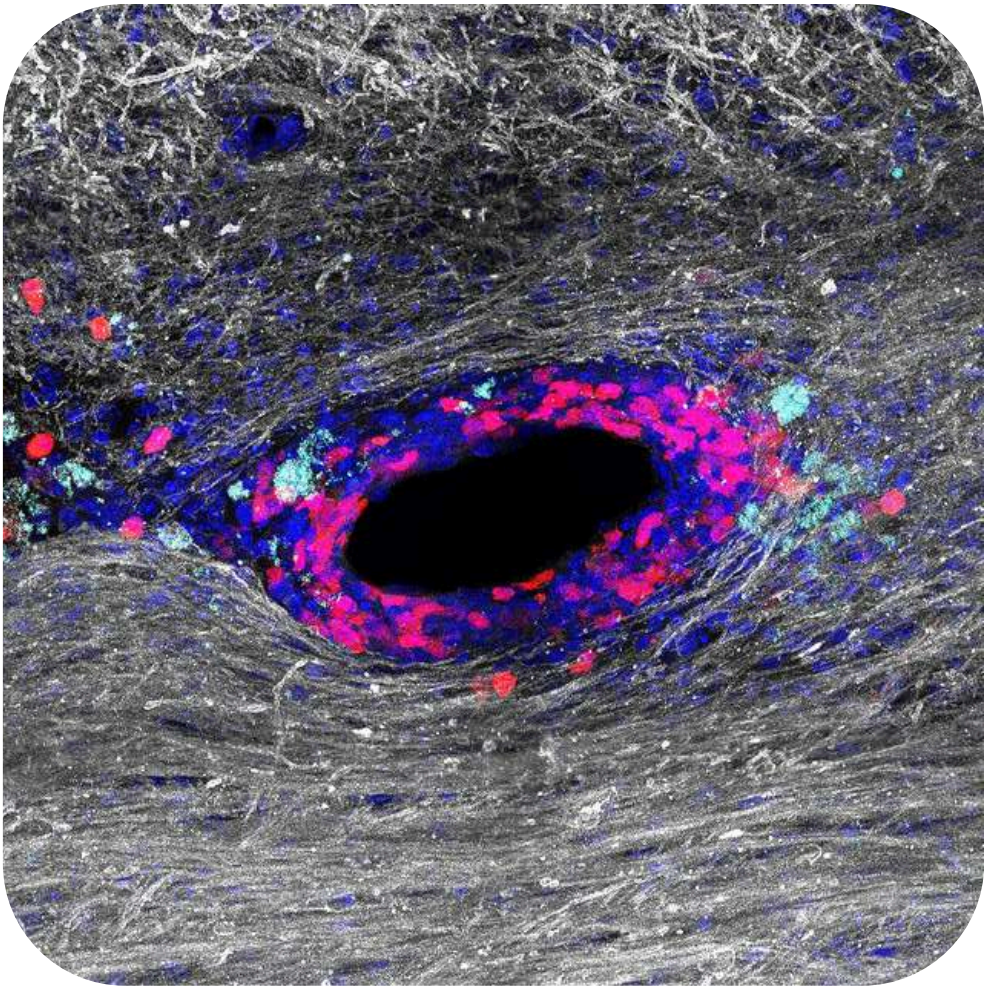
RESEARCH CENTER FOR CLINICAL
NEUROIMMUNOLOGY AND NEUROSCIENCE BASEL

RC2NB

ANNUAL REPORT 2025



*B cells infiltrating the area around a vein in the mouse brain following a viral infection

Universitätsspital Basel RC2NB University of Basel

CONTENT

RC2NB ANNUAL REPORT 2025

OUR VISION

ADVANCING SCIENCE, ENHANCING LIVES

Founded as a unique academic–industry initiative, the Research Center for Clinical Neuroimmunology and Neuroscience Basel (RC2NB) is dedicated to improving the lives of people living with Multiple Sclerosis and other neuroimmune and neurodegenerative diseases, including ALS and Alzheimer's disease.
We advance cutting-edge research and patient-centered care by developing and integrating innovative tools that comprehensively characterize disease processes. Through this approach, we aim to accelerate the discovery, development, and implementation of better treatments and to enable truly personalized disease management.
As a leading destination for clinical and translational innovation in neuroimmunology and neuroscience, RC2NB bridges science and care to transform understanding into meaningful outcomes for patients—today and in the future.

In close collaboration with the Departments of Neurology, Biomedicine, Biomedical Engineering and Clinical Research at University Hospital and University Basel and a strong national and international network, RC2NB integrates innovative technologies, interdisciplinary research, and clinical expertise to enable personalized disease management, accelerate better treatments, and improve patients' lives.

MESSAGE FROM CEOs

2024 HAS BEEN A YEAR OF FURTHER CONSOLIDATION BUT ALSO GROWTH AND NEW SCIENTIFIC ACHIEVEMENTS FOR RC2NB AS A LEADING RESEARCH CLUSTER IN CLINICAL NEUROIMMUNOLOGY AND NEUROSCIENCE.

The year 2025 marks a period of important transition and continued scientific momentum for RC2NB. Building on a phase of consolidation and growth, the Center has undergone meaningful structural and academic developments while advancing its mission as a leading research cluster in clinical neuroimmunology and neuroscience.

A defining feature of this year has been a series of key academic appointments that underscore RC2NB's strength and visibility. Prof. Tobias Derfuss and Prof. Jens Kuhle were appointed as Tenure Professors of Neuroimmunology and Heads of Neuroimmunology, while Prof. Cristina Granziera was appointed Professor of Translational Imaging and Co-Chair of Neurology. These appointments reflect both individual excellence and the Center's sustained commitment to joined, interdisciplinary, translational research at the interface of clinical care and neuroscience.

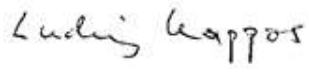
Scientific progress across the RC2NB workstreams reached several major milestones. In Workstream 1, the interim analysis of dreaMS Validation Study 1 (VS1) yielded promising results, reinforcing the potential of digital biomarkers for monitoring clinical progression in multiple sclerosis. At the same time, based on data obtained from this and associated studies, important technological and analytical advances were achieved within RC2NB and in collaboration with academic and corporate partners, further strengthening the foundation for upcoming international validation efforts of digital measures in MS and other neuroimmunological and neurodegenerative diseases. Complementing this, Neurostatus-UHB Ltd and the eCluster project continued to enhance the quality and granularity of standardized disability assessments, paving the way for further developments combining digital measures and clinical EDSS assessment in the future.

In Workstream 2, the translational imaging and body fluid biomarker programs delivered high-impact scientific output. Milestone publications advanced our understanding of GFAP as a biomarker for monitoring disease progression, as well as the role of the combination of GFAP with sNfL. The ThINk Basel group pioneered methodologies for postmortem-histopathology and imaging investigations and, through these approaches, identified new measures for remyelinating processes in people with MS. In Workstream 3, the group led by Tobias Derfuss published groundbreaking work in Cell, elucidating key triggers and mechanisms underlying the development of multiple sclerosis. In workstream 4, the pragmatic trial teams successfully completed enrolment in MULTIScript and planned a second cycle using the same framework.

The year also marked the planning of an important leadership transition at RC2NB. Ludwig Kappos announced his decision to step down from his executive role as CEO of RC2NB as of July 1st 2026, while continuing as a senior consultant and retaining co-responsibility for Workstream 1. A new leadership model will be implemented, with Prof. Derfuss, Prof. Kuhle, and Prof. Granziera jointly assuming responsibility for the strategic and scientific direction of the Center. This shared leadership approach reflects RC2NB's collaborative culture and ensures continuity while opening a new chapter in its development.

Across its four workstreams, with their multidisciplinary teams and international collaborations, RC2NB continues to generate high-quality scientific output, foster young investigators, and translate innovation into clinical impact. As we move forward, we remain committed to the rigorous validation and implementation of novel concepts—often along challenging paths—guided by the goal of improving the lives of people affected by neuroimmune and neurodegenerative diseases.

We extend our sincere gratitude to the University Hospital, the University, funding bodies, corporate partners, collaborators, and, above all, our patients and their families for their continued trust and support throughout this transformative period.



LUDWIG KAPPOS
CEO

CRISTINA GRANZIERA
CO-CEO

FACTS & FIGURES

RC2NB IN NUMBERS

RC2NB CORE ACTIVITIES

Knowledge & Technology Transfer
- Collaborative Research Initiatives
- Intellectual Property Management
- Training and Workshops
- Publications and Conferences
- Translational Research Focus

Innovative Research
- Pioneering Biomarker Discovery
- Cutting-Edge Neuroimaging Techniques
- Exploring molecular mechanisms of Immunedysregulation
- Translational Clinical Trials
- Interdisciplinary Research Approaches
- Personalized Medicine Initiatives
- Advancements in Data Science Application

RC2NB end-to-end Approach
- From Basic Research to Clinical Application
- Integration of Multi-Disciplinary Expertise
- Patient-Centric Methodology
- Real-World Data Utilization

Enabling World Class Care
- Patient-Centric Services
- Expert Clinical Teams/Unit
- Cutting-Edge Therapeutic Options
- Commitment to Research-Driven Care
- Seamless Integration of Research and Practice

Collaboration & Productive Dialogue
- Research Institutions
- Healthcare Networks
- Patients Advocacy Groups
- Tech-Industry/Pharma
- Regulatory and Health Technology Bodies

OUR OUTPUTS IN 2025

+132 Peer-Reviewed Publications

+100 Active Research Projects

+20* Million CHF in Competitive Research Funding
* Over the past years, from 2019 to 2024.

+20 Membership in International Committees and Boards

+10 Nationalities

+2179 MS Patients enrolled in Clinical studies

+50 National & International Collaborations

+40 PhD/Master students

418'594 Biosamples
+17'245 visits

+10 Top Awards and Accreditations from International Organizations

OUR INPUT

Our Framework
A governance System with Comprehensive determinations & balanced Decision making

Our Network
RC2NB strong local, national and international network

Our Community
Top international reputation, top talents and innovative solutions

Our Culture
RC2NB cultivates a culture of flexibility, scientific freedom, and a deep sense of belonging.

RC2NB BOARD OF TRUSTEES

Foundation Board of Trustees

Prof Christiane Pauli-Magnus - Chair of the Board, Co-Head, Department of Clinical Research, University Hospital Basel, **Dr med Rakesh Padiyath, MBA HSG** - CEO, University Hospital Basel, **Prof Primo Schär -** Vice-Rector Research, University of Basel, **Prof Eva Scheurer** - Dean, Medical Faculty, University of Basel. *The Board of Trustees held two meetings, on July 2, 2025 and December 17, 2025.*

Scientific Advisory Board

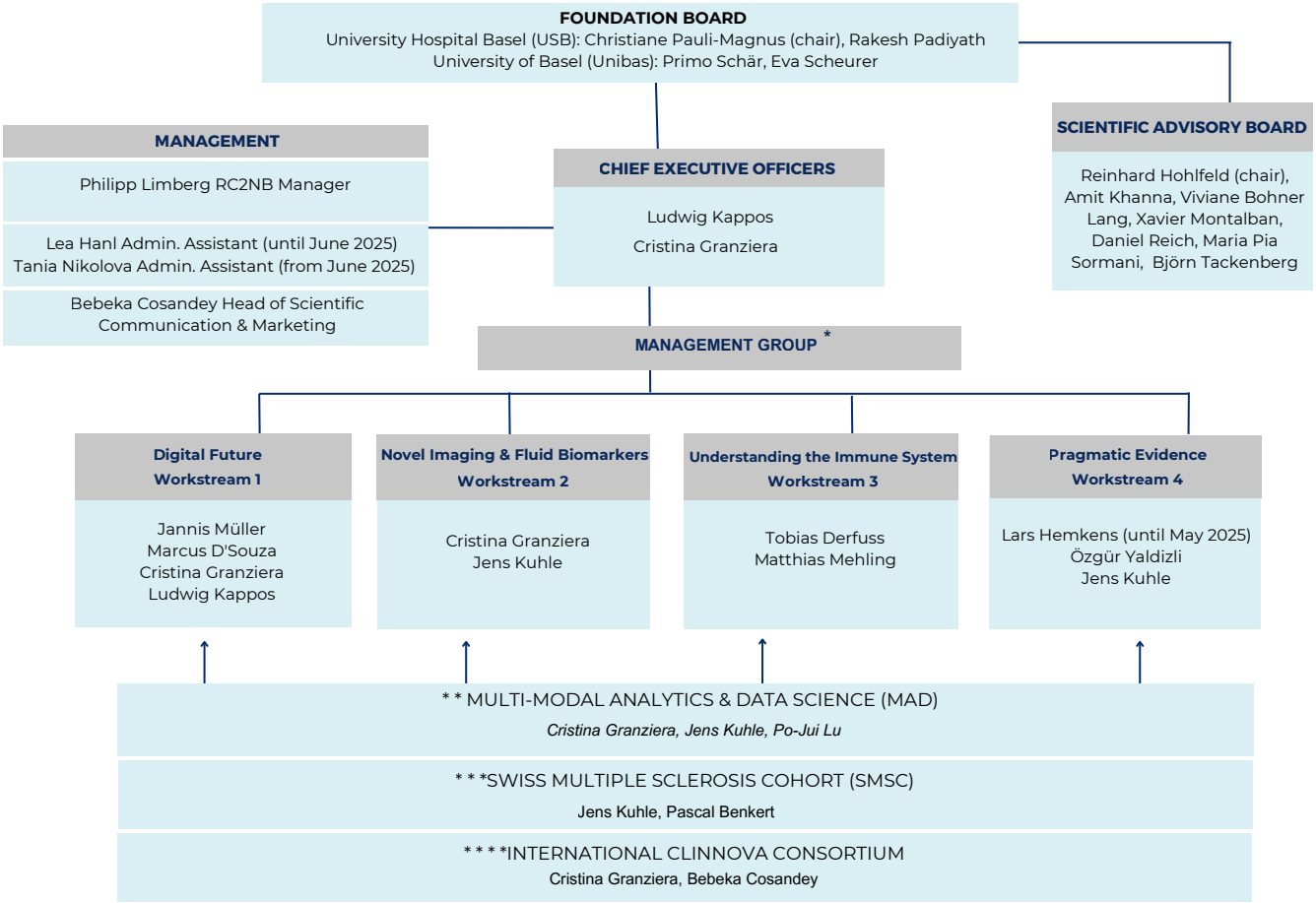
Prof Reinhard Hohlfeld - Chair, Munich, Germany, **Dr Viviane Bohner Lang** - Patient representative, Allschwil, Switzerland, **Dr Amit Khanna**, Basel, Switzerland, **Prof Xavier Montalban**, Barcelona, Spain, **Prof Daniel Reich**, Bethesda, United States of America, **Prof Maria Pia Sormani**, Genova, Italy, **Prof Björn Tackenberg**, Basel, Switzerland. *The international RC2NB Scientific Advisory Board **(SAB)** meets annually and independently reviews the work and provides advice to the RC2NB.*

QUOTE FROM THE UNIVERSITY RECTOR

"RC2NB brings together clinical excellence, scientific rigor, and data-driven innovation in a uniquely integrated way. By connecting discovery, clinical insight, and innovative methodologies, the center exemplifies the University of Basel's commitment to research with real societal impact."

Prof. Andrea Schenker-Wicki, Dr. Dr. h.c. Mult.
President of University of Basel

RC2NB GOVERNANCE BODIES



***Management group members**: Derfuss Tobias, D'Souza Marcus, Granziera Cristina, Hemkens Lars (until May 2025), Kappos Ludwig, Kuhle Jens, Müller Jannis, Özgür Yaldizli (since May 2025).

****MAD** is responsible for coordinating data analysis, artificial Intelligence, machine learning, in partnership with USB-IT, DKF, SciCore, Indivi and further external partners , s. p. 16.

*****SMSC** is a Swiss wide prospective high quality cohort, currently including > 2000 participants in 8 centers, s. p. 11-12

******CLINNOVA** drives healthcare digitalization by building data infrastructure and ensuring interoperability across systems in 4 countries, s.p.15.

SCIENTIFIC ACHIEVEMENTS 2025

FOUR WORKSTREAMS - ONE VISION

Four tightly integrated workstreams operate in close collaboration to advance the shared mission of RC2NB. Together, they unite interdisciplinary research teams that work both within and across thematic areas, fostering cross-pollination of ideas and accelerating innovation.
These coordinated efforts are dedicated to developing next-generation tools for monitoring the health of people living with MS and other neuroimmune and neurodegenerative diseases. By deepening our understanding of disease mechanisms, enabling more precise and personalized approaches to disease management, and driving the discovery of more effective therapies, RC2NB aims to deliver tangible improvements in patient care and long-term outcomes.

WORKSTREAM 1: DIGITAL FUTURE

Scan me to access dreaMS on RC2NB website.

Research Group Leaders

Prof Cristina Granziera
Co-CEO of RC2NB

Prof Ludwig Kappos
CEO of RC2NB

Dr Jannis Müller
PI VS1 and VS2 and research group leader

PD Dr Marcus D'Souza
Neurostatus-UHB

The mission of Workstream 1 is to translate rapid advances in digital technologies—particularly sensor-based measurements—into reliable tools for assessing neurological function in people with multiple sclerosis (MS). In an increasingly connected world, our goal is to integrate research directly into clinical care and to generate high-quality real-world evidence.

With the dreaMS project, we aim to develop and validate smartphone- and wearable-based digital measures of disability in MS. In November 2024, we completed recruitment for our Swiss-wide Validation Study 1 (VS1; NCT05009160), which includes 275 patients with MS and 50 healthy volunteers. In April 2025, we reached another major milestone when the first 100 participants completed their full two-year follow-up, triggering the predefined interim analysis.

In this analysis, we assessed the relationship between dreaMS tasks and established clinical reference measures, such as the Expanded Disability Status Scale, the 25-foot walk test, and cognitive assessments.

Importantly, several tasks were able to distinguish between patients with and without clinical worsening on reference tests, supporting the potential of dreaMS as a sensitive tool for detecting disability progression. Validation Study 1 is ongoing and expected to conclude by the end of this year. More than 55 participants have already entered a two-year extension study, either within VS1 or within Clinnova, a federated digital medicine project across Europe that also applies the dreaMS app (For additional information, please consult the section "Clinnova Consortium" on page 18).

dreaMS team, from left to right: Meyer C., Kolb S., Kappos L., Bezençon T., Tascedda S., Cortese R., Wiencierz A., Phavanh V., Granziera C., Stoll T., Müller J., Limberg P., Widmer F., Wölfle T, Pless S, Cosandey B. For the full team, please refer to the members list on page 24.

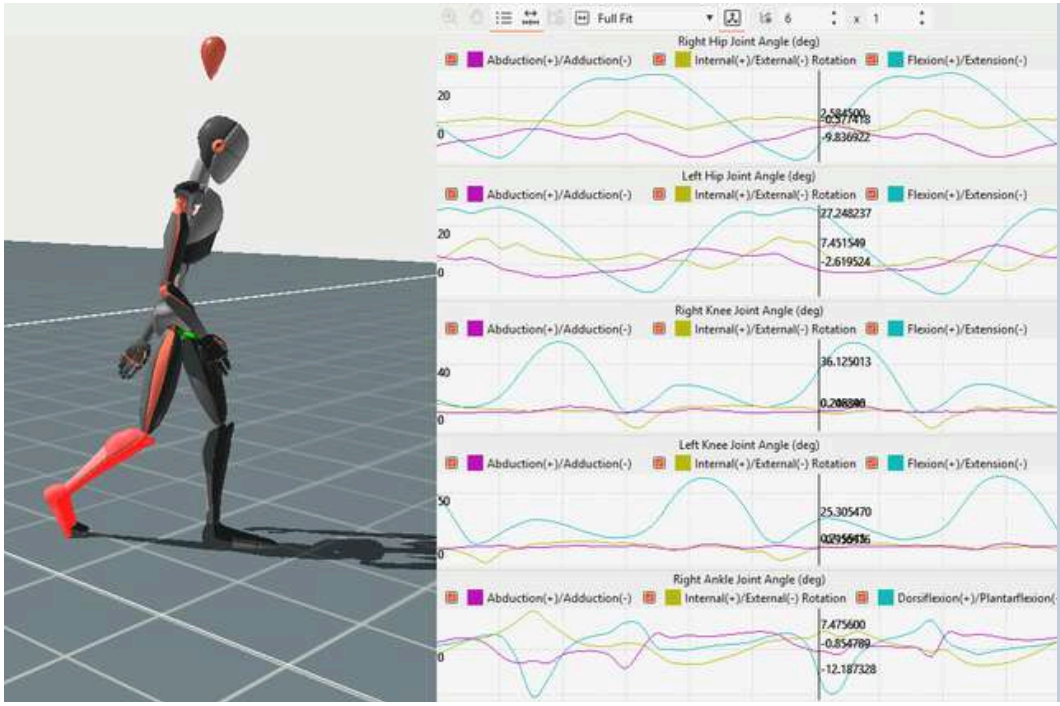


Figure 1. *Screenshot from the gait laboratory and corresponding visual representation generated by Xsens, an 18-sensor motion capture system. This setup enables comparison between measurements captured by dreaMS and a visual and technical ground truth.*

A second key pillar of the dreaMS program is the international Validation Study 2 (VS2), which will include approximately 600 participants across Europe and North America. This study will extend our findings with a stronger focus on patient-centered outcomes and generalizability. During 2025, we implemented methodological and regulatory refinements based on VS1. The first patients are expected to be enrolled in March 2026 in Vienna and San Francisco, followed by ten additional sites across Europe and North America.

In parallel with clinical validation, we have focused on analytical validity—ensuring that the dreaMS app measures what it is intended to measure.

At the baseline visit of VS1, 168 patients with MS and 40 healthy controls performed dreaMS tasks while wearing an 18-sensor motion capture system (XSens; Figure 1), allowing a direct comparison between both systems. We observed good agreement for most tasks.

In mobility tests, we identified rare cases of missed steps by the app and are addressing this by improving the step-detection algorithm in collaboration with our technical partner Indivi.
(Ena, A., Mazzà, C., Rodríguez-Romero, A. et al. Accurate quantification of steps from multiple smartphone positions. Sci Rep (2026). https://doi.org/10.1038/s41598-025-34270-2).

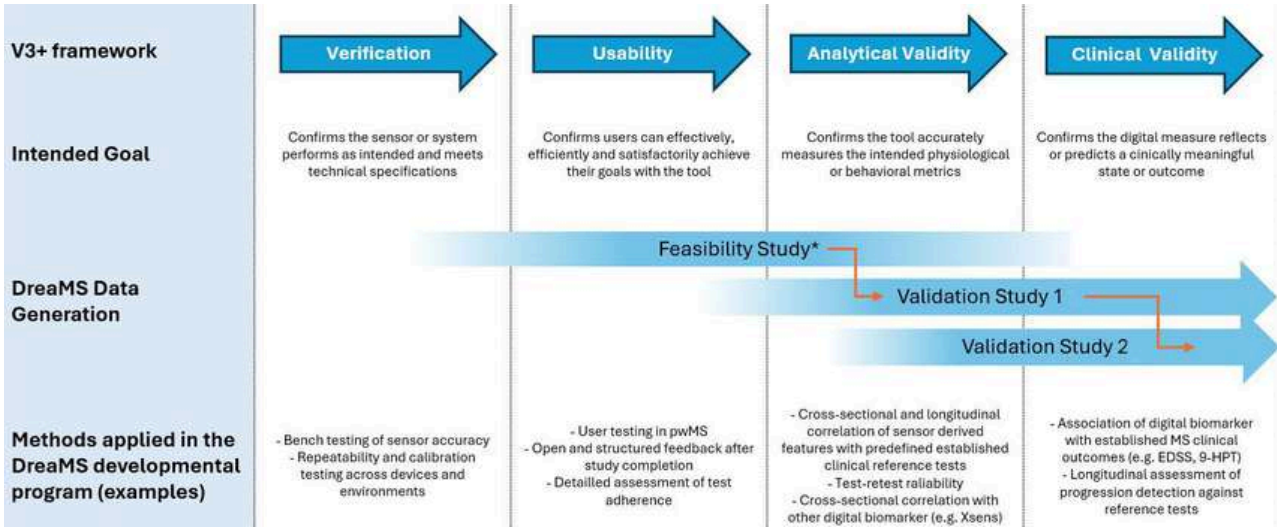


Figure 2. *depicts the "V3+" validation framework for digital health technologies and the associated data-generation studies implemented to establish the validity of dreaMS. The Feasibility Study (October 2020 – February 2021) evaluated the technical feasibility and analytical validity of candidate digital biomarkers derived from the dreaMS platform. The ongoing Validation Study 1 (November 2022 – December 2026) investigates cross-sectional and longitudinal associations between dreaMS-derived digital biomarkers and established clinical and functional outcome measures, including the EDSS, Nine-Hole Peg Test, and Timed 25-Foot Walk. Validation Study 2 (anticipated start Q2 2026) is designed to enable international replication and further methodological refinement of the dreaMS application and platform across diverse patient populations.*

WORKSTREAM 2: INNOVATIVE IMAGING AND ANALYSIS OF BODY FLUIDS

Research Group Leaders

Prof Cristina Granziera
Translational Imaging in Neurology - ThINk Basel

Prof Jens Kuhle
Swiss MS Cohort Study and Laboratory of Clinical Neuroimmunology

ThINk's Lab Team, from left to right: Galbusera R., Sanabria-Diaz G., Limberg M., Tsagkas C., Melie-Garcia L., Gkotsoulias D, Ocampo Pineda M.A., Lu P-J., Gavrilović P., Herrgott K., Weigel M., Bar Zohar N., Suljakovic A., Cagol A., Granziera C., Mastantuono M., Schönenberger L., Chen X., Cortese R., Ponti L.G., De Mauro A., Egli L., Ruberte E., Schaedelin S., Callegari I., Schmiedke T.M., Greselin M., Spagnolo F. For the full team, please refer to the members list on pages 24 to 25.

ThINk Basel: Innovative imaging

Translational Imaging in Neurology (ThINk) Basel is a collaborative, multi–principal investigator initiative positioned at the interface of translational neuroscience and state-of-the-art neuroimaging. The group, as part of RC2NB, is affiliated with the Department of Biomedical Engineering at the University of Basel and the Department of Neurology at University Hospital Basel.

ThINk Basel brings together five principal investigators—Prof. Cristina Granziera, Prof. Dr. Regina Schläger, PD Dr. Katrin Parmar, PD Dr. Athina Papadopoulou, and Prof. Dr. Oezguer Yaldizli—and their teams, comprising a total of 46 members. Within this structure, Prof. Cristina Granziera provides overall leadership and coordination of the initiative and directly supervises a multidisciplinary team of 26 professionals, including master's and PhD students, postdoctoral fellows, senior scientists, and research staff, all working collaboratively to advance research in neurology and neuroimaging.

The ThINk group's research is primarily focused on elucidating the pathophysiology of multiple sclerosis (MS), identifying biomarkers of disease progression and treatment response, developing novel computational models of disease impact and evolution, and investigating mechanisms of structural remodeling and regeneration within the central nervous system of patients with MS. These objectives are pursued through the use of advanced quantitative magnetic resonance imaging combined with modern analytical approaches, including classical machine-learning methods and deep-learning frameworks.

ThINk Basel is supported by funding from the Swiss National Science Foundation (SNSF), the Hasler Foundation, the Stiftung zur Förderung der gastroenterologischen und allgemeinen klinischen Forschung, intramural funding from the University of Basel, and corporate research grants.

In 2025, we have further strengthened the research combining postmortem MRI and histopathology, which we perform in collaboration with the Neuropathology department of Göttingen University Hospital (Prof. C. Stadelmann). In Galbusera et al. Brain Pathol. 2025[1], we demonstrated that quantitative T1 (qT1) mapping is sensitive to cortical remyelination in MS.

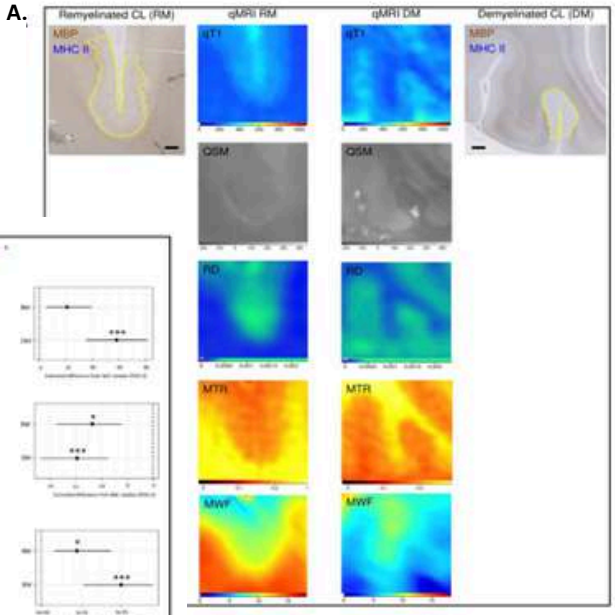


***Figure 3**. **(A)**, representative histological examples of remyelinated and demyelinated cortical lesions (RM/DM) and visual correlation with their corresponding quantitative MRI: qT1, quantitative T1; QSM, quantitative susceptibility mapping; RD, radial diffusivity; MTR, magnetization transfer ratio; MWF, myelin water fraction. **(B)** shows the point estimate with confidence interval of the Wilcoxon rank signed test shows a significant increase of T1 in DM, a significant reduction of QSM in both RM and DM, and a significant increase of RD in RM and DM. Notably, qT1 in RM did not significantly differ from the normal appearing cortex (NAC). In summary, qT1 appears to be the most sensitive metric for cortical remyelination. Figure adapted from Galbusera et al., Brain Pathology, 2025[1].*

Using postmortem brain tissue with matched histopathology, we showed that qT1 values in cortical remyelinated lesions were comparable to those in the normal-appearing cortex nearby. Importantly, qT1 and other quantitative MRI contrasts were sensitive in detecting subtle myelin repair in the cortex, supporting their potential role as noninvasive biomarkers of cortical remyelination, a key but historically elusive target in MS.

Complementing this work, Gkotsoulias & Schönenberger, et al. Cell Press: STAR protoc, 2025[2], provide a methodological framework to bridge mesoscopic MRI signals and microscopic histology using ultra-high-field (9.4T) postmortem MRI of brain blocks. By combining multi-contrast MRI (including T1, T2*, diffusion, and magnetization transfer) with quantitative

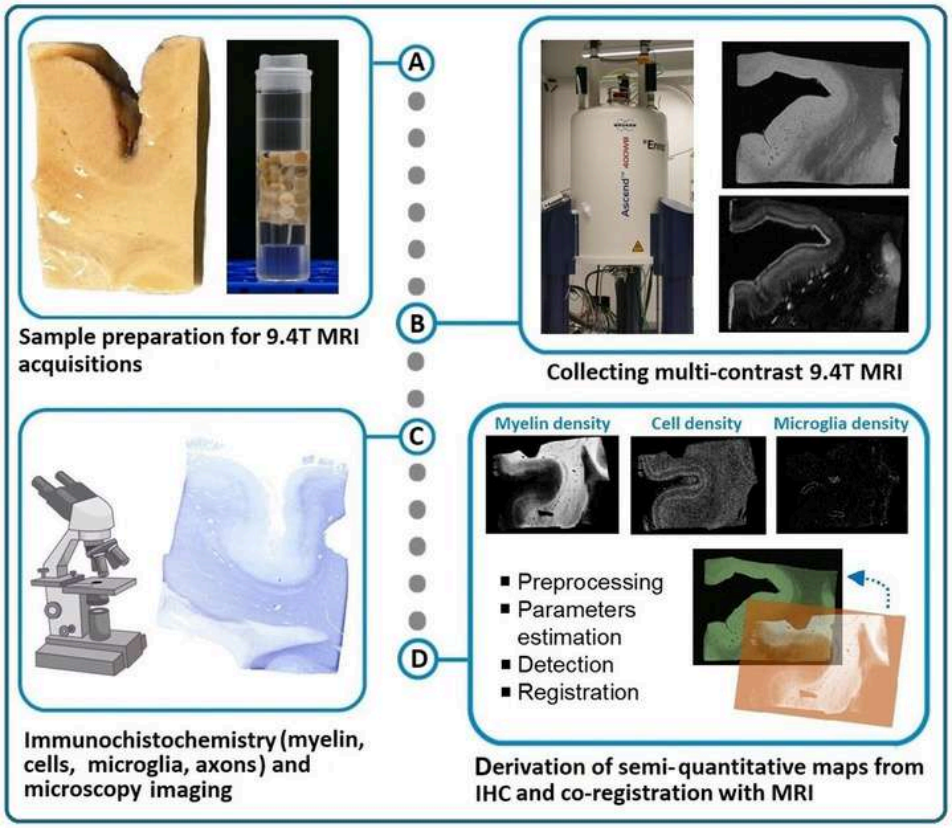


Figure 4. **The steps of the methodological framework for bridging postmortem multimodal meso-scale resolution 9.4T MRI of brain blocks and histology**. *The steps include preparation of the sample in perfluoropolyether (A), MR scans at a Bruker spectrometer (B), sectioning and immunohistochemical staining of slices of interest (C), derivation of reproducible quantitative maps tissue characteristics based on microscopy images and semi-automated co-registration with the MRI contrasts (D). Figure adapted from Gkotsoulias DG, Schönenberger L. et al., STAR Protocols, 2025[2].*

histological measures of myelin, axons, and iron, we established a rigorous pipeline for spatial registration and cross-modal quantification. This work emphasized how different MRI contrasts reflect overlapping but distinct tissue properties, underscoring the necessity of multimodal approaches to disentangle complex MS pathology.

Together, these studies advanced MS imaging on two fronts: biologically, by validating qT1 as a marker of cortical myelin repair, and methodologically, by offering a scalable strategy to connect MRI-derived metrics to histological ground truth. Taken together, they strengthen the translational bridge between postmortem validation and in vivo MRI, with direct implications for monitoring remyelination in clinical trials and for refining MRI biomarkers sensitive to repair rather than damage alone..

References

1. Galbusera R, Weigel M, Bahn E, Schaedelin S, Cagol A, Lu PJ, Barakovic M, Melie-Garcia L, Franz J, Dechent P, Nair G, Kappos L, Brück W, Stadelmann C, Granziera C. Quantitative T1 is sensitive to cortical remyelination in multiple sclerosis: A postmortem MRI study. Brain Pathol. 2025 Sep;35(5):e70010. doi: 10.1111/bpa.70010.

2. Gkotsoulias DG, Schönenberger L, Leupold J, Callegari I, Bahn E, Stadelmann C, von Elverfeldt D, Kiselev VG, Weigel M, Granziera C. Bridging mesoscopic and microscopic scales in multiple sclerosis: Post mortem brain block multi-contrast 9.4T MRI and histology quantification. STAR Protoc. 2025 Nov 17;6(4):104203. doi: 10.1016/j.xpro.2025.104203.

Scan me to access the ThINk website.

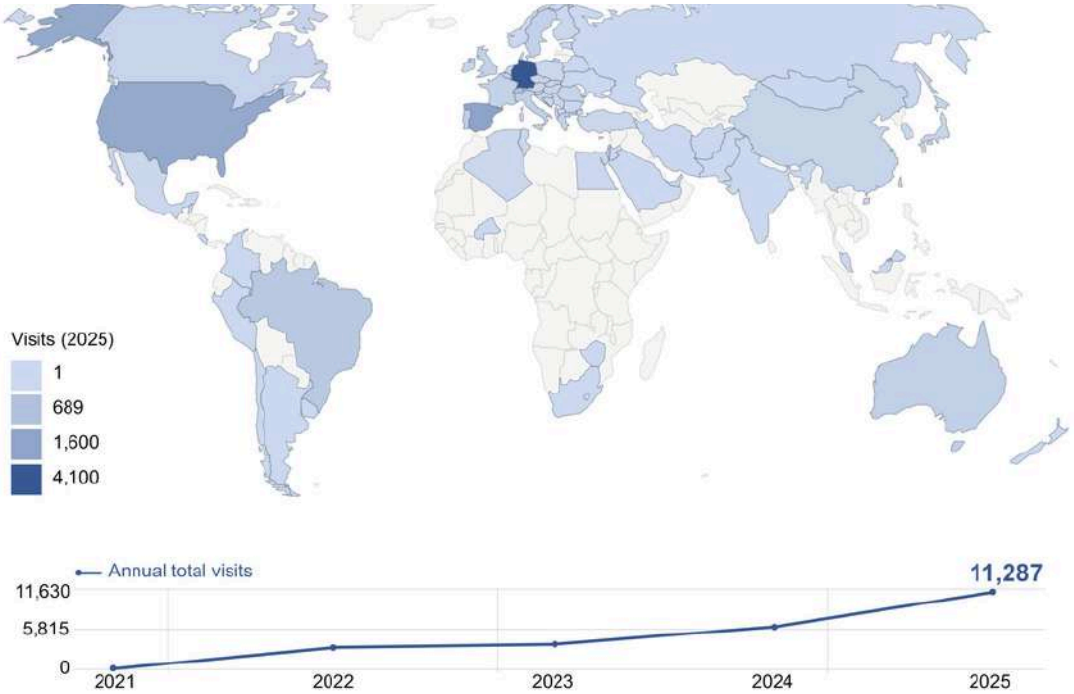
Clinical Neuroimmunology Laboratory and the Swiss MS Cohort: Biomarker discovery and translational advances

Leadership, mission, and international collaborations

Led by **Prof. Jens Kuhle**, **the Laboratory of Clinical Neuroimmunology** drives the discovery and clinical translation of body fluid biomarkers, oversees the Department of Neurology's biobank, and coordinates the Swiss MS Cohort Study (SMSC; NCT02433028). Expanding its focus beyond multiple sclerosis (MS), the Laboratory leads an international consortium establishing novel biomarkers for neuromyelitis optica spectrum disorders (NMOSD) and myelin oligodendrocyte glycoprotein antibody-associated disease (MOGAD). In 2025, the team advanced serum biomarkers for MS progression by establishing normative reference databases for serum glial fibrillary acidic protein (sGFAP) and validating its role as a prognostic and predictive marker of progression independent of relapse activity (PIRA). This work complements serum neurofilament light chain (sNfL) and is integrated with digital clinical tools to enhance disease monitoring.

Jens' Lab team, from left to right: Zadic A., Einsiedler M., Rodriguez Calvo M., Nicolella V., Gress U., Orleth A., Hofer L., Demuth L., Sandgren S., Gomez Vilchez J., Limberg M., Maleska Maceski A., Schädelin S., Oechtering J., Lacalamita M., Benkert P., Kuhle J., Leppert D. For the full team, please refer to the members list on page 25.

Figure 5. *Global usage of the NfL reference database in 2025. Color-coding reflects numbers of visits per region (total 11,200 visitors). Abbreviations: NfL, neurofilament light chain.*
Link to NfL reference database:
https://shiny.dkfbasel.ch/baseInflreference/
GFAP reference database:
https://shiny.dkfbasel.ch/baselgfapreference/



The SMSC: A unique resource for translational research

The SMSC, now in its 14th year, remains one of the largest and most comprehensive MS cohorts worldwide. It provides high-quality clinical, imaging, and biofluid data from more than 15,000 time points, supporting translational research, biomarker validation, and precision medicine.
With over 50 high-impact publications, fully recruited Multiscript Cycle 1 study (NCT06095271), and ongoing randomized interventional projects, the SMSC is a key resource for research at RC2NB, the MS Centre at the University Hospital Basel, and in national and international collaborations. During 2025, continued operation of the SMSC was secured through renewed funding from the Swiss MS Society for the next three years.

Serum GFAP reference database and its integration with sNfL as combined marker set

Building on the concept that accurate interpretation of sNfL requires a reference database from normal controls (Benkert et al.,

Lancet Neurology, 2022), the Clinical Neuroimmunology Laboratory developed an according reference database for sGFAP (Maleska et al., Brain, 2025; Figure 6). Based on this, we demonstrate that sNfL and sGFAP capture distinct biological processes: sNfL is a reliable indicator of future MS relapses, while sGFAP anticipates the occurrence of PIRA and of brain-diffuse neural damage. The results obtained further highlight the necessity of Z scores/percentiles values to adjust for age- and body mass index (BMI)-variability for accurate interpretation. The group further implemented the validation of Roche Elecsys® platform for sGFAP (Willemse et al., Clinical Chemistry and Laboratory Medicine, 2025 ; https://shiny.dkfbasel.ch/baselgfapreference/) and sNfL (Booth et al., Clinica Chimica Acta, 2025; https://shiny.dkfbasel.ch/baselnflreference/) measurement, and the establishment of respective reference databases of normal values.

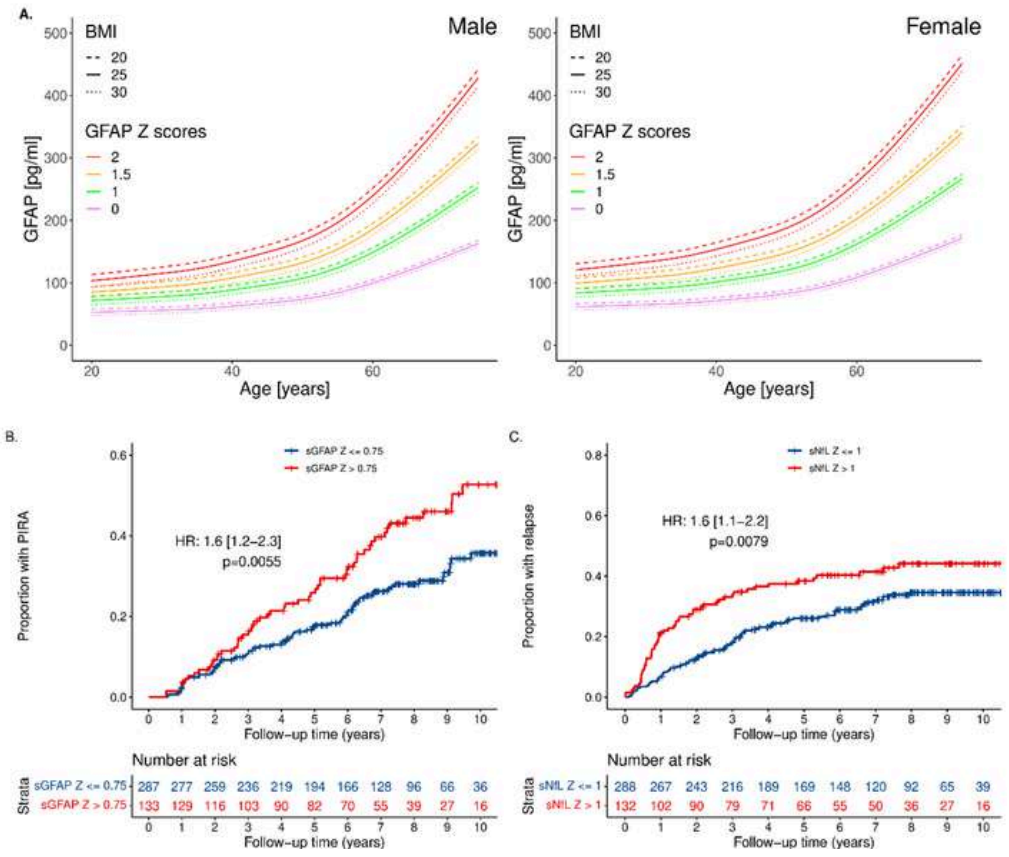


Figure 6. *Z scores or interchangeably percentiles (A) indicate deviation from a healthy reference population, adjusted for serum GFAP's associations with age, sex, and BMI. In fingolimod-treated patients with MS, higher GFAP Z scores predict greater risk of disease progression (B), while higher NfL Z scores predict greater risk of subsequent relapse (C). Abbreviations: BMI, body mass index; GFAP, glial fibrillary acidic protein; MS, multiple sclerosis; NfL, neurofilament light chain; PIRA, progression independent of relapse activity. (Maleska et al., GFAP and NfL as predictors of disease progression and relapse activity in fingolimod-treated multiple sclerosis. Brain. 2025 Nov 14:awaf433).*

Proteomic and multi-omics biomarker discovery in MS and other inflammatory demyelinating disorders

Using ultra-sensitive targeted protein analysis, NUcleic acid Linked Immuno-Sandwich Assay (NULISA), we measured 322 plasma proteins in MS patients treated with B cell-depleting therapy (n=185) or fingolimod (n=200), with median follow-up of 4.0 and 9.1 years. Plasma samples obtained approximately one year after treatment initiation were analysed for their ability to predict PIRA.

Among all proteins investigated, GFAP was the primary biomarker associated with future PIRA risk in our cohort, confirming our earlier results that astroglial injury is a key biological signal associated with MS progression. Up to now, our analysis has not revealed other markers of similar properties and value. To address this, we are expanding towards broader proteomic and multi-omics analyses in extreme clinical phenotypes selected from the SMSC, which uniquely enables selection of extreme-phenotype samples from >15,000 longitudinal timepoints, a possibility not available in other cohorts.

The planned ongoing study includes ~380 samples (including 51 controls) and combines discovery-oriented mass spectrometry (MS)–based proteomics (tandem mass tag [TMT]-labeled liquid chromatography [LC]–MS) with targeted affinity-based approaches (Olink, NULISA), alongside MS–based metabolomics and lipidomics, covering complementary biological layers, in collaboration with international experts. This will provide a biology-driven framework for integrating discovery and targeted proteomics across inflammatory demyelinating diseases to improve mechanistic understanding and disease stratification.

WORKSTREAM 3: RECORDING AND UNDERSTANDING THE DYSREGULATED IMMUNE SYSTEM

Research Group Leaders

Prof Tobias Derfuss
Cellular and Molecular Neuroimmunology

Prof Matthias Mehling
Immunosenescence, Protective Immunity under DMT

An epidemiological association between EBV infection and MS incidence has been well established by other groups, but there is no consensus regarding a mechanistic explanation for the relationship.

The Clinical Neuroimmunology Lab (Prof Derfuss) has reached a milestone in our mechanistic studies to understand the involvement of Epstein-Barr virus (EBV) in the pathogenesis of MS, with a publication in Cell (Kim H, et al. doi: 10.1016/j.cell.2025.12.031).

In these studies, we have combined human data with results from experiments with transgenic mouse models, and propose a model in which autoreactive B cells that enter the CNS during localized inflammation are - in the absence of cognate T cell help - normally efficiently eliminated by activation-induced cell death. The significance of EBV infection is that the viral protein LMP1 provides a surrogate for this T cell signaling, facilitating to the survival of autoreactive CNS-infiltrating B cells, the secretion of auto antibody, and localized demyelination. The project involved, in addition to more commonly used immunological techniques, data from our custom-built single autoreactive B cell screening pipeline, sixteen transgenic mouse lines, behavioral analysis, intravital multiphoton microscopy of B cell activity in the living mouse cortex, organotypic organ cultures, two single-cell transcriptomics sequencing studies, and extensive histological examinations of B cell activity in the mouse brain, as well as histological studies of biopsy and autopsy samples from people with MS. Our model is fundamentally EBV- and B-cell-centric, but following input from experts in the field, we also investigated the possible contribution of myelin reactive T cells. Our results do not provide evidence that T cells are involved in the early stage of lesion formation that we investigate, but in light of the genetic importance of MHC-II alleles, and the role of T cells in established mouse models of MS, it seems likely that T cells affect the disease course somehow.

Tobias' Lab Team, from left to right: Diebold M., Callegari I., Nadisauskaite R., Raach Y., Perdikaris G., Sakiri E., Schneider M., Derfuss T. For the full team, please refer to the members list on pages 25.

One possibility is that the T cells are involved downstream of the mechanism we describe. Another is that the MHC and the T cell response influence the susceptibility to MS by influencing the outcome of EBV infections. The model we describe is shown diagrammatically in Figure 7.

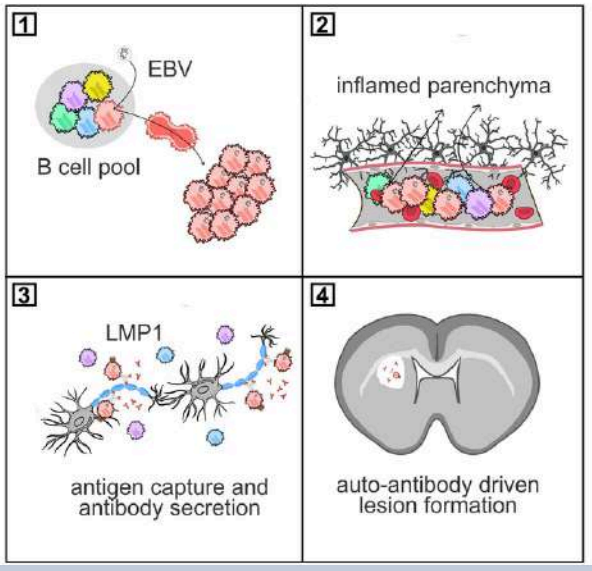


Figure 7. *Graphical summary of the conclusions of the study. In this model, early EBV infection leads to the random expansion of a clone of myelin-reactive, latently infected B cells (1). Later in life (2) an insult such as a brain infection causes immune cell influx (3), including B cells from the myelin-reactive clone. Expression of the viral protein LMP1 enables these B cells to escape tolerance, secrete antibody, and cause localized demyelination.*

Mehling Group – Translational Neuroimmunology (Department of Biomedicine)

The Mehling group investigated immune ageing in multiple sclerosis (MS) and its interaction with chronic viral infection and therapy. Using high-dimensional T-cell analyses in the Swiss MS Cohort, we identified cytomegalovirus (CMV) infection as a key driver of T-cell immunosenescence, independent of treatment. CMV status influenced T-cell function, JAK–STAT signaling, and markers of disease activity and neuroaxonal damage. These results suggest that immune ageing is not **inherently detrimental** in MS and, in certain contexts, may be linked to a more favorable disease course, supporting more personalized immune-informed treatment strategies.

WORKSTREAM 4: PRAGMATIC TRIALS AND REAL-WORLD EVIDENCE

Research Group Leaders

Prof Özgür Yaldizli
Senior consultant Neurologist (Group leader since May 2025)

Prof Lars Hemkens
Senior Scientist Neurology Clinical Epidemiology (Group leader until May 2025)

Prof Jens Kuhle
Swiss MS Cohort Study and Laboratory of Clinical Neuroimmunology

Workstream 4 continues to provide a comprehensive framework for translating innovation into clinical research and care by developing methodologies and infrastructures to assess clinical meaningfulness and patient benefit. These efforts focus on generating high-quality real-world evidence, leveraging RC2NB's interdisciplinary expertise, and fostering pragmatic, decentralized, and remote clinical trials. This integration enhances the seamless translation of research findings into routine clinical care.

Scan us to access the Pragmatic Evidence Lab and Multiscript websites.

PRAGMATIC EVIDENCE LAB

MultiSCRIPT

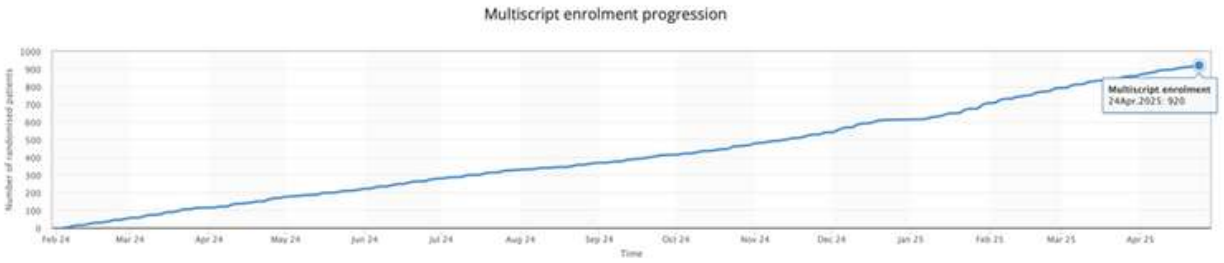


Figure 8. *Recruitment of MultiSCRIPT over time.*

MultiSCRIPT: Flagship Project Integrating Research into Routine Multiple Sclerosis Care

The flagship project of this workstream is **MultiSCRIPT**, a SNSF funded investigator-initiated randomized controlled trial embedded in the Swiss Multiple Sclerosis Cohort Study (Workstream 2) and exemplifying RC2NB's mission of seamlessly integrating research into care. In 2025, recruitment for MultiSCRIPT was completed, with 920 patients randomized (Figure 8). By the end of 2025, the dropout rate was 3.7%.
Patients in the intervention arm receive, in addition to usual care, serum neurofilament light chain testing every six months, whereas the control group does not undergo blood-based biomarker assessment.

The primary endpoint of the study is a composite of disease activity and quality of life.
In 2025, we published a Delphi consensus on treatment algorithms within **MultiSCRIPT** (Yaldizli Ö et al., Multiple Sclerosis Journal, 2025). These recommendations represent the first treatment guidelines worldwide to integrate serum neurofilament light chain into the treatment strategy for relapsing-remitting multiple sclerosis. The first results of MultiSCRIPT are expected in 2027. In consecutive evaluation cycles, MultiSCRIPT aims to evaluate and establish personalized treatment approaches that are directly embedded into routine care for people with multiple sclerosis.

CLINNOVA-MS BASEL: 2025 KEY HIGHLIGHTS

Scan us to access our website and the Clinnova Report

Clinnova.eu

Clinnova Basel report 2024-2025

Prof Cristina Granziera
Princpial Investigator

Dr Bebeka Cosandey
Lead Scientific Project Manager

Tanja Stoll
Study Nurse

International Clinnova Consortium Team, Strasbourg October 2025

2025 marked a highly successful and consolidating year for Clinnova, with Basel playing a central role in translating the consortium's vision into tangible progress. The Clinnova Basel Report (2024–2025) was distributed consortium-wide, testifying strong engagement and serving as a shared reference point for scientific, clinical, and strategic alignment across partner institutions.

A major milestone was reached with the completion of the first 1-year follow-up visits at Clinnova-MS Basel, confirming both the feasibility and sustainability of a digital, patient-centered research approach. Up to now, follow-up demonstrated strong participant engagement, particularly with the study's digital components, reinforcing confidence in long-term retention and real-world data collection. This achievement reflects the dedication of the Basel clinical and study team and the commitment of the patient community and represents a key step toward building one of Europe's most comprehensive transnational real- world MS datasets.

In addition, the group led by Bram Stieltjes, together with RC2NB, pioneered the development of a prototype for image analysis, specifically MS lesion detection in MRI scans using a federated learning platform. This initial milestone was achieved through collaboration between the neurology departments and IT units of the University Hospitals in Basel and Freiburg. The next step will be to extend this approach to the other centers within the Clinnova consortium. Clinnova's momentum was further strengthened by an excellent consortium meeting in Strasbourg, which brought together partners from across Europe. The meeting was widely regarded as impactful, enabling high-level strategic discussions, reinforcing cross-border collaboration, and aligning the consortium on next-phase ambitions. Together, these milestones underline 2025 as a year of consolidation, visibility, and shared progress for Clinnova, firmly positioning the initiative for scaling impact in the years ahead.

PRAGMATIC DATA SCIENCE CENTER (PDSC) BECOMES MULTI-MODAL ANALYTICS & DATA SCIENCE (MAD)

Prof Cristina Granziera
Translational Imaging in Neurology - ThINk Basel

Prof Jens Kuhle
Swiss MS Cohort Study and Laboratory of Clinical Neuroimmunology

Po-Jui Lu, PhD
Lead of MAD, Head of AI/Industrial Collaboration

The Vision

The complexity of Multiple Sclerosis (MS) requires a paradigm shift in how we monitor disease activity and treatment response. Traditional measures often lack sensitivity to subtle changes, while new digital approaches (digital sensors, MRI) and biofluid analyses generate vast amounts of informative and granular data. Our vision is to establish the Multi-modal Analytics & Data Science (MAD) group, a dedicated team that will drive innovative analytics in the Swiss Multiple Sclerosis Cohort (SMSC) by integrating digital sensor data with MRI, molecular, and clinical measures.

The SMSC provides an unparalleled infrastructure, with more than 2,000 patients followed prospectively, a median follow-up of 7 years, and some participants now beyond 13 years of continuous observation. Over 50 peer-reviewed publications have already arisen from SMSC data, underscoring both scientific productivity and robustness of the dataset. The SMSC, RC2NB, and the MS Centre Basel have pioneered and driven clinical improved more granular and well-standardized measures (Neurostatus), advanced imaging, and fluid biomarkers to worldwide application over the past decades. By uniquely combining these long-term, high-quality data with advanced analytics, artificial intelligence, and translational validation, MAD will deliver tools that transform both trialing and individualized patient care.

Rationale

Digital modules for assessing motor and cognitive functions have shown promise in capturing disease dynamics in pwMS in their natural environment with greater precision than conventional tools. Their true potential, however, lies in combining them with multimodal data streams, from imaging to biological markers (encompassing fluid measures but also cellular/molecular profiles).

Structure and Expertise

The MAD group will bring together complementary expertise in data preprocessing, statistical and AI modeling, and clinical translation. This cross-disciplinary integration is critical,ensuring that raw data become clinically meaningful tools.

MAD will have the goal to perform:
- Signal Pre-processing & Feature Extraction
- Statistical & AI Modeling:
- Support Clinical Translation & Validation

In addition, MAD will train the next generation of clinician-scientists in multimodal analytics, reinforcing the sustainability of expertise and implementation in daily management.

The MAD group impact

- Provide sensitive, multimodal measures for patient stratification for the purpose of
a) enhancing randomized clinical trials design
b) decreasing healthcare related costs.

-Generate internationally relevant benchmarks and novel outcome measures that can be incorporated into regulatory-grade clinical trials.

-Build a sustainable infrastructure for MS research, bridging digital innovation (sensor-based and MRI), fluid& cellular/molecular biomarkers and clinical applications.

Conclusion

The MAD group aims to enhance RCT design and effectiveness while reducing long-term healthcare costs by integrating digital innovation with fluid and imaging biomarkers. MAD will set a global benchmark for AI-driven precision monitoring and deliver tools that transform both MS research and everyday care.

RC2NB EVENTS 2025

HONOURING A LIFETIME OF ACHIEVEMENT – PROFESSOR LUDWIG KAPPOS, CHARCOT AWARD 2025

Prof Kappos at ECTRIMS 2025.

At the closing session of ECTRIMS 2025 in Barcelona, the Multiple Sclerosis International Federation (MSIF) presented Ludwig Kappos with the prestigious 2025 Charcot Award, the highest international accolade recognizing a lifetime of outstanding achievement in multiple sclerosis research.

His leadership in clinical trials has helped shaping nearly all major disease-modifying therapies used today, from interferons to newer agents like siponimod, ocrelizumab and ofatumumab, expanding treatment options for both relapsing and progressive MS. Beyond therapeutics, his pioneering work on standardization of clinical assessment, biomarkers, advanced imaging, and concepts such as progression independent of relapse activity (PIRA) has transformed how the disease is monitored and understood.

In his Charcot Lecture, titled "Developing MS therapeutics – success factors and call for innovation", he shared expert insights on advancing MS treatment. A key factor of success until now and even more for the future of therapeutic innovation is international and national interdisciplinary collaboration. Since its foundation RC2NB is deeply committed to such translational, collaborative approach to advance care through research excellence.

MAGNIMS 2025 IN BASEL

MAGNIMS 2025, Tobias Granberg presenting.

In November 2025, RC2NB hosted the 44th MAGNIMS Workshop in Basel, bringing together the international MAGNIMS community to discuss new developments at the interface of MRI and histopathology research.

Through its two annual meetings, MAGNIMS has delivered key evidence supporting the validation and standardisation of both conventional and advanced MRI biomarkers across centres, enhancing their robustness and clinical interpretability with direct implications for imaging guidelines and clinical trial design in MS and other demyelinating diseases, including NMOSD and MOGAD.

The workshop organized by Cristina Granziera and Ludwig Kappos together with the MAGNIMS Steering Committee convened many of the field's most influential researchers and international guests, leading experts across MRI, neurology, neuroradiology, artificial intelligence, and neuroimmunology.

A dense and forward-looking scientific programme focused on post-mortem imaging and neuropathology, fostering deep interdisciplinary dialogue and reinforcing the translational mission of the MAGNIMS network.

MAGNIMS 2025 strengthened international partnerships, elevated Basel's visibility in MS imagingresearch, and reaffirmed RC2NB's commitment to advancing imaging science to deepen understanding of this complex disorder and, ultimately, improve patient care.

CLINNOVA CONSORTIUM MEETING 2025

The Clinnova Consortium Meeting 2025, hosted in Strasbourg, brought together partners from Luxembourg, Switzerland, France, and Germany for two days of focused, in-person collaboration dedicated to advancing cross-border precision medicine.

Organised with the strong involvement of Luxembourg Institute of Health, the meeting reinforced Clinnova's role as a flagship European initiative for data sharing, harmonization, and federated analysis in three groups of frequent, chronic inflammatory diseases of high socio-economic impact across borders through a trusted, interoperable health data ecosystem.

Across interactive workshops, use-case presentations, and live demonstrations, partners showcased tangible progress in digital health innovation. Demonstrations of federated learning applications illustrated the growing maturity of the federated network of Data Integration Centers and its ability to enable data-driven research while respecting national regulations and data sovereignty.

Beyond the formal agenda, the meeting created valuable space for networking and informal exchanges, often where the most impactful ideas and future collaborations begin. These moments highlighted the added value of face-to-face engagement in addressing complex, cross-border challenges. Moving forward, the consortium agreed to build on the second option discussed, namely a federated approach connecting all data warehouses through a shared federated node, which closely mirrors the structure already in place for imaging. Commercial solutions were deliberately set aside due to cost considerations. It was also discussed that, moving forward, the consortium should aim for consortium-wide funding rather than country-specific funding to better support alignment and long-term sustainability. While differences in national frameworks, regulatory environments, and operational contexts continue to pose challenges, the consortium demonstrated a shared commitment to alignment, interoperability, and innovation. The collective ambition and diversity of expertise present underscore the enormous potential for breakthroughs when partners work together across borders.

PHD HIGHLIGHT 1

COGAMES – GAMIFIED MONITORING OF COGNITION IN PEOPLE WITH MULTIPLE SCLEROSIS

Silvan Pless: Silvan is now a postdoctoral researcher at the RC2NB, where he completed his PhD on monitoring cognitive function in people with MS in the summer 2025. He studied psychology at the University of Basel, working with MS patients at the University Hospital Basel, and earned a Master's degree in Clinical Psychology and Neuroscience with a thesis on affective symptoms and cognition in MS. His research now focuses on developing and improving cognitive assessment methods, particularly the CoGames.

Scan us to access the GoGames poster and paper.

Cognitive functions such as information processing speed, episodic memory, and mental flexibility are often impaired in people with multiple sclerosis (MS). Although cognitive impairment is highly prevalent and can severely impact quality of life, it is often neglected in both routine clinical assessment and treatment.

Silvan Pless addressed this challenge by developing a novel, patient-friendly approach to cognitive monitoring. As part of the dreaMS project (Development of Digital Biomarkers for MS) and in cooperation with the medical device manufacturer Indivi, he and the dreaMS team created CoGames.

CoGames consists of six gamified and adaptive smartphone games designed to assess and monitor 5 cognitive domains with high temporal resolution. Gamification elements such as points, performance feedback, and appealing visual effects make the assessment appealing and engaging. Additionally, the adaptive difficulty system helps to prevent frustration when the task is too difficult and boredom when the task too easy, an important feature given the heterogeneity of cognitive impairment in MS.

Figure 9. *Demonstration of the game "Think Fast!", which measures mental processing speed.*

Results from multiple studies, including analyses of reliability and acceptance in healthy volunteers, long-term adherence, and correlations with neuroimaging markers and established cognitive reference tests in people with MS, have already been published in peer-reviewed journals and presented at international conferences. Most notably, at the most recent European Charcot Foundation Annual Meeting, Silvan Pless received the Young Investigator Award in the category "Investigations." Following initial feasibility testing in healthy volunteers, CoGames is currently being validated in one Swiss and two international validation studies.

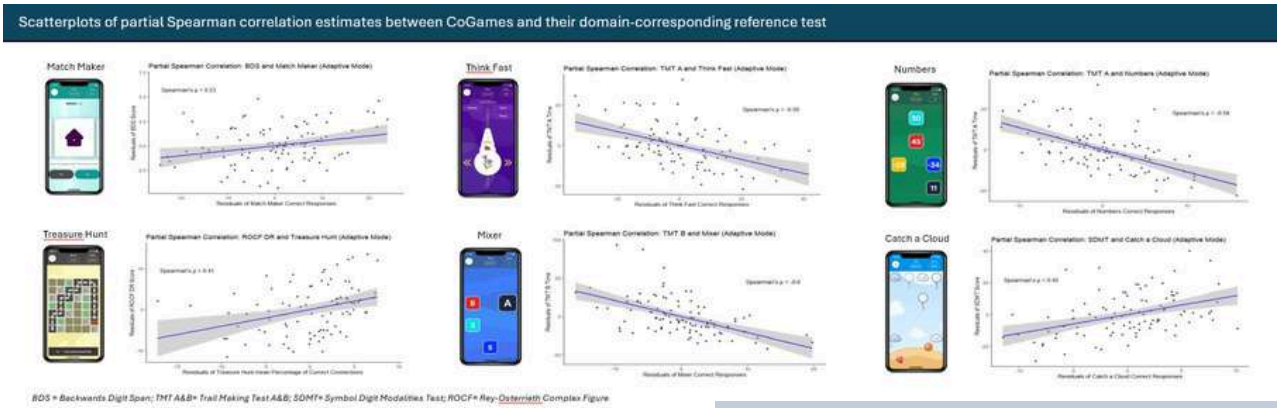


Figure 10. *Correlations between game derived measures and neuropsychological reference tests from 100 people with multiple sclerosis.*

PHD HIGHLIGHTS 2

NOA BAR ZOHAR

Seeing remyelination through many lenses

At the intersection of neuroimaging and genetics, my PhD project at RC2NB explores why remyelination differs so markedly among people with multiple sclerosis. Repair succeeds in some individuals yet fails in others - a complexity that cannot be understood from a single perspective.

By combining quantitative MRI to identify remyelinating lesions with genome-wide association analyses, the work links in vivo imaging markers of repair to underlying biological mechanisms. The aim is to uncover the anatomical and genetic factors that shape remyelination heterogeneity in multiple sclerosis, identifying brain regions and genetic loci associated with reduced or enhanced repair.

Particular attention is given to whether lesion location within the brain influences its capacity to remyelinate, and how individual genetic susceptibility contributes to a patient's repair potential.

Embedded in the interdisciplinary environment at RC2NB, this research approaches remyelination not as an isolated biological event, but as a process shaped by anatomy, genetics, imaging, and clinical insight. It is this convergence of perspectives that turns heterogeneity into understanding while spinning sessions or Pilates classes provide the perfect counterbalance to long hours of lesion segmentation.

PHD HIGHLIGHTS 3

TIM WÖLFLE

Advancing MS Research Through Digital Biomarkers

The interdisciplinary nature of research and the diversity in backgrounds and cultures at RC2NB have broadened my horizon and allowed me to think more outside the box.

My experience at RC2NB has set a very high standard. I wish to convey and experience the same level of openness, team spirit, and sense of a shared mission. Regarding my best research ideas, they usually come to me when I try to think about research least - in the middle of a climbing wall or in the sauna.

My thesis was on "smartphone- and smartwatch-based digital biomarkers for MS", which promise quantitative and objective insights into the disease course with high temporal resolution and sensitivity to change - important prerequisites for the digital revolution of clinical practice and research in MS!

For my thesis, we performed a systematic literature review mapping and classifying 308 publications employing wearable sensors to assess motor function in PwMS. It became clear that while dedicated research-grade sensors were mostly used in the past, smartphones and smartwatches are increasingly used. Furthermore, we examined a common issue in longitudinal assessments: learning and practice effects. Then, we performed a 6-week feasibility study, examining reliability and acceptance of our own digital biomarker solution for PwMS: dreaMS. All 11 active tests produced several features with good to excellent test-retest reliability and were perceived as highly relevant by PwMS. In the same feasibility study, we also examined passive monitoring with a commercial smartwatch device. Moreover, we performed a cross-sectional exploratory classification of MS-severity-subgroups using dreaMS movement tests and machine learning. Finally, I've outlined next steps for dreaMS, including the ongoing clinical validation through two large validation studies, difficulties concerning long-term adherence, and important aspects of data privacy.

FINANCIAL STATEMENT

FINANCIAL RESULTS AND RESEARCH IMPACT - 2025

In 2025, RC2NB used the funds available to advance our understanding of MS and related neuroimmunological disorders. We wish to thank our supporters for their generous support that enables us to continue this pursuit.

FINANCIAL OVERVIEW

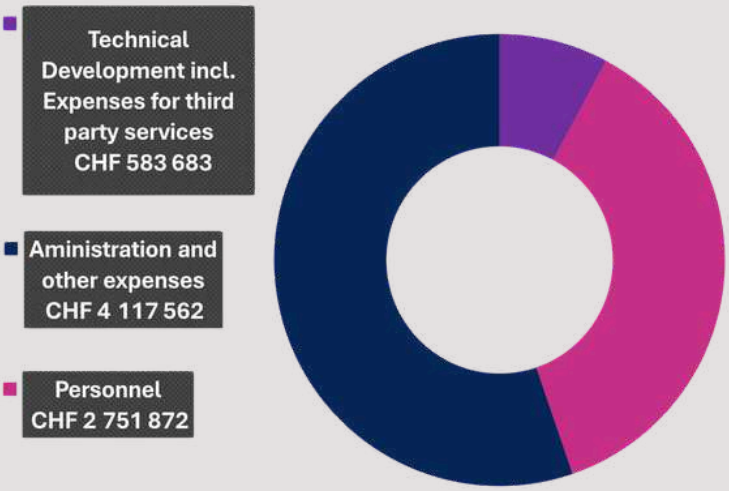
Total operating income for the year amounted to CHF 10'411'255. This increase includes the transfer of CHF 3'600'000 from a dedicated University Hospital Basel account to RC2NB and then donated to the University of Basel for the establishment of the MS and Neuroimmunology professorships. Further project-bound funding came from industry and non-profit organizations.

Expenses for the year totaled CHF 7'453'117, including the RC2NB donation for the MS and Neuroimmunology professorships. Deducting this one-off expense, annual expenses decreased vis-à-vis 2024. Also, the composition of the total has changed as the need for personnel is now the single largest expense, while technical development costs are decreasing.

Management and administration costs continue to account for less than 10% of the overall expenses underlining RC2NB's operational efficiency.

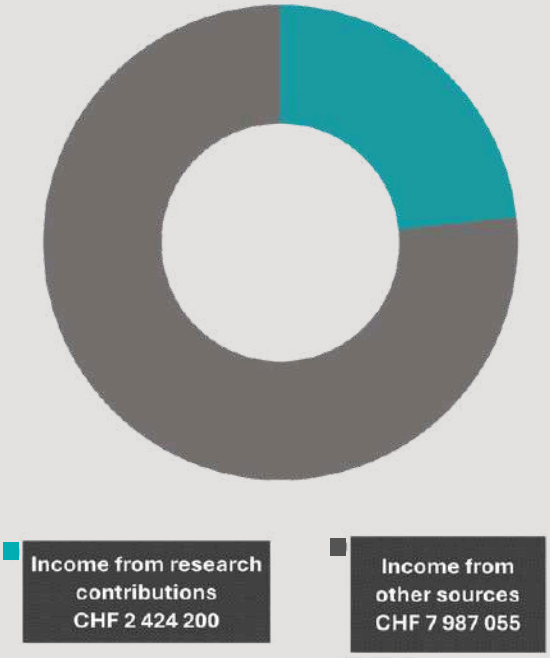
EXPENSES BY CATEGORY

TOTAL EXPENSES: 7 453 117 CHF



INCOME BY CATEGORY

TOTAL INCOME: 10 411 255 CHF



FINANCIAL STATEMENT 2025

	2025	2024
Income from research contributions	2 424 200 CHF	1 884 000 CHF
Income from other sources	7 987 055 CHF	1 677 408 CHF
Total Operating Income	**10 411 255 CHF**	**3 561 408 CHF**
Technical Development incl. expenses for third party services	- 583 683 CHF	-1 541 784 CHF
Personnel	-2 751 872 CHF	-2 563 474 CHF
Aministration and other expenses	-4 117 562 CHF	-453 619 CHF
Total Operating Expenses	**-7 453 117 CHF**	**-4 558 877 CHF**
Financial Income	12 448 CHF	30 999 CHF
Financial Expenses	-3 732 CHF	-2 855 CHF
Financial Result	8 716 CHF	28 145 CHF
Ordinary Result before allocation to restricted funds	**2 966 854 CHF**	**-969 324 CHF**
Assets allocated to restricted funds	-2 520 483 CHF	294 318 CHF
Ordinary Result after allocation to restricted funds	**446 371 CHF**	**-675 006 CHF**
Assets allocated to unrestricted funds	-446 371 CHF	675 006 CHF
Ordinary Result after allocation to unrestricted funds	**0 CHF**	**0 CHF**

EXPENSES BY COST CENTERS

RC2NB's Financial Statement 2025 was reviewed and approved by the auditor BDO AG. **Several projects of research groups in the RC2NB workstreams 2, 3 and 4 are currently funded independently and managed by the University Hospital or the University of Basel and therefore, not part of RC2NB's financial statement.**

	Personnel	Consumable and other lab services	Technical Development	Administration and other expenses	Total
Workstream 1	723 835 CHF	124 753CHF	418 981 CHF	53 206 CHF	**1 320 775 CHF**
Workstream 2	1 391 361 CHF	40 610 CHF	0 CHF	254 227 CHF	**1 686 198 CHF**
Workstream 3	71 189 CHF	0 CHF	0 CHF	3 604 667CHF	**3 675 856 CHF**
Workstream 4	92 680 CHF	0 CHF	0 CHF	8 813 CHF	**101 493 CHF**
Data Storage and Analysis	200 119 CHF	0 CHF	0 CHF	8 221 CHF	**208 340 CHF**
Management/ Administration	272 688 CHF	0 CHF	0 CHF	187 767 CHF	**460 456 CHF**
Total	**2 751 872 CHF**	**165 363 CHF**	**418 981 CHF**	**4 116 901 CHF**	**7 453 117 CHF**

EQUITY

	2025	2024
Equity as of 01.01	**6 702 801 CHF**	**7 672 125 CHF**
Income	10 419 971 CHF	3 589 553 CHF
Expenses	**-7 453 117 CHF**	-4 558 877 CHF
Equity as of 31.12	**9 669 654 CHF**	**6 702 801 CHF**

MAIN PARTNERING INSTITUTIONS AND RESEARCH SUPPORT

Thank you for supporting us in 2025!

We extend our sincere appreciation to all who supported our work in 2025. The dedication of our institutional partners, foundations, and individual supporters remains essential to the success of our research and the continued progress of our mission.

Our sponsors in Switzerland

Universitätsspital Basel · University of Basel · SMSC Swiss MS Cohort · Indivi · Roche · NOVARTIS · Neurostatus-UHB AG · sanofi · MS Schweizerische Multiple Sklerose Gesellschaft · euresearch Swiss guide to European research and innovation · Schweizerischer Nationalfonds · Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra

Our Clinnova partners and locations around Europe

Basel (Switzerland)

RC2NB · University of Basel · Kanton Basel-Stadt · Universitätsspital Basel · Clarunis Universitäres Bauchzentrum Basel

Grand Est (France)

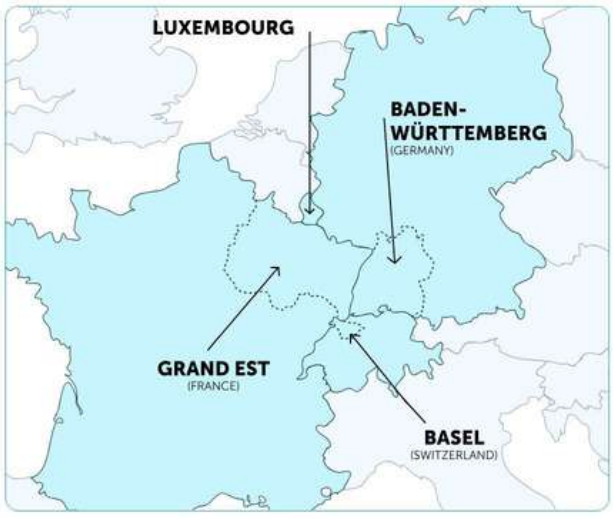
La Région GrandEst · IPHC · Université de Strasbourg · Université de Lorraine · inesia · Université de Reims Champagne-Ardenne · BIOVALLEY France · CHRU Nancy · Les Hôpitaux Universitaires de Strasbourg · INFINY · Inserm · PRIeSM

Baden-Württemberg (Germany)

miracum · 3DIH · Universitätsklinikum Freiburg · UMM Universitätsmedizin Mannheim · Medizinische Fakultät Mannheim der Universität Heidelberg · Universitätsklinikum Mannheim · KTBW

Luxembourg

uni.lu Université du Luxembourg · LCSB · Hôpitaux Robert Schuman · CHL · Luxembourg Institute of Health



Our dreaMS VS2 partners and locations around the world

Austria *Innsbruck*
Austria *Graz*
Austria *Wien*
Canada *Toronto*
Canada *Vancouver*
Germany *Berlin*
Germany *Mainz*
Germany *München*
Germany *Münster*
Germany *Bochum*
Germany *Dresden*
Italy *Bari*
Italy *Cagliari*
Italy *Genova*
Italy *Milano*
Italy *Roma*
Netherlands *Amsterdam*
Norway *Oslo*
Spain *Madrid*
Spain *Sevilla*
Sweden *Stockholm*
UK *Liverpool*
USA *New York*
USA *San Francisco*
USA *Boston*

MEMBERS AND AFFILIATES OF RC2NB IN 2025

ADMINISTRATION

Kappos Ludwig, Prof (RC2NB CEO)
Granziera Cristina, Prof (RC2NB CO-CEO)
Limberg Philipp, MSc (RC2NB manager, project management dreaMS VS1 and dreaMS VS2)

Cosandey Bebeka, PhD (head of scientific communication & marketing)
Hanl Lea (CEO assistant and management assistant until June 2025)
Herrgott Kathleen (scientific collab. and content creator)
Nikolova Tania (CEO assistant and management assistant from June 2025)
Saupper Claudia, MSc (data architect until Dec. 2025)
Suljakovic Aida (admin. employee research)

DIGITAL FUTURE - WORKSTREAM 1

Group Members and Affiliates
dreaMS and digital biomarkers:

Granziera Cristina, Prof (research group leader)
Müller Jannis, Dr.med., MSc (PI VS1 and VS2 research group leader)
Hemkens Lars, Prof (PI VS2 until May 2025)
Bezençon Thomas (master/medical student)
Cortese Rosa, MD, PhD (clinician-scientist)
Cosandey Bebeka, PhD (lead scientific project manager)
Kolb Sibylle (study nurse)
Lu Po-Jui, PhD (head of AI/industrial collaboration)
Mesmer Fabian (PhD student)
Meyer Carolin, Dr.rer.nat. (study nurse)
Phavanh Vanny (study nurse)
Pless Silvan, PhD (neuropsychologist)
Sala Rossella, MSc (study nurse until October 2025)
Stoll Tanja, MSc (study nurse)
Tascedda Sophie, MSc (PhD candidate)
Widmer Felix, Dr.med., PhD (clinician-scientist)
Wiencierz Andrea, PhD (statistician)
Wölfle Tim, MD, PhD (research fellow, neurologist)

Indivi Ltd:

Belachew Shibeshih, Dr, CMO
De Jong Corne, CFO
Dupont Guilhem, Chairman, CEO
Oscar Reyes, PhD, Head Data Scientist
Rey Simone, COO
(INDIVI; other employees of INDIVI Ltd involved in dreaMS are not individually mentioned, see https://indivi.io/)

Neurostatus-UHB LtD

D'Souza Marcus , PD Dr (senior consultant/CEO)
Athanasopoulou Ioanna, Dr (neurologist2)
Boos Lukas (neurologist)
Brandt Jenny, Dr (research associate)
Callegari Ilaria, MD, PhD (neurologist)
Cerdá Fuertes Nuria Alicia, Dr (neurologist lead)
Corageoud Matthieu (IT)
Demirtzoglou Anastasios (neurologist)
Gysin Annalea (management assistant)
Haghighi Erfan (requirements engineer/ IT)
Heiniger-Bär Carla (management assistant)
Hug Gabriel (student/IT)
Dinsenbacher Lisa, Dr (neurologist)
Duhan Prerna (intern)
Forman Barbara (operations & legal affairs)
Fricker Evy (COO)
Gamez Marcos (IT)
Garcia Eddy (operations lead)
Götti Joël (legal assistant)
Greselin Martina (PhD student)
Kamm Christian, Prof (neurologist)
Kel Jakob (IT lead)
Lee Joanne (Sim Joo) (operations)
Limberg Philipp (COO)
Mallucci Giulia, Dr (neurologist)
Minkova Lora (digital tools for HD & connection to the EHDN digital working group)
Njuguna Steven (IT)
Pereira Vieira Bítia (extern, consulting physician)
Trouillet Thomas (IT)
Tschirky Michelle (intern/IT)
Waiz Colleen (operations)

NOVEL IMAGING & FLUID BIOMARKERS - WORKSTREAM 2

Group Members and Affiliates
ThINk Basel
Prof Cristina Granziera team:

Granziera Cristina, Prof (RC2NB Co-CEO, head of neurology USB, research group leader)
Barker David Charles (student)
Bar Zohar Noa (PhD student)
Bosticardo Sara (PhD student)
Cagol Alessandro, MD, (research fellow, neurologist)
Callegari Ilaria, MD, PhD (neurologist)
Mastantuono Marina (visiting PhD student)
Melie Garcia Lester, Dr (senior researcher)
Meluso Marco (visiting scholar)
Müller Jannis, MD, MSc (consultant in neurology USB, research group leader)
Negeh Bah Aaisha (master student)
Ocampo Pineda Mario Alberto, Dr (research fellow)

Chen Xinjie, MD, PhD (research fellow)
Cortese Rosa, MD, PhD (clinician-scientist)
Dhital Bibek, Dr (research fellow)
Egly Laurin (student)
Ernst-Wilhelm Radue (Prof Emeritus)
Galbusera Riccardo, MD, PhD (research fellow, neurologist)
Gkotsoulias Dimitrios, Dr (research fellow)
Greselin Martina (PhD student)
Herrgott Kathleen (scientific collab. and content creator)
Kaim Kornelius (student)
Limberg Marguerite (research assistant)
Lu Po-Jui, Dr (research fellow)
Magnenat Victor (student)
Ponti Ludovica Giovanna (PhD student)
Ruberte Esther, Dr (senior researcher)
Schädelin Sabine, MSc (statistician)
Schönenberger Lukas (PhD student)
Spagnolo Federico (PhD student)
Suljakovic Aida (personal assistant)
Tsagkas Charidimos, MD, PhD (research fellow, neurologist)
Weigel Matthias, Dr (senior researcher)
Wenger Antonia (PhD student)
Wölfle Tim, MD, PhD (research fellow, neurologist)

PD Athina Papadopoulou team:
Papadopoulou Athina, PD (senior consultant)
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Burget Villena Federico (doctoral student)
Ebner Katarina (doctoral student)

Prof Özgür Yaldizli team:
Yaldizli Özgür, Prof (research group leader, senior consultant)
Aldea Andreea (assistant doctor)
Dieterle Manuel, MD (Team Lead Artificial Intelligence)

Prof Regina Schläger team:
Schläger Regina, Prof (research group leader, consultant)
Jetzer Renée Joëlle (master student)
Konjevod Valentina (doctoral student)

PD Katrin Parmar team:
Parmar Katrin (senior consultant at the Reha Rheinfelden)
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Prof Jens Kuhle team:
Swiss MS Cohort Study and Clinical Neuroimmunology - Fluid Biomarker Laboratory
Kuhle Jens, Prof (head of the multiple sclerosis centre and neuroimmunology unit, senior consultant)
Benkert Pascal, Dr (head of SMSC datacentre, senior statistician)
Demuth Lilian (study coordinator)
Einsiedler Maximilian (senior neurologist/post-doc)
Genc Nafiye (resident neurologist)
Gomez Juan Vilchez (research technician)
Gress Ulrich (study coordinator)
Lacalamita Melanie (study coordinator)
Leppert David, Prof (senior research associate)
Limberg Marguerite (research assistant)
Maleska Maceski Aleksandra, MSc (bioengineer)
Oechtering Johanna, Dr (senior neurologist/postdoc)
Orleth Annette, Dr (post doc)
Rodriguez Calvo Mauricio (study coordinator)
Sandgren Sofia, Dr (neurologist/postdoc)
Salfati Jonathan (data manager)
Schädelin Sabine, MSc (statistician)
Schmid Genevieve (study nurse until July 2025)
Stanojevic Daniela (study nurseuntil Dec. 2025)
Subramaniam Suvitha, MSc (data scientist)
Willemse Eline, Dr (post doc until Dec. 2025)
Zadic Amar (research technician)

INTERNATIONAL CLINNOVA CONSORTIUM

Clinnova Basel
Granziera Cristina, Prof (princial investigator)
Cosandey Bebeka, PhD (lead scientific project manager)
Stoll Tanja, MSc (study nurse)

UNDERSTANDING THE IMMUNE SYSTEM - WORKSTREAM 3

Group Members and Affiliates

Prof Tobias Derfuss Team:
Derfuss Tobias, Prof (senior consultant, vice chair of the department of neurology, head neurology outpatient Clinic)
Billot Ghislaine (study nurse)
Brunner Caroline (study nurse)
Galli Edoardo Dr (post doc)
Lacalamita Melanie (study coordinator)
Miteva Suzana (study nurse)
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Phavanh Vanny (study nurse)
Perdikaris Georgios (PhD student)
Raach Yakine (PhD student)
Sakiri Elif (PhD student)
Sanderson Nicholas, PD, PhD, (senior scientist)
Schneider Mika (PhD student)

Prof Matthias Mehling team:
Mehling Matthias, Prof (senior consultant)
Boog Olivier (PhD student)
Coray Mali (MD-PhD student)
Epple Varenka, Dr (research associate)
Fuhrmann Jakob, Dr (research associate)

Prof Anne-Katrin Pröbstel team:
Pröbstel Anne-Katrin, Prof (senior consultant since April 2025, chief Physician University Hospital Bonn)
Berve Kristina (post doc)
Beyerle Miriam (MD doctoral student)
Burckhard Maria, Dr (Clinical science, project lead)
Cullen Baumann Pauline (scientific coordinator)
Dürrenberger Tim (doctoral student)
Flammer Julia (resident/post doc)
Gutzwiller Julia (clinical study coordinator)
Gutzwiller Sophia (student assistant)
Häfelfinger Marco (master student)
Kulsvehagen Laila (PhD student)
Lecourt Anne-Cathérine (lab manager/technician)
Lerner Jasmine (master student)
Lipps Patrick (MD doctoral student)
Lutz Luc (master student)
Neziraj Tradite, Dr (resident/post doc)
Otto Maximilian (undergraduate student)
Pereira Loureiro Jose Pedro Dr (postd oc)
Pössnecker Elisabeth (PhD student)
Pretzsch Roxanne (resident/post doc)
Saary Paul, Dr (post doc)
Schäfer Verena (lab manager/technician)
Scherhag Florine (master student)
Wenger Nicole (lab technician)
Wettig Angéline (master student)
Wetzel Nora (MD-PhD student)

PRAGMATIC EVIDENCE - WORKSTREAM 4

Group Members and Affiliates

Prof Özgür Yaldizli, Pragmatic Evidence Lab:
Yaldizli Özgür, Prof (research group leader from June 2025, senior consultant)
Hemkens Lars, Prof (research group leader until May 2025; senior scientist)
Beer Maximilian (master student medicine)
Chaboud Louise (PhD student clinical research)
Düblin Pascal (application developer)
Hansen Sina (senior project manager)
Hirt Julian, Dr (research fellow)
Janiaud Perrine, Dr (head of Pragmatic Data Science Center until May 2025, research fellow)
Mohamadi Marjan (master student epidemiology)
Andreas Schmitt, MD (research fellow)

AWARDS, DISTINCTIONS AND OTHER ACHIEVEMENTS IN 2025

Chen Xinjie – received the 1st Prize of the Anna Müller-Grocholski Foundation, awarded by the Swiss Society of Neuropediatrics for the best planned research project.

Gkotsoulias Dimitrios DG. – received the ISMRM–ESMRB Magna Cum Laude Award (Top Abstracts) for his MRI-based investigation of astrocytic activation in multiple sclerosis; Selected Oral Presentation and Highlights Nomination at ECTRIMS 2025, accompanied by a registration stipend and travel grant.

Kuhle Jens – Appointment as Clinical Professor of Neurology, Neuroimmunology and Multiple Sclerosis at the University of Basel and University Hospital Basel, Affiliate Membership of the United Kingdom Dementia Research Institute, and recognition as a Highly Cited Researcher by Clarivate.

Pless Silvan – Young Investigator Award in the category „Investigations“ at the European Charcot Foundation (ECF) 33rd Annual Meeting in Baveno for his poster "Monitoring Cognition in Multiple Sclerosis via Adaptive Smartphone Games - First Insights from a Validation Study“.

Özgür Yaldizli - Chornexus SNF ERANET Project grant in the amount of CHF 347,000.

COMPLETED PHD, DOCTORAL THESES AND MASTER THESES

Completed PhDs

Bosticardo Sara, PhD (Department of Biomedical Engineering), with her thesis “A multi-compartment model for pathological connectomes".

Pless Silvan, PhD (Medical Faculty Basel), with his thesis “CoGames: Development and Validation of Smartphone-Games for Monitoring Cognition in Multiple Sclerosis”.

Spagnolo Federico, PhD (Department of Biomedical Engineering), with his thesis “Toward clinical translation: advancing the understanding of AI models in multiple Sclerosis”.

Wenger Antonia, PhD (Department of Biomedical Engineering), with her thesis "Investigating the relationship of structural connectivity with clinical and cognitive measures in patients with Multiple Sclerosis“.

Wölfle Tim, PhD (Medical Faculty Basel), with his thesis “Smartphone- and Smartwatch-based Digital Biomarker for Patients with Multiple Sclerosis”.

Completed Medical Degree Theses

Bezencon Thomas, MD (Medical Faculty Basel) with his thesis "Development and Design of a Custom Quality Control Pipeline for the Evaluation of Intertion Motion Capture in People with Multiple Sclerosis."

Demirtzoglou Anastasios, MD (Medical Faculty Basel), with his thesis "Associations between cognitive and physical disability in patients with multiple sclerosis". Manuscript currently with the co-authors. MSJ

Kaim Kornelius, MD (Medical Faculty Basel), with his thesis "Macro- and Microstructural Changes in the Upper Cervical Spinal Cord and Their Clinical Correlates in Multiple Sclerosis".

Tan Gizem, MD (Medical Faculty Basel), with her thesis "On the Choroid Plexus Volume in Alzheimer's Disease: A cross-sectional Analysis of the Alzheimer's Disease Neuroimaging Initiative Cohort".

Completed Masters

Duhan Prerna, Master (medical informatics, FHNW Muttenz), with her thesis "Designing a tablet-based electronic data capture (EDC) tool for an outpatient neurology clinic". Manuscript currently with the co-authors. JMIR

Negeh Aaisha, Master (Department of Biomedical Engineering), with her thesis "Investigating the Relationship Between the Morphometric Data of MS Patients and a Selected Cognitive Game".

PUBLICATIONS IN PEER REVIEWED JOURNALS

Highlighted papers are displayed in red

Authors displayed in **bold** are members of RC2NB working groups

1. Abdelhak A, Bachhuber F, Ning K, **Benkert P**, John Boscardin W, **Maleska Maceski A**, **Schädelin S**, Achtnichts L, Finkener S, Lalive PH, Uginet M, Pot C, Du Pasquier R, Hoepner R, Chan A, Gobbi C, Zecca C, Müller S, Roth P, **Granziera C**, Chitnis T, Madill E, Weiner HL, Green AJ, Hauser SL, Cree BA, Kümpfel T, Havla J, Skripuletz T, Gingele S, Senel M, Vardakas I, Taranu D, Ziemann U, Kowarik MC, Kleiter I, Hoshi MM, Zettl UK, Haarmann A, Thebault S, Freedman MS, Bergman HP, Iacobaeus E, Khademi M, Ferraro D, Cardi M, Mariotto S, Comabella M, Montalban X, Vilaseca-Jolonch A, Strijbis EM, Wessels MH, Killestein J, Hemmer B, Held F, Sellebjerg F, Højsgaard Chow H, Alvarez-Lafuente R, Domínguez-Mozo MI, Hegen H, Berek K, Deisenhammer F, Thouvenot E, Agherbi H, Rejdak K, Gąsior M, Tzanetakos D, Tzartos JS, Sormani MP, Dujmovic Basuroski I, Arrambide G, Khalil M, Piehl F, Teunissen CE, **Kuhle J**, Tumani H. Blood biomarkers for predicting disability worsening in progressive multiple sclerosis: a multinational, individual participant-level analysis. J Neurol Neurosurg Psychiatry. 2025 Oct 15;96(11):1046–52.

2. Abdelhak A, Cordano C, Duncan GJ, Emberley K, Nocera S, Xin W, Ananth K, Jabassini N, Ning K, Reinsberg H, Oertel FC, Beaudry-Richard A, **Kuhle J**, Petzold A, Patel PJ, Ribeiro Reis AP, Foster PJ, Watkins T, Chan JR, Emery B, Green AJ. Markers of axonal injury in blood and tissue triggered by acute and chronic demyelination. Brain. 2025 Aug 1;148(8):3011–20.

3. Ahola V, Saraste M, Nylund M, Matilainen M, Luoma A, Vuorimaa A, Lehto J, Laaksonen S, Brockmann EC, **Kuhle J**, **Leppert D**, Soukka T, Lamminmäki U, Airas L. Plasma CHI3L1 associates with brain volume loss and glial activation in multiple sclerosis. J Neurol Neurosurg Psychiatry. 2025 Oct 15;96(11):1053–60.

4. Androdias G, Lünemann JD, Maillart E, Amato MP, Audoin B, Bruijstens AL, Bsteh G, Butzkueven H, Ciccarelli O, Cobo-Calvo A, **Derfuss T**, Di Pauli F, Edan G, Enzinger C, Geraldes R, **Granziera C**, Hacohen Y, Hartung HP, Hynes S, Inglese M, **Kappos L**, Kuusisto H, Langer-Gould A, Magyari M, Marignier R, Montalban X, Mycko MP, Nourbakhsh B, Oh J, Oreja-Guevara C, Piehl F, Prosperini L, Sastre-Garriga J, Sellebjerg F, Selmaj K, Siva A, Tallantyre E, van Pesch V, Vukusic S, Weinstock-Guttman B, Zipp F, Tintoré M, Iacobaeus E, Stankoff B. De-escalating and discontinuing disease-modifying therapies in multiple sclerosis. Brain. 2025 May 13;148(5):1459–78.

5. Arnold DL, Kolind S, Assemlal HE, Bar-Or A, Inglese M, **Kappos L, Parmar K**, Sprenger T, Traboulsee A, Vavasour IM, Wolinsky JS, Bernasconi C, Bonati U, Magon S, Tackenberg B, Gaetano L. Short- and long-term effects of early versus delayed treatment with ocrelizumab on cerebellar volume loss in patients with RMS and PPMS. Mult Scler. 2025 June;31(7):821–32.

6. Avramiotis NS, Mutke MA, **Mehling M**, Todea RA, Psychogios MN, Fischer UM, Fladt J. Case 341. Radiology. 2025 May;315(2):e243300.

7. Avramiotis NS, Mutke MA, **Mehling M**, Todea RA, Psychogios MN, Fischer UM, Fladt J. Case 341: Infratentorial Posterior Reversible Encephalopathy Syndrome Associated with Interferon-β in Relapsing Multiple Sclerosis. Radiology. 2025 Sept;316(3):e243301.

8. Barkhof F, Reich DS, Oh J, Rocca MA, Li DKB, Sati P, Azevedo CJ, Bagnato F, Calabresi PA, Ciccarelli O, Dwyer MG, DeLuca GC, De Stefano N, Enzinger C, Filippi M, **Granziera C**, Halper J, Henry RG, Gasperini C, Gauthier S, **Kappos L**, Laule C, Newsome SD, Montalban X, Morrow SA, Schoonheim MM, Sicotte N, Toosy A, Wilken J, Yousry T, Sastre-Garriga J, Traboulsee A, Ontaneda D, Rovira À, Magnetic Resonance Imaging Network in Multiple Sclerosis, Consortium of Multiple Sclerosis Centers, North American Imaging in Multiple Sclerosis Cooperative MRI guidelines working group. 2024 MAGNIMS-CMSC-NAIMS consensus recommendations on the use of MRI for the diagnosis of multiple sclerosis. Lancet Neurol. 2025 Oct;24(10):866–79.

9. Baumgartner T, Freyberg M, Campetella L, Crijnen Y, Dargvainiene J, Behning C, Bien CG, Rada A, Prüss H, Rössling R, Kovac S, Strippel C, Thaler FS, Eisenhut K, Lewerenz J, Becker F, Reinecke R, Malter MP, Sühs KW, Tauber SC, Von Podewils F, Melzer N, Wandinger KP, Fernandez Ceballos RAM, **Kuhle J**, Berger K, Bauer T, Rüber T, Racz A, Becker AJ, Pitsch J, Kuhlenbäumer G, Muñiz-Castrillo S, Honnorat J, Titulaer MJ, Leypoldt F, Surges R, and the GENERATE study group. Risk of Epilepsy and Factors Associated With Time to Seizure Remission in Anti-LGI1 Encephalitis: Long-Term Outcome in 236 Patients. Neurol Neuroimmunol Neuroinflamm. 2025 Nov;12(6):e200469.

10. Bausch K, Speich B, Vogt DR, **Hemkens L**, Dreher M, Kwiatkowski M, Subotic S, Ardelt P, Bossard P, Hermanns T, Bruni N, Wyler S, Prause L, Merz SC, Engesser C, Roth J, Widmer AF, Seifert HH. Single-dose Versus 3-day Antimicrobial Prophylaxis in Transurethral Resection or Photoselective Vaporization of the Prostate: A Multicenter, Randomized, Placebo Controlled Trial (CITrUS Trial). Eur Urol Focus. 2025 Sept 11;S2405-4569(25)00254-8.

11. Bédard S, Karthik EN, **Tsagkas C**, Pravatà E, **Granziera C**, Smith A, Weber Ii KA, Cohen-Adad J. Towards contrast-agnostic soft segmentation of the spinal cord. Med Image Anal. 2025 Apr;101:103473.

12. Benedict RH, **Kappos L**, Miller A, Hartung HP, Overell J, Pei J, Dahlke F, Bernasconi C, Koendgen H, Wang Q, Bonati U, Cohan S. Cognitive effects of ocrelizumab vs interferon β-1a in relapsing multiple sclerosis: A post hoc analysis of the OPERA I/II trials. Mult Scler Relat Disord. 2025 Mar;95:106310.

13. **Berati K**, Enz L, Zuber P, **Ebner K**, **Sellathurai S**, Schoenholzer K, Villena FB, Gaetano L, **Kappos L**, Magon S, Sprenger T, **Papadopoulou A**. Somatosensory Profile of Central Post Stroke Pain of Thalamic Origin: Findings of a Quantitative Sensory Testing Study. Eur J Pain. 2025 Sept;29(8):e70104.

14. Boesen K, Dueblin P, **Hemkens L**, **Janiaud P**, **Hirt J**. Machine-learning assisted screening for evidence synthesis: Methodological case study of the ASReview tool. J Clin Transl Sci. 2025;9(1):e241.

15. Booth RA, Beriault D, Schneider R**, Benkert P, Willemse E, Maceski AM, Leppert D**, Freedman MS, **Kuhle J**. Validation and generation of age-specific reference intervals for a new blood neurofilament light chain assay. Clin Chim Acta. 2025 Sept 1;577:120447.

16. **Bosticardo S**, Battocchio M, **Ocampo-Pineda M, Cagol A, Lu PJ, Ruberte E, Oliveira S Siebenborn ND, Chen X, Melie-Garcia L, Weigel M, Kappos L, Kuhle J**, Daducci A, **Granziera C**. TIME: Tractography-Informed myelin estimation. Neuroimage Clin. 2025;48:103878.

17. **Bosticardo S**, Battocchio M, Schiavi S, Zalesky A, **Granziera C**, Daducci A. A multi-compartment model for pathological connectomes. Netw Neurosci. 2025;9(4):1245–63.

18. Bovis F, **Kappos L**, Arnould S, Karlsson G, Sormani MP. Personalized Treatment Response in Progressive MS: Can the Patient's Profile Influence the Outcome? Brain Behav. 2025 June;15(6):e70459.

19. **Burguet Villena F, Cerdá-Fuertes N, Hofer L, Schädelin S**, **Sellathurai S**, Schoenholzer K, **D'Souza M, Oechtering J**, Hanssen H, Gugleta K, **Cagol A, Granziera C, Kappos L**, Petzold A, **Benkert P, Kuhle J, Papadopoulou A**. Retinal neuronal loss and progression independent of relapse activity in multiple sclerosis. J Neurol. 2025 June 10;272(7):454.

20. **Cagol A, Schädelin S, Ocampo-Pineda M, Benkert P, Melie-Garcia L**, Luchetti L, **Yaldizli Ö, Oechtering J, D'Souza M**, Fischer-Barnicol B, Müller S, Finkener S, Vehoff J, Disanto G, Chan A, Pot C, Zecca C, **Derfuss T**, Lieb JM, Diepers M, Wagner F, Du Pasquier R, Lalive PH, Pravatà E, Kim OCH, Hoepner R, Roth P, Gobbi C**, Leppert D**, Battaglini M, **Kappos L**, Sormani MP, **Kuhle J**, **Granziera C**, Swiss MS Cohort. Comparative effectiveness of teriflunomide and ocrelizumab on smoldering activity in multiple sclerosis: an observational study in the Swiss Multiple Sclerosis Cohort. J Neurol. 2025 July 2;272(8):491.

21. **Cagol A, Schädelin S**, **Pretzsch R, Kappos L**, Sormani MP, **Granziera C**. The effect of disease-modifying therapies on brain volume loss and disability accumulation in multiple sclerosis: a systematic review and network meta-analysis. Lancet Reg Health Eur. 2025 Dec;59:101476.

22. Calabresi PA, Giovannoni G, Hartung HP, Naismith RT, Fox RJ, Sormani MP, Arnold DL, **Kappos L**, Valis M, Newsome SD, Belkin MI, Bartholomé E, Riester K, Javor A, Lyons J, Bradley DP, Fisher E, Tagge I, Naylor ML, Belachew S, Deykin A, Franchimont N, Zhu B, Cheng W. Safety and efficacy of opicinumab in participants with relapsing multiple sclerosis (AFFINITY Part 1): A randomized, controlled, phase 2 trial. Mult Scler. 2026 Jan;32(1):107–20.

23. **Chaboud L, Janiaud P, Hirt J, Hemkens L**. Agreement of treatment effects in decentralised trials versus traditional trials: meta-epidemiological study. BMJ. 2025 Nov 18;391:e084307.

24. **Chen X, Lu PJ, Ocampo-Pineda M, Cagol A, Schädelin SA, Ruberte E, Weigel M, Spagnolo F, Benkert P**, Lieb JM, **Leppert D, Yaldizli Ö, Oechtering J, D'Souza M**, Fischer-Barnicol B, **Derfuss T**, Ekerdt C, Menks WM, Chan KS, Zwiers M, Chan A, Hoepner R, Wagner F, Pot C, Du Pasquier RA, Finkener S, Diepers M, Bridel C, Lalive PH, Uginet M, Gobbi C, Zecca C, Pravatà E, Disanto G, Roth P, Vehoff J, Mueller S, Chan-Hi Kim O, **Kappos L, Kuhle J, Melie-Garcia L**, Marques JP, **Granziera C**. Unraveling Microstructural and Macrostructural Brain Age Dynamics in Multiple Sclerosis. Neurol Neuroimmunol Neuroinflamm. 2025 Sept;12(5):e200459.

25. Chitnis T, Magliozzi R, Abdelhak A, **Kuhle J, Leppert D**, Bielekova B. Blood and CSF biomarkers for multiple sclerosis: emerging clinical applications. Lancet Neurol. 2025 Dec;24(12):1066–78.

26. Christensen RH, Ashina H, Al-Khazali HM, **Ocampo-Pineda M**, Rahmanzadeh R, Hadjikhani N, **Granziera C**, Amin FM, Ashina M. Signs of Cortical Inflammation in Migraine Measured with Quantitative Magnetic Resonance Imaging: A Registry for Migraine (REFORM) Study. Ann Neurol. 2025 June;97(6):1168–79.

27. Cohen JA, Arnold DL, DeLuca J, Hartung HP, **Kappos L**, Comi G, Selmaj K, Steinman L, Bar-Or A, Montalban X, Havrdová EK, Sheffield JK, Pachai C, Cheng CY, Riolo JV, Cree BA. Brain atrophy and associations with long-term disability and cognitive function in participants with relapsing multiple sclerosis treated with ozanimod: Results from phase 3 and open-label extension trials. Mult Scler. 2025 Sept;31(10):1218–30.

28. Cortese M, Peng X, Edan G, Freedman MS, Hartung HP, Montalban X, Sandbrink R, Radü EW, Barkhof F, Wicklein EM, **Kappos L**, Ascherio A, Bjornevik K, BENEFIT Study Group. Serum Alpha-Linolenic Acid and Long-Term Multiple Sclerosis Activity and Progression. Neurology. 2025 Aug 12;105(3):e213905.

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