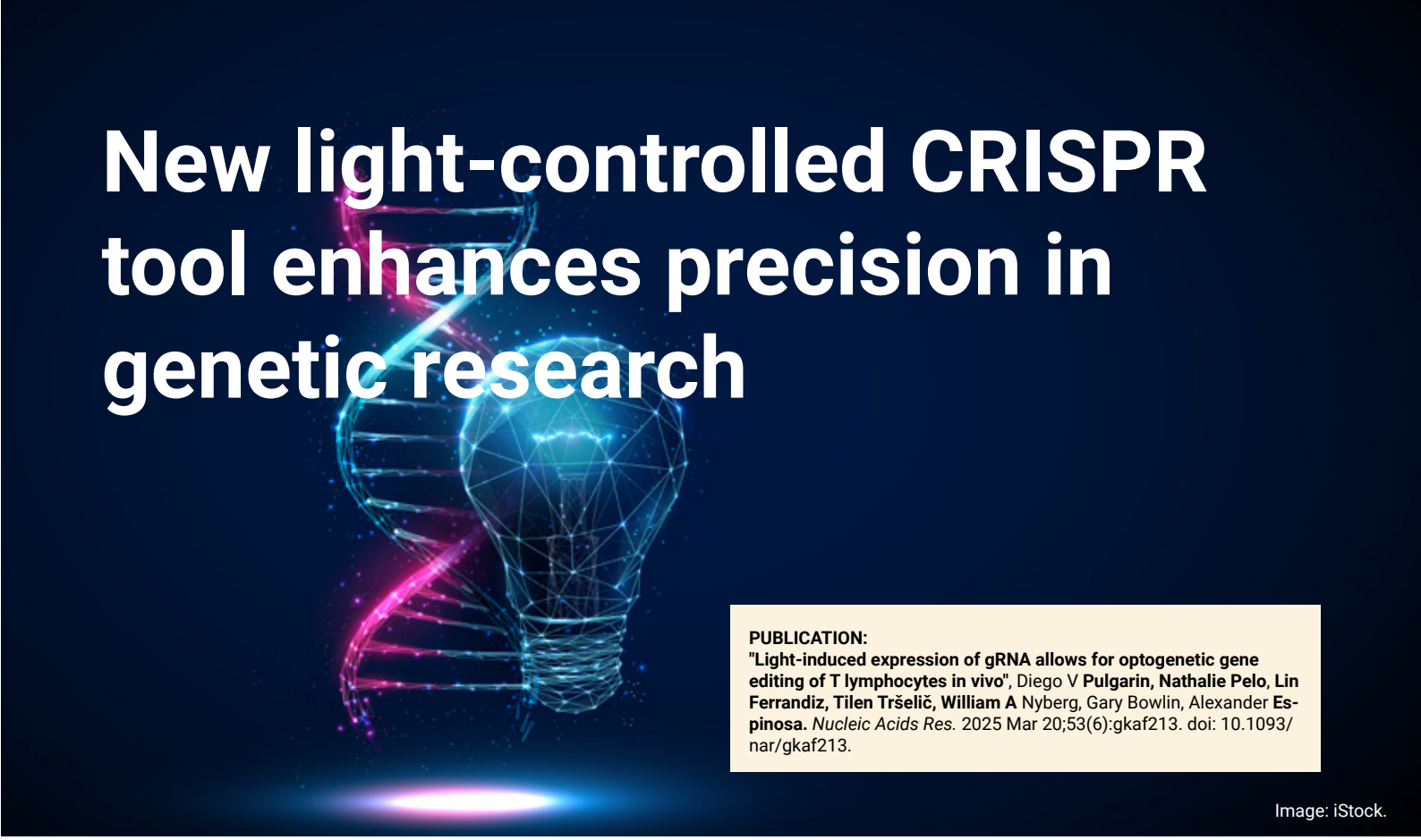
Aida Collado Sánchez, the first author of the study sees the potential of the new findings: “Our results provide a new understanding of how red blood cells contribute to vascular damage in type 2 diabetes and point to possible treatment strategies to counteract these complications,” she says in an article on the Karolinska Institutet news site.

Future research will explore blood vessel changes in patients and test new drugs candidates to block vesicle uptake.

The study was a collaboration with Karolinska University Hospital and funded by several Swedish foundations such as the Swedish Heart-Lung Foundation, the Swedish Research Council, and the Knut and Alice Wallenberg Foundation.

Aida Collado Sánchez and John Pernow.
Photos: Eftychia Kontidou and Ola Hedin, respectively.

New light-controlled CRISPR tool enhances precision in genetic research



PUBLICATION:
"Light-induced expression of gRNA allows for optogenetic gene editing of T lymphocytes in vivo", Diego V **Pulgarin, Nathalie Pelo**, **Lin Ferrandiz, Tilen Tršelič, William A** Nyberg, Gary Bowlin, Alexander **Espinosa.** *Nucleic Acids Res.* 2025 Mar 20;53(6):gkaf213. doi: 10.1093/nar/gkaf213.

Image: iStock.

HIGHLIGHTED PUBLICATION

Researchers from CMM have developed BLU-VIPR, a method to control CRISPR gene-editing using light. Published in *Nucleic Acids Research*, this tool could greatly improve our understanding of gene functions in complex organisms.

Traditional genetic research methods at large lack necessary tools with a high level of control to modify genes in specific areas of an organism at precise times. BLU-VIPR is the newly published method that solves this by using light to target specific anatomic areas, like lymph nodes, for gene modification.

“Our new tool for light-induced CRISPR will enable researchers to understand the biological role of genes much more precisely, which in turn will increase our understanding of biological processes”, says Alexander Espinosa, CMM Team Leader, associate professor at the Department of Medicine Solna and last author of the article.

The study describes how researchers created a light-induced transcription factor, VPR-EL222, by fusing the bacterial protein EL222 with a transcription activation domain called VPR. When exposed to blue light, this factor activates guide RNA, which binds to Cas9, leading to the editing of selected genes.

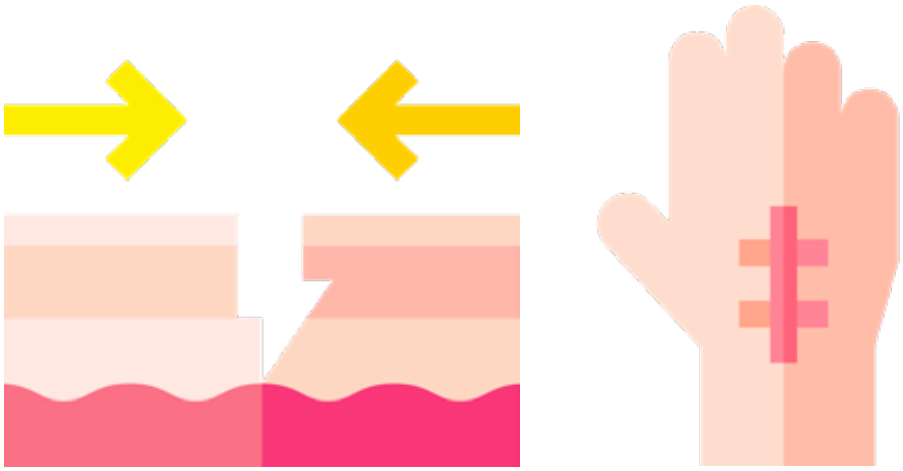
Alexander Espinosa and his team first tested the effectiveness of the method in cells in vitro. Thet then went on to demonstrate it in vivo by incorporating the light-induced CRISPR system into viral vectors, successfully delivering it to primary T cells and achieving light-induced gene knockouts in T cells within the lymph nodes of mice.

Alexander Espinosa. Photo: Nathalie Pelo

The researchers will now focus on refining the system to target genes in other cells of the immune system.

BLU-VIPR represents an important advancement in genetic research, providing scientists with a highly precise tool to investigate the complex functions and roles of genes in multicellular organisms and different diseases.

Important new insights into wound healing



Images: Flaticon

HIGHLIGHTED PUBLICATION

A study from Ning Xu Landén's group at CMM maps the cellular and molecular dynamics of human wound healing in exceptional detail. The study was published in *Cell Stem Cell*.

Self-healing of wounds is vital, but little is known about how cells cooperate during this process. To better understand this, researchers studied skin and wounds from the same individuals at different phases of healing: inflammation, proliferation, and remodeling.

They used advanced single-cell RNA sequencing and spatial transcriptomics techniques to track how cells and molecules change over time.

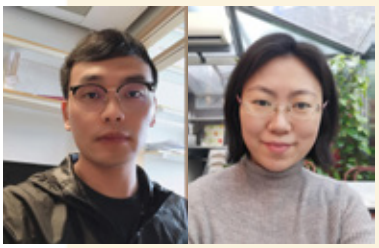
"We have discovered that an important protein, FOSL1, helps skin cells to move and cover wounds during the healing process. We have also seen that certain other cells, such as macrophages and fibroblasts, help these skin cells to move and repair the damage. When we compared wounds from people with chronic diseases, such as venous ulcers and diabetic foot ulcers, we found that problems with cell movement can make healing more difficult," says Zhuang Liu, postdoc researcher in Ning Xu Landén's at CMM and the Department of Medicine, Solna, Karolinska Institutet.

This breakthrough sheds light on why some wounds fail to heal effectively. Through a detailed comparison between chronic and acute wounds, the researchers uncovered impaired inflammatory responses and cellular migration capability, suggesting targeted approaches to overcome these healing barriers.

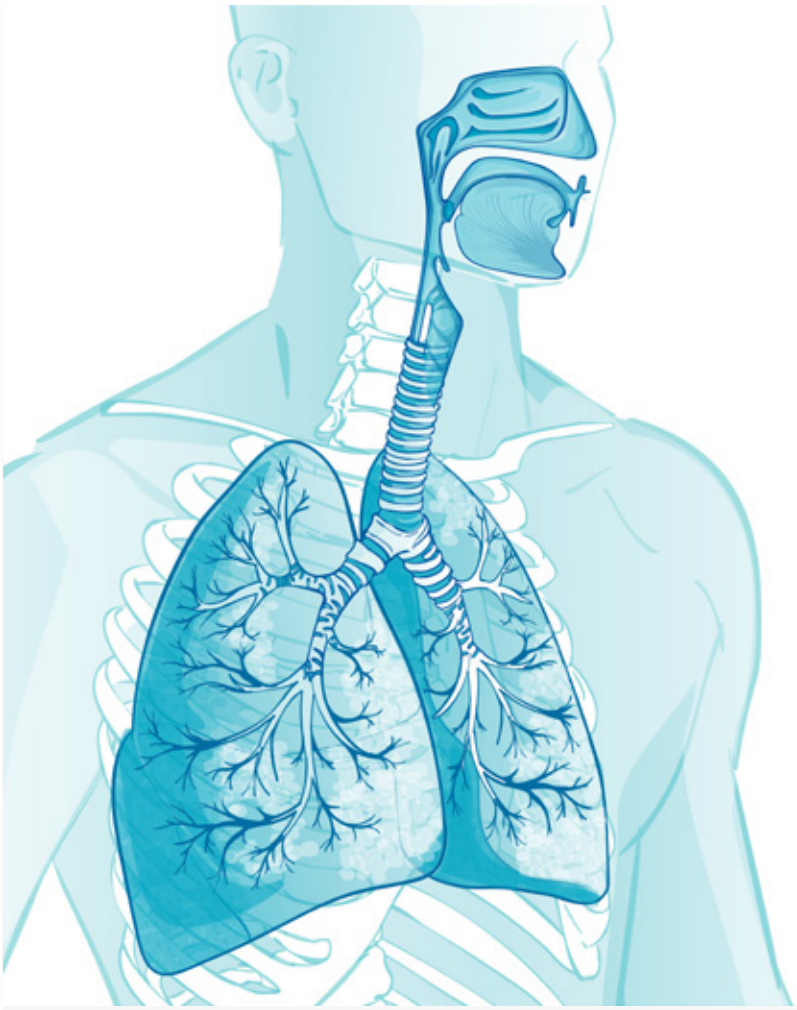
"Our findings also underscore the unique characteristics of human skin wound healing, which differ significantly from animal models. This is critical for bridging the gap between fundamental research and clinical innovation" explains CMM Group Leader Ning Xu Landén, associate professor at the same department.

The researchers hope that their work will contribute to improved clinical outcomes and a deeper understanding of the biological processes underpinning wound healing.

PUBLICATION:
"Spatiotemporal Single-Cell Roadmap of Human Skin Wound Healing", **Zhuang Liu**, **Xiaowei Bian, Lihua Luo,** Åsa K. Björklund, Li Li, **Letian Zhang**, Yongjian Chen, Lei Guo, Juan Gao, Chunyan Cao, Jiating Wang, Wenjun He, Yunting Xiao, Liping Zhu, Karl Annusver, Huda Gopee, Daniela Basurto-Lozada, David Horsfall, Clare L. Bennett, Maria Kasper, Muzlifah Haniffa, Pehr Sommar, Dongqing Li, **Ning Xu Landén**. *Cell Stem Cell*, Volume 32, Issue 3, 479 - 498.e8



Zhuang Liu and Ning Xu Landén. Photos: Private.



Protein in the nose provides information about COPD

PUBLICATION:
"Nasal production of IL-26 involving T cells in smokers with and without COPD", Julia Arebro, **Nikolaos Pournaras**, **Patricia Ramos-Ramírez**, Eduardo I. Cardenas, **Elga Bandeira**, Karlhans Fru Che, Bettina Brundin, **Apostolos Bossios**, Reza Karimi, Sven Nyrén, Pär Stjärne, **Magnus Sköld, Anders Lindén.** *J Allergy Clin Immunol.* 2025 Jul;156(1):118-128. doi: 10.1016/j.jaci.2025.03.017.

Image: iStock

HIGHLIGHTED PUBLICATION

Early diagnosis of chronic obstructive pulmonary disorder (COPD) improves patient quality of life and treatment effectiveness. Researchers at CMM found that nasal lavage material can help assess COPD at an early stage, potentially leading to a simple diagnostic method. The study was published in the *Journal of Allergy and Clinical Immunology*.

Chronic obstructive pulmonary disease (COPD) affects tChronic obstructive pulmonary disease (COPD) affects ten percent of the world population and is the fourth leading cause of death globally. It is primarily caused by biomass smoke, produced for instance by burning wood or animal dung for heat. Patients exhibit diverse symptoms and prognoses, necessitating individualized and simple diagnostic methods.

Researchers at CMM, Karolinska Institutet and Karolinska University Hospital have discovered that elevated levels of interleukin-26 (IL-26) in the noses of smokers, both with and without COPD, can help assess early-stage COPD. IL-26 is a cytokine crucial for immune cell communication and has direct inhibitory effects on bacteria and viruses. It has been linked to various inflammatory diseases, including COPD, where its levels are elevated in the lower respiratory tract.

The study, published in the Journal of Allergy and Clinical Immunology, focused on IL-26 production in the noses of smokers and its implications for individual COPD patients.

"We have discovered that IL-26 is produced in greater amounts in the nose of smokers with COPD compared to non-smokers, while smokers without COPD showed a tendency towards increased levels. This suggests that IL-26 may be an important factor in the inflammatory process underlying COPD," says the study's first author Julia Arebro, researcher at the Department of Clinical Science, Intervention and Technology, Karolinska Institutet, and physician at Karolinska University Hospital.

Julia Arebro.
Photo: Private.

The study involved 50 participants: habitual smokers with and without COPD, and healthy non-smokers, excluding those with other lung diseases. Participants underwent nasal lavage to measure IL-26 levels in the nose. Among other things, the study participants underwent a simple nasal lavage so that the researchers could analyse the presence of IL-26 in the nose.

The measured levels were found to reflect inflammation of the lower respiratory tract but also symptoms and other clinical findings in COPD.

This method offers a simpler way to characterize COPD patients without invasive, resource-intensive procedures. The study also found that T cells in the nose produce IL-26.

Anders Lindén.
Photo: Catarina Thepper.

"Our results support that IL-26 contributes to the chronic inflammation that is typical for COPD. This may open up for new treatment strategies that target IL-26 to reduce inflammation and improve the quality of life for patients with COPD," says Anders Lindén, CMM Group Leader, professor at the Institute of Environmental Medicine, Karolinska Institutet, and senior physician at Karolinska University Hospital who has led the research team behind the study.

The study was conducted on patients with mild to moderate COPD. Future research will focus on later stages of COPD to confirm these findings and potentially implement this diagnostic method within a few years.

The study was funded by the Swedish Heart-Lung Foundation, the Swedish Research Council, Region Stockholm (ALF funding), the Swedish Society for Respiratory Medicine, and AstraZeneca. The researchers report no conflicts of interest.

Next deadline for sending in contributions to CMM News: 28th of August

Genes combined with immune response to Epstein-Barr virus increase MS risk

Image: iStock.

PUBLICATION

In multiple sclerosis (MS), antibodies to the common Epstein-Barr virus (EBV) can accidentally attack a protein in the brain and spinal cord. New research shows that the combination of certain viral antibodies and genetic risk factors can be linked to a greatly increased risk of MS. The study has been published in the journal *PNAS* and led by researchers at Karolinska Institutet, Sweden, and Stanford University School of Medicine, USA.

An estimated 90 to 95 percent of adults are carriers of the Epstein-Barr virus (EBV) and have formed antibodies against it. Many become infected as children with few or no symptoms, but in young adults, the virus can cause glandular fever. After infection, the virus remains in the body in a dormant (latent) phase without active virus production.

Everyone affected by the neurological disease MS, where the immune system attacks the brain and spinal cord, is a carrier of EBV. However, the mechanisms behind the association are not fully understood.

Now, researchers at Karolinska Institutet and Stanford Medicine have confirmed that antibodies to an EBV protein called EBNA1 can inadvertently react with a similar protein in the brain called GlialCAM, which probably contributes to the development of MS. The new study also shows how different combinations of antibodies and genetic risk factors for MS contribute to the risk increase.

“A better understanding of these mechanisms may ultimately lead to better diagnostic tools and treatments for MS,” says Tomas Olsson, professor at the Department of Clinical Neuroscience at Karolinska Institutet and one of the study’s corresponding authors.

The researchers analysed blood samples from 650 MS patients and 661 healthy people. They compared the levels of antibodies directed against the viral protein EBNA1 and the levels of misdirected antibodies against GlialCAM and two other proteins in the brain, ANO2 and CRYAB, which are also similar to EBNA1.

Ingrid Kockum, Olivia Thomas and Tomas Olsson. Photos: Creo Media Group, Erik Holmgren, Andreas Andersson.

Elevated levels of all these antibodies were detected in people with MS. High antibody levels in combination with a genetic risk factor for MS (HLA-DRB1*15:01) were associated with a further increase in risk. The absence of a protective gene variant (HLA-A*02:01) in combination with any of the antibodies against proteins in the brain was also associated with a strong increase in risk.

“The new findings provide another piece of the puzzle that adds to our understanding of how genetic and immunological factors interact in MS,” says Lawrence Steinman, professor at Stanford Medicine, who led the research there with William H. Robinson and Tobias V. Lanz.

Researchers at Karolinska Institutet now plan to analyse samples collected before MS disease development to see when these antibodies appear.

“If they are already present before the onset of the disease, they may have the potential to be used as biomarkers for early diagnosis,” says Tomas Olsson.

The research was funded by the Swedish Research Council, the Swedish Brain Foundation, the EU/Horizon Europe, the Knut and Alice Wallenberg Foundation and the Margaretha af Ugglas Foundation, among others. Tomas Olsson and Lawrence Steinman have received lecture and advisory board fees from several companies. William H. Robinson and Tobias V. Lanz are stockholders and consultants of Ebvio and Flatiron Bio and have filed a patent with Stanford University. See the scientific article for a complete list of conflicts of interest.

PUBLICATION: “Antibody reactivity against EBNA1 and GlialCAM differentiates multiple sclerosis patients from healthy controls”, Neda Sattarnezhad, **Ingrid Kockum, Olivia G. Thomas**, **Yicong Liu,** Peggy P. Ho, Alison K. Barrett, Alexandros I. Comanescu, Tilini U. Wijeratne , Paul J. Utz, **Lars Alfredsson,** Lawrence Steinman, William H. Robinson, **Tomas Olsson,** Tobias V. Lanz. *Proc Natl Acad Sci U S A*. 2025 Mar 18;122(11):e2424986122. doi: 10.1073/pnas.2424986122.

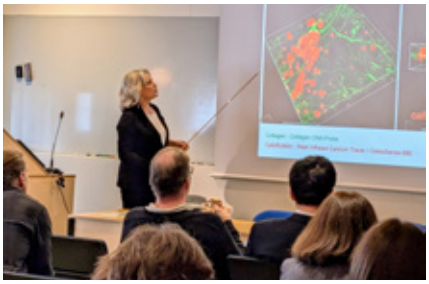
CMM Events and Outreach

CMM Seminar Series

Some glimpses from the CMM Seminars with William Nyberg and Georg Schett, respectively. Photos: Magdalena Lindén.

During Spring 2025 seminars within the CMM Seminar Series were held. On January 30th William Nyberg from the Department of Medicine Huddinge gave a talk titled 'Enhancing T cell therapies for cancer with precise gene editing'. Prof. Dr. Georg Schett, Freidrich-Alexander-Universität, Erlangen-Nürnberg and Karolinska Institutet was invited to give at talk on 'T cell engagers in autoimmune disease' on February 20th. Finally, on June 12th, Prof. Dr. F. Ulrich Hartl, Director of the Department of Cellular Biochemistry, Max Planck Institute of Biochemistry, Martinsried, Germany: “Molecular chaperones – cellular machineries of protein folding and proteostasis”

Cardiovascular seminar with professor Elena Aikawa



Professor Elena Aikawa during the seminar. Photo: Magdalena Lindén.

On March 26th, professor Elena Aikawa gave a talk at CMM, titled 'Novel insights into cardiovascular calcification'. The talk was a part of the Cardiovascular Research Seminar Series, organized by the Cardiovascular Research Program at Karolinska Institutet.

Elena Aikawa is a Professor of Medicine at Harvard Medical School as well as the Naoki Miwa Endowed Chair in Cardiovascular Medicine at Brigham and Women’s Hospital. Dr. Aikawa’s research focuses on developing therapies for calcific aortic valve stenosis, bridging basic science with advanced imaging. She is the Founding Director of the Heart Valve Translational Research Program and Co-director of the Center for Interdisciplinary Cardiovascular Sciences.

Ljubica Matic and Elena Aikawa. Photo: Magdalena Lindén.

The well attended seminar was hosted by Ljubica Matic, Nailin Li and Göran Hansson.

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