H.U.B

HÔPITAL UNIVERSITAIRE
DE BRUXELLES

ACADEMISCH ZIEKENHUIS
BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme ULB

Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Hôpital Universitaire des enfants
Universitair Kinderziekenhuis

SCIENTIFIC REPORT

2024

FROM 2021 TO 2024

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Foreword

J Cimino, N Deconinck, J-M Hougardy

Founded in 1986 and integrated into the H.U.B (Hôpital Universitaire de Bruxelles) in 2021, HUDERF/UKZKF (Hôpital Universitaire Des Enfants Reine Fabiola / Universitair KinderZiekenhuis Koningin Fabiola) stands as Belgium's only university hospital dedicated exclusively to pediatric medicine, in affiliation with the Université Libre de Bruxelles (ULB). Designed with children and their families in mind, HUDERF/UKZKF provides comprehensive care from birth through adolescence, adhering to the charter of rights for hospitalized children. As a 183-bed medical-surgical facility, it is committed to delivering high-quality, cutting-edge healthcare accessible to all. As a key member of HUB, a dynamic hospital group that includes Institut Jules Bordet and Hôpital Erasme, this pediatric center is uniquely positioned for growth, fostering new synergies, shared values, and a strong culture of innovation.

Pediatric research is central to HUDERF/UKZKF's mission, playing a critical role in advancing medical knowledge and improving the health and well-being of children. Conducted within specialized infrastructure, this research bridges the gap between clinical care and scientific discovery, driving the development of new therapies, diagnostic tools, and preventive strategies tailored to the unique needs of young patients. Through rigorous studies and clinical trials, our researchers continuously contribute to the enhancement of pediatric healthcare, ensuring that children receive the most innovative and effective treatments available.

As HUDERF/UKZKF embarks on a new chapter, it faces a series of challenges and opportUnities. A new strategic research plan, titled «Comprehensive Children's Hospital,» aligns with the medical strategy and highlights key pillars :

a) To broaden the scope of pediatric research to include projects that also address themes related to maternity, fertility, and parenthood—areas that have long been developed within the HUB in collaboration with its two partner hospitals, the academic hospital Erasme and the Jules Bordet Institute—all of which are brought together under the concept of 'Family and Child,' with a particular focus on perinatal care.

b) Strengthening medical leadership on research activity by creating a «review committee» for pediatric clinical studies.

c) Strengthening of the clinical research monitoring team dedicated to children, smoothly integrated in the CTCU and this in an optimized model in terms of self-financing,

d) The possibility of conducting paediatric Phase 1 studies, particularly in haematology-oncology, which requires training

These strategic directions connect fundamental research from our laboratories with clinical applications through collaborative «dream teams» of clinician-researcher pairs. This initiative strengthens existing HUB connections in neuroscience, the oncofertility clinic, cardiology, pediatric oncology, and other fields. Collaboration with the European Plotkin Institute for Vaccinology holds promise for the development of pediatric vaccines. Additionally, strong ties have been established with BioPark, a biomedical startup incubator founded by ULB.

Other key areas of focus include strengthening collaborations between our academic partners and the pharmaceutical industry, developing the «Réseau mère-enfant de la francophonie (RMEF),» the Belgian Society of Paediatric Haematology Oncology (BSPHO), and European Network Expertise Centers for departments such as hematology and oncology (ERN Paed-Can). Partnerships extend to other network institutions like the endocrinology clinic (Endo-ERN), the metabolic clinic (MetabERN), the genetics clinic (ERN ITHACA), and the French-speaking consortium BRACE (Brussels Rare and Complex Epilepsies), recognized as a full member of the ERN for rare and complex epilepsies (EpiCARE). Fully engaged in translational research, HUDERF/UKZKF is focused on sustaining its technological platforms, fostering a dynamic and cross-disciplinary collaborative environment, and maximizing the value of biobanking and research findings. In this context, the role of «The Belgian Kids' Fund» remains crucial, and we extend our heartfelt thanks to the association.

The collective efforts of HUDERF/UKZKF's talented researchers, dedicated staff, and visionary leadership will undoubtedly continue to push the boundaries in the fight against pediatric diseases. HUDERF/UKZKF's tradition of excellence and pioneering approach to interdisciplinary research make it a standout institution, poised to make even greater contributions to medical science and society in the years ahead.

With this ambition in mind, we pledge to ensure that HUDERF/UKZKF receives unwavering support from the «HUB Family» and its co-founders, the City of Brussels and the Université Libre de Bruxelles. Together, we aim to elevate the quality of research, bringing it to the forefront of academic excellence in the coming years.

Nicolas Deconinck
Scientific Director Family and Child

Jonathan Cimino
Clinical Director of Research

Marielle Sautois
Director of Research Administration

Jean-Christophe Beghin
Deputy Medical Director Family Child

Pierre Smeesters
Deputy Medical Director Family Child

Jean-Michel Hougardy
General Medical Director

Children have unique and rapidly changing physical, psychosocial, and developmental needs. Addressing early-life diseases and adverse childhood experiences has lifelong benefits for individuals, families and commUnities. This may also limit or even prevent many chronic adult-onset diseases that originate in early life. Since the acknowledgement of children as 'therapeutic or pharmaceutical orphans' in the 1960s there has been a worldwide recognition of the need to conduct trials of medicines used in children as a mechanism to improve the health of children. Significant advances in child health have resulted from the conduct of paediatric trials. Well-known trials of polio vaccines and the subsequent rapid translation into practice were instrumental in the successful and almost complete eradication of polio. Recent advances in multicentre cancer trials in children have increased childhood cancer 5 year survival from 28% in the late 1960s to 79% by 2005. Regrettably, these stories of remarkable benefits cannot be extended to many other childhood conditions because of the dearth of relevant trials. Prescribing in children is often based on extrapolation from trials in adults due to the lack of paediatric data. Children are not 'little adults,' but are a heterogeneous group, ranging from preterm neonates to post-pubertal adolescents. Their disease presentation may have a different natural history from adults and they may also suffer from diseases which do not occur in adults. Children have complex physiological, developmental, psychological and pharmacological characteristics that vary from adults and these features are also different across the newborn to adolescent age range. They may metabolize certain medicines differently from adults resulting in sub-optimal therapy, unexpected responses, adverse drug reactions and toxicity which may affect development and future reproductive capacity. More trials are needed, especially in areas of high clinical need. A study in 2007 showed that the number of randomized controlled trials in adults published in five high impact general medical journals has nearly doubled over 20 years, while the number of paediatric trials has not increased. Despite about 27% of the world's population being children, paediatric trials constitute only 16.7% of the total number of trials registered on the World Health Organization (WHO) portal. In a study of trials registered on clinicaltrials.gov on selected medical conditions, only 12% were paediatric trials although children contributed to almost 60% of the total disease burden. The WHO Global Burden of Disease study in 2002 estimated 11.4 million deaths in children under 10 years of age with 91% of these in children less than 5 years. Fewer trials are conducted in younger children where they are most needed.

However, most pediatric researchers face financial, regulatory, institutional, ethical, and career challenges, placing pediatric research at a distinct disadvantage compared to adult investigations. During the past thirty eight, HUDERF improved clinical practice and contributed to the development of new therapies and medical technologies. For the next phase in our evolution, the aim of HUDERF is to grow to become one of the top research hospital in Belgium dedicated to child and family health research. Research is a key part of what makes children's hospitals unique and so essential.

Family and Children (HUDERF) Strategic Plan for Clinical Research

2025-2028
Prof. Nicolas Deconinck

1. Vision and Mission

Vision:

To position Family and Children research and particularly HUDERF its child hospital as a national and European leader in children clinical research, championing innovation and excellence to improve the lives of all children.

Mission:

- To generate high-quality, ethical, and inclusive clinical evidence to support the care of children and adolescents.
- To lead and collaborate in pediatric research projects addressing rare, chronic, and complex diseases.
- To translate scientific discoveries into meaningful improvements in care within HUDERF and beyond.
- To create a vibrant, inclusive research ecosystem embedded in clinical practice and commUnity engagement.

2. Strategic Objectives

2.1. Strengthen Research Excellence and Innovation

- Focus on strategic research themes aligned with HUDERF's expertise: rare diseases, pediatric neurology, oncology, immunology, psychiatry, and chronic care.
- Increase participation in Belgian (BCRP) and European (Horizon Europe, c4c) clinical trials.
- Promote innovative methodologies including real-world evidence, digital health trials, and precision medicine.
- Create multidisciplinary translational research bridges between clinical departments (HUDERF), ULB labs, and biobanks.

2.2. Develop Infrastructure and Capacity

- Consolidate a dedicated Clinical Research Unit within HUDERF, fully integrated with research administration and compliant with regulatory standards.
- Expand pediatric biobanking with ethical consent frameworks tailored to children and families.
- Upgrade digital tools to support electronic data capture, secure patient registries, and GDPR-compliant data sharing.
- Create child- and adolescent-friendly environments for study participation, including safe and welcoming research spaces.

Family and Children (

Excellence & Innovation
Focus on rare diseases, pediatric neurology, oncology, immunology, psychiatry, and chronic care
Real world data, precision medicine

Infrastructure & C
Dedicated research un
biobanks
Secure digital data

Join 2 nev
Publish first

2025
Leverage HUDERF Clinical Research Unit
10% increase in trials

2.3. Advance Collaborative Networks

- Deepen collaboration with ULB, the Brussels Health Campus, and the H.U.B. (Hôpital Universitaire de Bruxelles).
- Actively engage in European pediatric networks (e.g., Enpr-EMA, ERNs, c4c) and forge new alliances with global academic centers.
- Co-create projects with commUnity organizations and parent/patient associations to ensure relevance and equity.
- Establish HUDERF as a key site for industry-sponsored pediatric trials, ensuring public benefit and transparency.

2.4. Ensure Ethical, Inclusive, and Patient-Focused Research

- Embed ethics and child rights at the core of all clinical research activities.
- Develop inclusive recruitment strategies, especially for underserved and multilingual families in Brussels.
- Involve youth and family advisory councils in shaping priorities, materials, and consent/assent processes.
- Tailor communication and dissemination strategies to families and non-specialist audiences.

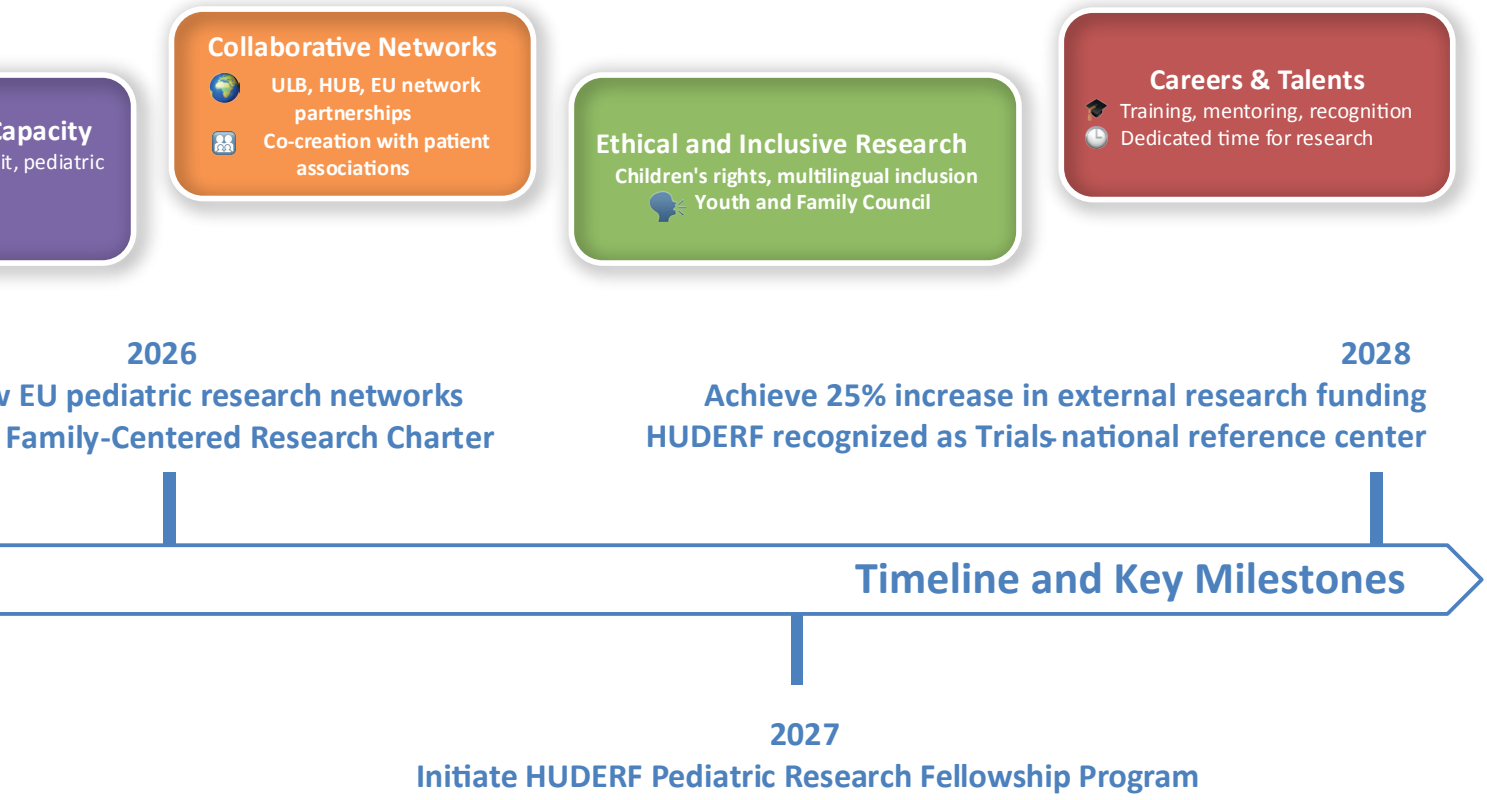
2.5. Support Research Careers and Talent Development

- Create structured pathways for young clinicians and researchers to engage in pediatric clinical research.
- Offer training in GCP, pediatric research ethics, trial design, and data management via HUDERF and ULB channels.
- Provide protected time, mentorship, and incentives for clinician-scientists.
- Recognize and celebrate research achievements across hospital staff.

3. Implementation and Governance

- **Leadership:** A Clinical Research Steering Group (CRSG), reporting to hospital management and the scientific board, will oversee implementation.
- **Metrics:** Annual KPIs will include number of trials, enrolled patients, scientific outputs, staff training sessions, and external funding.
- **Funding:** Consolidate partnership with Belgian Kid Foundation, its historical and most important funding body and seek for complementary diversified funding from F.R.S.-FNRS, Innoviris, EU, and philanthropic sources
- **Sustainability:** Ensure alignment between clinical excellence, academic strategy, and long-term research funding.

(HUDERF) Strategic Plan for Clinical Research 2025–2028



Research in numbers

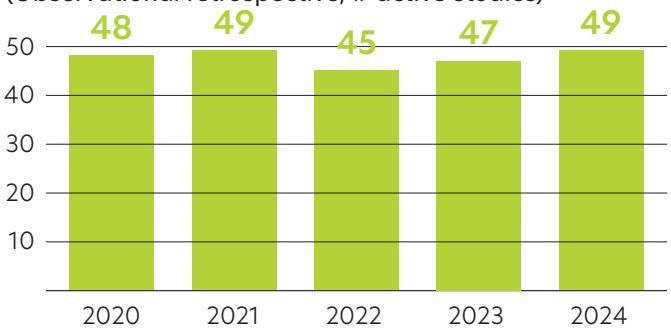
1. HUDERF general clinical activities

	2021	2022	2023	2024
Standard admissions	4 917	4 778	5 656	5 595
One day admissions	4 525	5 071	5 582	5 936
Consultations	122 725	118 290	123 302	121 425
Operating rooms	3 776	3 828	4 161	4 448
Emergencies	41 178	42 690	38 116	38 146

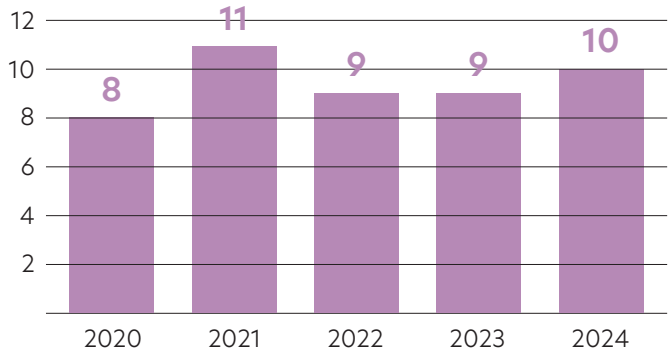
2. Research activities

Research projects 2020-2024

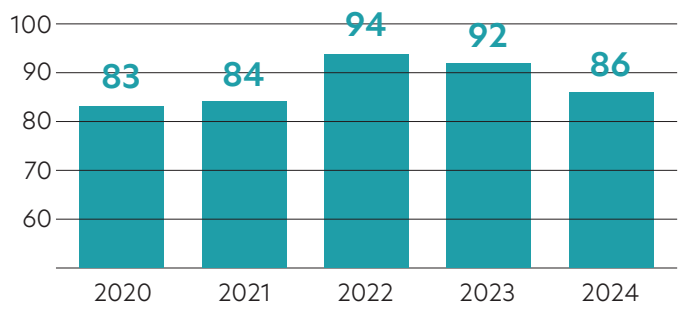
(Observational retrospective, # active studies)



(Observational prospective, # active studies)

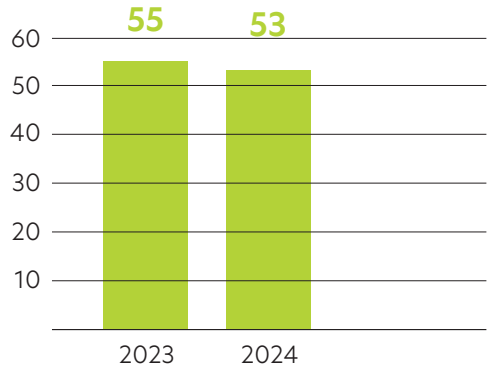


(Interventional, # active studies)

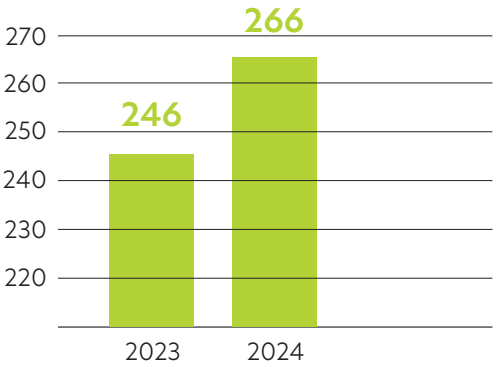


Patients included in prospective trials 2023-2024

Observational (prospective)

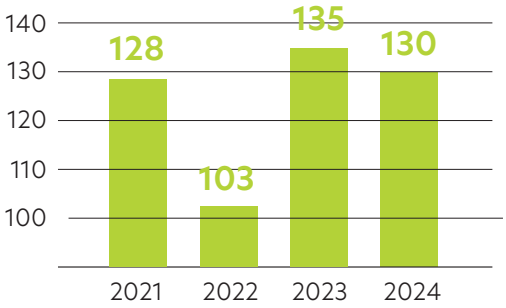


Interventional (académic and commercial)*

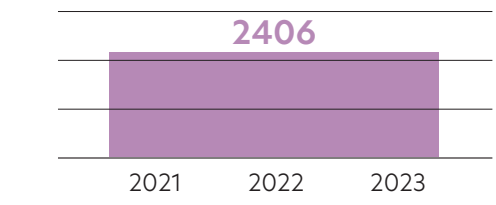


Publications

Number of Publications 2021-2024



Number of citation 2021-2023



*Interventional: any prospective trial (academic or commercial) that evaluates safety and efficacy of a new treatment, procedure, or medical device

3. Research personnel*

23 Medical Senior Scientists

10 Medical Research Fellows

2 Postdoctoral Scientists

16 PhD Students

5 Technicians

5 Study (Nurse) Coordinators

2 Clinical Data Managers

4 Research Coordinators

1 Research Pharmacists

32 Experts in Clinical Trials Operations

6 Statisticians

11 Research IT

2 Quality Assurance & Control

2 Patients Collaboration

12 Finance/ Legal Support for Research

17 Administrative Support for Research

*Iincluded within the scope of activities under the Family and Child concept

RESEARCH CHAPTERS

Obstetrics / Fetal Medicine Department

Purpose

In terms of innovative research, the objective of the Obstetrics clinics is to investigate the impact of novel obstetrical approaches on obstetric and neonatal issues as well as to evaluate the impact of several factors including infectious ones (Sars-cov2, CMV) and those related to lifestyle (weight gain, obesity, diabetes) on pregnancies outcomes. Several research studies and PhD projects are currently ongoing in the obstetrics department.

Team and infrastructure

The Investigation center is located at Erasme maternity (HUB) is actually headed by Anne Delbaere, and its team includes 5 PhD students (E Costa, C Deconinck, S Derisbourg, C Lamy, A Vercoutere). The Center has access to a several databases including Statbel, CEpiP (Center for perinatal epidemiology), the BOSS (Belgian Obstetric Surveillance System) and INOSS (international obstetric surveillance system). There are close collaborations with the Laboratory Research on Human Reproduction (ULB) directed by Prof. Isabelle Demeestere MD,PhD and with its biobank for samples storage. Active collaborations take place with Pr Marie-Luce Delforge, director of the National Reference Center (NRC) for Congenital Infections within the LHUB (Laboratoire Hospitalier Universitaire de Bruxelles).

MAIN PROJECTS and RECENT ACHIEVEMENTS

In 2017, a breech clinic was established, spearheaded by PhD candidate Dr. Sara Derisbourg to promote vaginal breech birth. The ongoing research focuses on the obstetric and neonatal outcomes and the experiences of the women and their partners.

In 2020, the covid-19 pandemic overwhelmed our healthcare system. PhD candidate Dr. An Vercoutere conducted a national-level study in collaboration with the BOSS (Belgian Obstetric Surveillance System) and INOSS (international obstetric surveillance system) to analyze the impact of covid-19 on pregnancy. Additionally, in the context of a Brussels multicentric study we examined the prevalence of sars-cov-2 infection among women who gave birth during the pandemic and investigated the potential transfer of antibodies to their fetuses. This work will be part of a PhD project scheduled for presentation and defense during the 2024-2025 academic year with recommendations for other future pandemics.

Meanwhile, PhD candidate Dr. Elena Costa studied the impact of the pandemic on the management of gestational diabetes and pregnancy outcomes, with results currently under publication.

Since 2022, PhD candidate Dr. Clotilde Lamy has been studying the evolution of obesity, weight gain during pregnancy and macrosomia in the Belgian population, and their impact on difficult births. Several projects are being carried out in the department on these topics.

Prof Anne Delbaere and the Obstetetrics and gynecology service

PhD candidate Dr. Caroline De Coninck is taking part in a large multicenter study to assess the need for continued first-trimester cmv screening to enable antiviral treatment of women with suspected congenital infection. she has also been analyzing hub data since it was first collected.

In addition to the PhD projects, several other research initiatives are ongoing.

In collaboration with the B.OSS network, we are conducting a study on the use of general anesthesia during c-sections, aiming to minimize its occurrence and better understand the underlying reasons. This research will provide recommendations for future practices. additionally, all cases of cholestasis during pregnancy are being recorded in the B.OSS registry and analyzed by our team. another study focuses on cases requiring re-exploration via laparotomy after a C-section.

The obstetric team is also investigating female genital mutilation, with several studies currently underway.

Furthermore, the team is increasingly investing in education through simulation. in collaboration with Simlabs, we plan to analyze the impact and effectiveness of simulation-based training in the near future. we will shortly be taking part in a trial of a new assisted delivery technique, the odon device.

In our in-hospital midwife-led Unit, cocon, currently the only one in Belgium, we are now analyzing all outcomes after 10 years. Finally, Dr. Siham Zaytouni works on vulnerability during pregnancy and the importance of multidisciplinary work to prevent disorders around parenthood. she is also taking part in the hub ethics clinic as part of her master's degree in ethics.

Selected publications

- De Coninck C, Donner C, Costa E, Abbas S, Delforge ML. Long-term follow-up of a series of 24 congenital CMV-infected babies with false negative amniocentesis. Journal of Clinical Virology. 2024; 172:105675. PMID: 38640886

- Vercoutere A, Racapé J, Zina MJ, Alexander S, Benoit K, Boulvain M, Goemaes R, Leroy C, Van Leeuw V, Costa E, Derisbourg S, Goffard JC, Roelens K, Vandenberghe G, Daelemans C, B.OSS collaborative group. Did we observe changes in obstetric interventions in SARS-CoV-2 infected pregnant women at the beginning of COVID-pandemic in Belgium? Results of a nationwide population-based study. Eur J Obstet Gynecol Reprod Biol X. 2024;23:100328. doi: 10.1016/j.eurox.2024.100328. eCollection 2024 Sep. PMID: 39155890
- Vercoutere A, Zina MJ, Telis M, Goffard JC, Boulvain M, de Doncker L, Derisbourg S, Houben S, Delforge ML, Daelemans C, Kelen D. Seroprevalence and placental transfer of SARS-CoV-2 antibodies in unvaccinated pregnant women. BMC Infect Dis. 2024;24(1):509. doi: 10.1186/s12879-024-09399-6. PMID: 38773493
- Vercoutere A, Zina MJ, Benoit K, Costa E, Derisbourg S, Boulvain M, Roelens K, Vandenberghe G, Daelemans C; B. OSS collaborating group. Late miscarriage and stillbirth in asymptomatic and symptomatic hospitalised pregnant women in Belgium during the first and second waves of COVID-19: a prospective nationwide population-based study. BMC Pregnancy Childbirth. 2023 May 16;23(1):356. doi: 10.1186/s12884-023-05624-3.PMID: 37193958
- Derisbourg S, Costa E, De Luca L, Amirgholami S, Bogne Kamdem V, Vercoutere A, Zhang WH, Alexander S, Buekens PM, Englert Y, Pintiaux A, Daelemans C. Impact of implementation of a breech clinic in a tertiary hospital. BMC Pregnancy Childbirth. 2020 ; 20:435. doi: 10.1186/s12884-020-03122-4. PMID: 32727421

Neonatology and perinatology Unit

"The Unit is localized on both sites of the Brussels University Hospital (Laeken and Anderlecht)."

General purpose

The Neonatology and Perinatology Unit aims at improving medical care and outcomes of sick newborns due to various conditions such as very preterm birth, congenital anomalies, and failed neonatal adaptation after full-term birth. Our research activities are dedicated to elucidating the mechanisms of neonatal diseases and exploring preventive measures as well as new treatment options to improve neonatal health.

Specific aims

- to analyze the mechanisms of altered lung development after very preterm birth and to assess the impact of neonatal intensive care on postnatal lung growth and function during and beyond hospital stay.
- To elucidate the mechanisms of adaptation to extra-uterine life during intact cord resuscitation and to assess clinical outcomes after physiological based umbilical cord clamping as compared to standard care in a series of conditions known to alter neonatal cardiorespiratory transition.
- To develop clinical tools based on artificial intelligence for an earlier detection of comorbidities and a better prediction of outcomes for hospitalized newborns.
- To evaluate and propose alternate clinical practices to better support neonatal neurodevelopment and parents-infant relationship via increased parental participation during hospital stay.

Team and infrastructure

The Neonatology and Perinatology Unit is head by Aline Vuckovic (MD, PhD; Director) and Dorottya Kelen (MD; Associated Director). This clinical Unit also includes 9 MDs (among whom 2 PhD students) and annually welcomes medical students for their master's thesis. Because the Unit dedicated to medical care, there is no specific technicians, platform or material directly available on site for research. However, collaborations with local laboratories and other national/international research teams can provide access to a variety of laboratory platforms (animal facilities, qPCR, ELISA immunoassays, Western Blot analysis, and histology).

Main projects

1. Understanding the mechanisms involved in fetal and neonatal lung development

Translational and clinical research in the context of congenital anomalies (diaphragmatic hernia) or acquired conditions (prematurity) affecting lung growth. Ongoing collaboration since 2023 with KULeuven (Department of Development and Regeneration, Perinatal & Pediatric Lung Disease Section) as part of a co-supervised doctoral program (PhD candidate: Emilie Goffinon, MD; BKF scholarship). Laboratory analyses funded by KULeuven.

Dr Anna Amoruso, Dr Daniella Avino, Prof Aline Vuckovic, Dr Vinciane Dr Vlieghe, Dr Annick Lebrun

Prof Dorottya Kelen, Dr Hadrien Guillaume, Dr Stejskal Vojtech, Dr Valérie Godart

2. Adaptation to extra-uterine life of at-risk newborns

Two ongoing RCTs launched in January 2024 and focusing on the impact of resuscitation with an intact umbilical cord (after term cesarean section or moderately premature birth) on physiological measures in newborns and parents-newborn bonding. Additional prospective observational studies ongoing about neonatal transition in infants with congenital cardiac and/or airway anomalies. Research initiated as part of a doctoral thesis (PhD candidate: Anna Amoruso, MD; BKF scholarship). Collaboration between Brussels University Hospital (Laeken site) and Brugmann University Hospital. Partial funding obtained via the Iris Fund.

3. Artificial intelligence tools for predicting outcomes in newborns hospitalized in neonatal intensive care Units

Ongoing national collaboration between the Neonatology and Perinatology Unit (Site Anderlecht) and the University of Antwerp in the "Innocens" project (prediction of late-onset neonatal sepsis in very preterm infants). No funding source currently available.

4. Developmental support care and integration of parents into the care of newborns hospitalized in neonatal Units

Ongoing multidisciplinary quality improvement projects at the Anderlecht site (supported diagonal flexion, tandem transport after preterm birth) and at the Laeken site (meditation to reduce parental stress, care bundle to decrease late-onset sepsis). Most of these projects are part of master's theses in medicine.

Recent achievements

- Participation in the international prospective observational SUPREMEneo study: "survey on sedo-analgesia practices prior to laryngoscopy in newborns in neonatal intensive care Units and pediatric transport teams in France and Belgium)".
- Finalization of the pilot single-center randomized controlled Phycord 1 trial (NCT06278415): "Pilot Prospective Unblinded Randomized Controlled Study assessing the Efficacy and Safety of Physiologically Based Cord Clamping versus Standard Delayed Cord Clamping after Elective Scheduled Cesarean Delivery of Full-term Newborn".
- Participation in the international randomized controlled DOXA trial: "Doxapram versus placebo in preterm newborns".

Selected publications

Collaborations:

- Dütemeyer V, Schaible T, Badr DA, Cordier AG, Weis M, Perez-Ortiz A, Carriere D, Cannie MM, Vuckovic A, Persico N, Cavallaro G, Houfflin-Debarge V, Carreras E, Benachi A, Jani JC. Observed-to-expected lung-area-to-head-circumference ratio on ultrasound examination vs total fetal lung volume on magnetic resonance imaging in prediction of survival in fetuses with left-sided diaphragmatic hernia. Ultrasound Obstet Gynecol. 2024 Sep;64(3):354-361.
- Dütemeyer V, Schaible T, Badr DA, Cordier AG, Weis M, Perez-Ortiz A, Carriere D, Cannie MM, Vuckovic A, Persico N, Cavallaro G, Benachi A, Jani JC. Fetoscopic endoluminal tracheal occlusion vs expectant management for fetuses with severe left-sided congenital diaphragmatic hernia. Am J Obstet Gynecol MFM. 2024 Feb;6(2):101248.

First/Last author:

- Goffinon E, Lefèvre L, Fils JF, Vuckovic A. Rising Rates of Non-Invasive Ventilation and Bronchopulmonary Dysplasia: A Propensity Score-Matched Analysis. J Perinatol. 2024. In review.
- M'Rini M, De Doncker L, Huet E, Rochez C, Kelen D. Skin-to-skin transfer from the delivery room to the neonatal Unit for neonates of 1,500g or above: a feasibility and safety study. Front Pediatr. 2024 Mar 20;12:1379763.
- Vercoutere A, Zina MJ, Telis M, Goffard JC, Boulvain M, de Doncker L, Derisbourg S, Houben S, Delforge ML, Daelemans C, Kelen D. Seroprevalence and placental transfer of SARS-CoV-2 antibodies in unvaccinated pregnant women. BMC Infect Dis. 2024 May 21;24(1):509.

Paediatric Intensive Care Unit

"The Unit is localized in the Queen Fabiola University Children's Hospital (site of Laeken) of the Brussels University Hospital."

General purpose

The Paediatric Intensive Care Unit aims at improving medical care and outcomes of critically ill children from newborns to the age of 16. Our Unit is a mixed medical and surgical Unit admitting children with various medical and surgical conditions for intensive monitoring or support of organ dysfunction. Our research activities are dedicated to the study of mechanisms of diseases, to the determination of risk factors of disease, and to the exploration of support or treatment options to improve outcomes.

Specific aims

The Paediatric Intensive Care Unit has developed different research areas:

1. Respiratory insufficiency and mechanical ventilation:

a. Goal directed mechanical ventilation: to assess lung and thorax mechanics using electrical impedance tomography.

b. Extubation readiness: to assess extubation readiness using diaphragmatic and lung ultrasound to decrease extubation failure.

c. Bronchiolitis: to assess lung recruitment and adapt ventilation strategies in children with bronchiolitis.

d. Status asthmaticus: to compare different treatment strategies between 2 PICU's in Belgium.

e. Pleural effusion: to compare intrapleural antifibrinolytics versus video-assisted thoracoscopy on the use of analgesia and hospital length of stay for parapneumonic pleural effusion.

f. ProVENT-Ped study.

2. Haemodynamics

a. Postoperative cardiac surgery: to study risk factors and outcomes in children undergoing cardiac surgery

i. The impact of redo surgery on red blood cell transfusion: to assess the impact of redo surgery and determine risk factors associated with transfusions in children undergoing cardiac surgery to reassure parents and develop tailored intraoperative strategies to decrease exposure to blood products.

ii. The impact of age on outcomes in neonates undergoing arterial switch operation for transposition of the great arteries: to assess the best age window to perform surgery to decrease risks associated with impaired outcomes.

iii. The impact of fluid balance and fluid overload on outcome in children undergoing cardiac surgery: to determine the impact of fluid overload on outcome in children undergoing cardiac surgery.

iv. The impact of preoperative ECMO or urgent surgery in neonates with transposition of the great arteries.

Prof Ariane Willems, Dr Tine François, Dr Daphné Vens, Dr Anissa Lahfafa, Dr Veronique Masy

b. Sepsis and septic shock:

i. Survey on the use fluid bolus and inotropes and vasopressor in paediatric sepsis and septic shock aiming at determining current practice.

ii. Sepsix study: to study gender dysmorphism on the inflammatory response in children with sepsis and septic shock.

c. The role of point-of-care ultrasound in haemodynamic evaluation of patient with circulatory insufficiency: to determine and validate echocardiographic parameters using Mostcare® for heamodynamic evaluation of children with circulatory insufficiency.

d. Survey on extracorporeal membrane oxygenation in cardiac arrest (ECMO – CPR).

e. Pulmonary hypertension: evaluate incidence and patient population at risk for pulmonary hypertension.

3. Patient blood management

a. Risk factors of perioperative anaemia and impact on outcomes in children undergoing cardiac surgery.

b. Transfusion thresholds and triggers for transfusions. Determination beneath triggers based on hematologic values also physiologic triggers for transfusions.

i. In critically ill patients.

ii. In cardiac surgery patients.

iii. In patients on ECMO.

c. Determination and characterization of type and severity of bleeding to develop goal-directed strategies.

d. Anticoagulation on ECMO.

i. To compare different tests for heparin titration in children undergoing ECMO and their impact on bleeding and thrombosis outcomes.

ii. To assess the impact of antithrombin administration for heparin resistance on bleeding outcomes

iii. Bleeding study (XXX).

4. Nutrition and metabolism

a. Feeding of patients in the early postoperative period of cardiac surgery.

b. Early enteral nutrition in children on ECMO.

5. Pharmacology

a. Pharmacology of antibiotics in critically ill children.

6. Neurocritical care

a. Cerebral autoregulation in different high-risk population.

b. Neurologic outcomes in children undergoing ECMO.

7. Onco-ICU

a. Determination and selection of patients with respiratory failure for respiratory support using ECMO.

8. Infectious disease

a. Study I Pierre Smeesters.

b. Study II Pierre Smeesters.

9. Psychology and ethics

a. Parent's perceptions of patients on ECMO.

b. Animal mediation in a paediatric critical care Unit.

Team and infrastructure

The Paediatric Intensive Care Unit is a 17-bed Unit admitting medical and surgical critically ill neonates, infants and children including 3 separated beds for burned patients. The team is composed of 8 physicians and 37 nurses. Ariane Willems (MD, MSc Biomed, PhD) is the medical director. Overall, 2 paediatric intensivists have a PhD and one is a PhD student. The medical team annually welcomes medical students and postgraduate students for their master's thesis. The Unit is dedicated to medical care and will welcome oncologic or neuromuscular patients participating in Phase I trials in collaboration with the Hospital Research Unit and supported by the Research Unit of the Bordet Institute. The team has several collaborations with local laboratories and national/international research teams.

Main projects

5. Prolonged versus short intermittent infusions of beta-lactams in critically ill neonates and infants with severe infections - a randomized controlled trial

Clinical research on the pharmacokinetics and pharmacodynamics of antibiotics in critically ill children. Ongoing collaboration since years with UZ Gent (Department of Pharmacy and Department of Applied Medical Sciences). KCE Funding.

6. Preoperative Extracorporeal Membrane Oxygenation in children with transposition of the great arteries: an ELSO registry study

Cohort study and translational research on extracorporeal membrane oxygenation for unstable neonates with transposition of the great vessels. Collaboration with Leiden University Medical Centre (LUMC) (Department of Intensive Care). Local funding.

7. Prognostic factors associated with extubation readiness in pediatric post-cardiac surgery patients in the PICU

Different studies (systematic review, observational study, interventional study) aiming at characterizing extubation failure in children admitted to the PICU after cardiac surgery. Collaboration with Leiden University Medical Centre (LUMC) (Department of Intensive Care). Local funding. Ariane Willems co-promotor of PhD student Sabien Heisterkamp.

8. ECmo hemoSTAtic Transfusions In Children (ECSTATIC)

Randomized controlled trial, comparing two prophylactic transfusion strategies in non-bleeding children on ECMO. Collaboration within BloodNet, international research group on Transfusion and Bleeding in critically ill children.

9. PRactice of VENTilation in Critically Ill PEDiatric Patients' (PRoVENT-PED) study

Investigator-initiated, prospective, international, multicenter observational cohort study over a 10-year period aiming to a) describe the practice of ventilatory support in critically ill pediatric patients, b) to identify potentially modifiable ventilation setting and parameters that have independent associations with outcome including duration of ventilatory support, the number of days free from ventilatory support at day 28, length of ICU stay, and ICU mortality and c) to study the prevalence of the Pediatric Acute Respiratory Distress Syndrome (PARDS). Collaboration with Amsterdam's University Medical Centre. Local Funding.

10. Pediatric ECMO Survey: Anticoagulation Practices Among European Centers

Survey to evaluate anticoagulation strategies employed in pediatric centers across Europe, with a specific focus on the use of direct thrombin inhibitors (dTIs). Collaboration with the Centre Hospitalier Universitaire de Nantes (Paediatric Intensive Care Unit).

11. Systemic Anticoagulation with bivalirudin versus unfractionated heparin during pediatric extracorporeal membrane oxygenation (ECMO): a cluster randomized crossover trial. BivaLirudin versus UnfraCtionated Heparin for the maintenance of systemic anticoagulation during ECMO in children (BLUCH trial)

Multicenter, open-label, cluster-randomized study. 320

patients will be included across 16 participating centers. Anticoagulation will be either unfractionated heparin or bivalirudin for a period of 12 months, with crossover, in a randomized order for each center. Anticoagulation-specific biological monitoring will be standardized for each group. Collaboration with the Centre Hospitalier Universitaire de Nantes (Paediatric Intensive Care Unit).

Selected publications

Collaborations:

- Alexander PMA, Bembea M. Cashen K, Cheifetz IM, Dalton HJ, Himebauch AS, Karam O, Moynihan KM, Nellis M, Ozment C, Raman L, Rintoul NE, Said A, Saini A, Steiner ME, Thiagarajan R, Watt K, Willems A, Zantek ND, Barbaro R, Steffen K, Vogel A, Almond C, Anders M, Annich G, Brandao LR, Chandler W, Delaney M, DiGeronimo, Emani S, Gadepalli SK, Garcia AV, Haileselassie B, Hyslop R, Kneyber MCJ, Baumann Kreuzinger L, Le J, Loftis L, McMichael AV, McMullan DM, Monagle P, Nicol K, Paden ML, Patrgani J, Priest J, Raffini L, Ryerson LM, SLoan SR, Teruya J, Yates AR, Gehred A, Lyman E, Muszynski JA. Executive Summary: Pediatric ECMO Anticoagulation Collaborative (PEACE) Consensus Conference. Ped Crit Care Med 2024;1:25 (7):643-675
- Muszynski JA, Bembea MM, Gehred A, Lyman E, Cashen K, Cheifetz IM, Dalton HJ, Himebauch AS, Moynihan KM, Nellis ME, Ozment C, Raman L, Rintoul NE, Said A, Steinet ME, Thiagarajan R, Watt K, Willems A, Zantek ND, Barbaro R, Steffen K, Vogel AM, Alexander PMA. Priorities for Clinical Research in Pediatric ECMO Anticoagulation from the Pediatric ECMO Anticoagulation Collaborative (PEACE) Consensus Conference. Ped Crit Care Med 2024;1:25 (Suppl 1):e78-e89
- Ozment C, Alexander PMA, Chandler W, Emani S, Hyslop R, Monagle P, Muszynski JA, Willems A, Gehred A, Lyman E, Thiagarajan RR. Anticoagulation Monitoring and Targets: The PEACE Consensus Conference. Ped Crit Care Med 2024;1:25 (Suppl 1):e14-e24
- Alexander PMA, Di Nardo M, Combes A, Vogel AM, Antonini MV, Barrett N, Benedetti GM, Bettencourt A, Brodie D, Gomez-Gutierrez R, Gorga SM, Hodgson C, Kapoor PM, Le J, MacLaren G, O'Neil ER, Ostermann M, Paden ML, Patel N Rojas-Pena A, Sais AS, Sperotto F, Willems A, Vercaemst L, Yoganathan AP, Lorts A, Del Nido PJ, Barbaro RP; Extracorporeal Life Support (ELSO); International ECMO Network (ECMONet); Pediatric Acute Lung Injury ans Sepsis Investigators (PALISI); Pediatric ECMO group of PALISI and ELSO (PediECMO); European Society of Paediatric and Neonatal Intensive Care (ESPNIC); Australian and New Zealand Intensive Care Society Paediatric Study Group (ANZICS PSG); Intensive Care Society (ICS); Pediatric Cardiac Intensive Care Society (PCICS); Advanced Cardiac Therapies Improving Outcomes Network (ACTION); Children's Hospital Neonatal Consortium (CHNC); American Pediatric Surgical Association (APSA); Society of Thoracic Surgeons (STS); Society of Critical Care Medicine (SCCM). Definition of adverse events associated with extracorporeal membrane oxygenation in children: results of an international Delphi process from the ECMO-CENTRAL ARC. Lancet Child Adolesc Health 2024;8(10):773-780

First/Last author:

- Willems A, Anders M, Garcia AJ, Vogel A, Yates AR, Muszynski JA, Alexander PMA, Steffen K, Emani S, Gehred A, Lyman E, Raman L. Management of ECMO Anticoagulation in the Peri-operative Period: The PEACE Consensus Conference. Ped Crit Care Med 2024;1:25 (Suppl 1):e53-e65

Paediatric Emergency Unit

Purpose- main research questions?

The H.U.B. Paediatric Emergency Department Research Unit, on the one hand, focuses on inflammation and infectiology, in close collaboration with the Paediatrics Laboratory of the Université Libre de Bruxelles (ULB) and the Translational Research Laboratory of the Immunology Laboratory of the Brugmann University Hospital. On the other hand, we take a deeper dive into the more practical side of Paediatric Emergency Medicine, with a focus on good clinical practice.

Composed of scientists with different backgrounds, this Unit aims to evaluate and update clinical practices in paediatric emergencies based on current epidemiology.

Research in infectiology focuses on the evaluation of clinical practices, while studies on inflammation focus on the cellular mechanisms of sepsis and inflammatory differences between the sexes.

Our Unit recently started the bi-monthly "Research and Coffee", accessible for all students, nurses, paramedical and medical staff, which promotes the communication of current projects and the opening of the scientific world to young researchers.

Team

- PhD Candidate : Alexandros Popotas MD
- Junior Researchers: Margaux Delplace MD, Julie Lombart MD, Martial Kalisa MD, Benjamin Noyon MD, Alice Tabourot MD, Till Terrando, Caroline Willaert MD
- Senior Researcher : Inge Roggen, MD, PhD

Main Current research projects

Clinical practices in paediatric emergency management: The majority of our projects focus on the clinical practices of paediatric emergency physicians, with the aim of reviewing existing protocols, aligning them with the world literature, and adapting them to current epidemiology:

- Analysis of the factors influencing the deviation of acute otitis media management protocols in children, with the aim of improving adherence to established guidelines.
- Evaluation of the threshold for the use of the QuikRead CRP test as a screening tool for upper urinary tract infections in febrile infants, in order to optimize rapid and accurate diagnoses.
- Management of fever in infants with leukocyte abnormalities, seeking to refine initial treatment strategies.
- Exploration of the microbial landscape of children who have travelled outside Europe and are presenting to the emergency department, in order to provide crucial information for their care. All of this research aims to improve the quality of care, the accuracy of diagnoses and the effectiveness of protocols in the HUDERF paediatric emergency department.
- Effectiveness of medical nursing triage: a key pillar of the proper functioning in paediatric emergency department. In our department, we study the correct applicability and its medical-clinical performance of this triage, which is crucial for the effectiveness and quality of care in paediatric emergencies.

Prof Inge Roggen, Dr Benjamin Noyon

Cellular mechanisms of sepsis and inflammatory differences between the sexes, recruitment at the emergency department: the main objectives are to understand the immune mechanisms of acute inflammation and sexual dimorphism in the inflammatory responses of infectious and non-infectious diseases. A series of clinical and experimental investigations are conducted to characterize the inflammatory immune response in boys and girls with acute or chronic inflammatory diseases. To achieve these goals, a cellular approach is used to examine Toll-like receptor (TLR) pathways, as well as approaches such as transcriptomics (mRNA and microRNA), proteomics and metabolomics combined with mass spectrometry.

1. "Evaluation of the practical-clinical performance of nursing triage in paediatric emergencies at HUDERF" - C. Willaert - I. Roggen.
2. "Analysis of factors influencing the deviation from the protocol for the management of acute otitis media in children between 0 and 16 years old in the paediatric.

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1. "Evaluation of the practical-clinical performance of nursing triage in paediatric emergencies at HUDERF" - C. Willaert - I. Roggen.
2. "Analysis of factors influencing the deviation from the protocol for the management of acute otitis media in children between 0 and 16 years old in the paediatric emergency department of HUDERF" - T. Terrando - I. Roggen.
3. "Finding a cut-off level to use QuikRead CRP testing as a screening tool for upper urinary tract infection in the febrile well-appearing infant at the emergency department." - A. Tabourot - I. Roggen.
4. "Management of fever in the paediatric emergency department of HUDERF in infants aged 29 to 90 days presenting with leucocytosis or leukopenia on admission." - M. Delplace - I. Roggen.
5. "A look into the microbial landscape of children who travelled outside Europe and who presented to the HUDERF emergency department" - M. Kalisa.
6. "Study of the sex differences in inflammatory diseases in children" - A. Popotas - B. Noyon - N. Lefèvre.
7. "Comparative study of Paediatric Inflammatory Multisystem Syndrome Temporarily-associated with SARS-CoV-2 (PIMS-TS) and sepsis" - A. Popotas - I. Roggen.
8. "KD-CAAP : Kawasaki Disease Coronary Artery Aneurysm Prevention" - L. Goffin, J. Lombart.

Selected recent publications

- Deny M, Popotas A, Hanssens L, Lefèvre N, Arroba Nuñez LA, Ouafo GS, et al. Sex-biased expression of selected chromosome x-linked microRNAs with potent regulatory effect on the inflammatory response in children with cystic fibrosis: A preliminary pilot investigation. Front Immunol. 2023;14:1114239.
- Popotas A, Casimir GJ, Corazza F, Lefèvre N. Sex-related immUnity: could Toll-like receptors be the answer in acute inflammatory response? Front Immunol. (2024) 15:1379754. doi: 10.3389/fimmu.2024.1379754.

- Yin N, Van Nuffelen M, Bartiaux M, Préseau T, Roggen I, Delaunoy S, et al. Clinical impact of the rapid molecular detection of RSV and influenza A and B viruses in the emergency department. PLoS One. 2022;17(9):e0274222. pmid:36054246
- Lecompte S, Noyon B, Boitsios G, Segers V, Biarent D, Vens D. Clinico-pathologic presentation of a case of perinatal ARDS of viral etiology. Rev Med Brux. 2022;43(5):534-7.

Paediatric hemato-oncology Unit

Purpose

The pediatric hemato-oncology Unit is specialized in treatment of children and adolescents with:

1) Cancer (solid tumours, lymphoma and leukaemia's) ;
2) Benign hematological diseases ;
3) Haemophilia and other coagulation disorders ;
4) Disorders requiring hematopoietic stem cell transplantations (inclusive non-oncological pathologies : immunodeficiency's, benign hematology,...)

The pediatric hemato-oncology Unit takes in charge all the patients with a hemato-oncology pathology through inter and pluridisciplinar approach.

Current research projects focus on the therapeutic approach of oncologic and hematologic patients in order to

1) Improve the overall survival of oncologic patients with poor prognosis
2) Decrease the long term toxicity of oncologic treatments
3) Therapeutic de-escalation for oncologic patients with good prognosis
4) Refine the prognostic factors of oncologic diseases using molecular biology
5) Cure patients with benign hematological disorders through innovative therapies such as gene therapy

An accredited and strongly connected Unit

- A recognized oncology reference centre , member of the BSPHO (Belgian Society of Pediatric Hematology and Oncology) and of SIOP(Société Internationale d'Oncologie Pédiatrique) with approximately 70 new malignancies/year
- JACIE accredited for the HSCT Unit with approximately 15 pediatric HSCT's/year.
- Member of the European Reference Network (ERN PaedCan) that links up European professionals in sharing good practices and treating and supporting children with rare or complex cancers.
- Member of the European Reference Network EUROBloodnet in which it is Participating in the RADeep registry. The Unit is the national coordinator of the Belgian Registry for Rare Anemia and Sickle Cell Disease which is in active collaboration with RADeep.
- A Reference Treatment Center for Haemophilia, HemoWaB, together with the Brugmann Hospital and the Liège Hospitals.

Our mission and our medical staff

- Provide the clinical care in day and conventional hospitalization to children, adolescents and young adults with a hemato-oncology pathology and manage consultations.
- Participation to the pluridisciplinar oncology meetings.
- Teaching participation and participation in scientific publications.
- Active participation in clinical trials and translational research.
- Active participation in national and international Hemato-Oncology committees.

Dr Christine Devalck, Dr Laure Kornreich, Dr Pauline Mazilier,

Team and infrastructure

Dr. C. Devalck - Head of Unit
Dr. L. Dedeken - Senior UHP
Dr. S. Diallo - UHP
Dr. P. Mazilier - Resident
Dr. L. Kornreich - Resident
Dr. PL. Calo - Resident

1 ETP Administrative Coordinator / Data Manager
1,5 ETP Data Manager
1 ETP CRA
3 ETP Studycoordinator (actual 1 open vacancy)
1 ETP Studynurse

The Unit consists of:
- 18 beds in hospitalization whereof 5 beds in the sterile HSCT Unit.
- 14 beds in day-hospitalization and a consultation Unit.

Specialized material

- Apheresis machine used for Red Blood Cell Exchange and Stem Cell Collection.

Main projects

- The Unit is the national coordinator of the Belgian Registry for Rare Anemia (BR-ScRa) and Sickle Cell Disease which is in active collaboration with RADeep. The BR-ScRa is a national registry including 16 members, gathering diagnosis, demographic, socio-economic and clinical data from patients affected with Rare Anemia.

The primary objectives are :
- Define the features of the Belgian Rare Anemia population.
- Follow up of mortality and morbidity.
- Keep a national surveillance tool to improve the prevention and screening of complications.
- Establish new recommendations based upon the collected results.
- Most important data easy accessible and visible.
- Collaboration with RADeep : sharing of data at EU level.

RADeep, the Rare Anaemia Disorders European Epidemiological Platform is an initiative for pooling data from patients affected by a rare anaemia disorder, built in line with ENROL and the EU-RD-Platform recommendations for patients' registries on rare disorders.

Paediatric Late Effect (PLE) project with financing of a data manager

The registration project «Paediatrics - Late effects» (PLE) is an initiative of the Dutch-speaking paediatric haemato-oncology centres and is supported by the French-speaking centres. The project has been set up by the Belgian Cancer Registry and the Belgian Society of Paediatric Haematology Oncology (BSPHO) with financial support of Kom op tegen Kanker and Foundation against Cancer.

The PLE project has as main objective to collect and explore the acute and late side effects associated with the treatment of cancer in children and adolescents. With this information we aim to gain more insight into the late effects, identify unknown side effects and develop evidence-based guidelines to prevent late effects of cancer treatments in children and adolescents.

Princess (Préservation de la fertilité et de la qualité de vie chez les femmes guéries d'un cancer pédiatrique)

The PRINCESS project is coordinated by CHR-CHU de Liège, with participating centres CUSL and HUDERF (HUB).

At HUDERF level we collaborate with Erasme for the Follow-Up and Analyses of fertility.
The aim of the PRINCESS study is to improve fertility preservation and quality of life in pediatric cancer survivors, through the following objectives:
- Evaluate the impact of low-intermediate doses of chemotherapy on ovarian function and fertility.
- Evaluate the impact of ovarian tissue cryopreservation on ovarian function and fertility.
- Identify new markers for predicting the risk of ovarian failure using translational/epigenetic techniques.

National coordinator FaR-RMS academic trial

Rhabdomyosarcoma (RMS) is the commonest paediatric soft tissue sarcoma. Multi-modality treatment combining multi-agent chemotherapy with local control (surgery and/or radiotherapy (RT) is the current standard of care. Treatment in current trials is stratified according to clinical risk factors but introducing the use of PAX-FOXO1 fusion gene status is predicted to improve risk group allocation. This study is a comprehensive clinical research programme and will evaluate several therapies addressing survival and long term morbidity in children, teenagers and adults with RMS. Its aims to explore whether outcomes can be improved for those with RMS, by the optimisation of radiotherapy and maintenance schedules and addition of new biologically targeted drugs in both frontline and relapsed disease,

National coordinator Interfant-21 academic trial Interfant-21:

- International collaborative treatment protocol for infants under one year with KMT2A-rearranged acute lymphoblastic leukemia or mixed phenotype acute leukemia.
- International multicenter open-label non-randomized phase 3 clinical trial conducted in the Interfant network.

Recent achievements

- Promotor thesis (MD, Paediatric resident)
  2022-2023 : 3
  2023-2024 : 3

- Renewal of the ERN PaedCan accreditation in 2023
- 3 Ongoing PhD Thesis

  - L. Dedeken : Contribution in Sickle Cell Disease management and treatment.
  - H. de Traux : Molecular biology in RMS (Institut Curie Paris, MSK New York).
  - PL. Calo : Molecular biology in CNS tumour (KUL).

Selected publications

- Haydar Frangoul, M.D., Franco Locatelli, M.D., Ph.D. , Akshay Sharma, M.B., B.S. , Monica Bhatia, M.D., Markus Mapara, M.D., Ph.D., Lyndsay Molinari, M.D., Donna Wall, M.D., Robert I. Liem, M.D., Paul Telfer, M.D., Ami J. Shah, M.D., Marina Cavazzana, M.D., Ph.D., Selim Corbacioglu, M.D., Damiano Rondelli, M.D., Roland Meisel, M.D., Laurence Dedeken, M.D., Stephan Lobitz, M.D., Mariane de Montalembert, M.D., Ph.D., Martin H. Steinberg, M.D., Mark C. Walters, M.D., Michael J. Eckrich, M.D., M.P.H., Suzan Imren, M.D., Laura Bower, M.D., Christopher Simard, M.D., Weiyu Zhou, Ph.D., Fengjuan Xuan, Ph.D., Phuong Khanh Morrow, M.D., William E. Hobbs, M.D., Ph.D., and Stephan A. Grupp, M.D., Ph.D., for the CLIMB SCD-121 Study Group. N Engl J Med. 2024 May 9;390(18):1649-1662. doi: 10.1056/NEJMoa2309676. Epub 2024 Apr 24. Exagamglogene Autotemcel for Severe Sickle Cell Disease.
- Bisogno G, Minard-Colin V, Zanetti I, Ferrari A, Gallego S, Dávila Fajardo R, Mandeville H, Kelsey A, Alaggio R, Orbach D, Terwisscha van Scheltinga S, Guillén Burrieza G, Ben-Arush M, Glosli H, Mudry P, Ferman S, Devalck C, Defachelles AS, Merks JHM, Jenney M.J Clin Oncol. 2023 May 1;41(13):2342-2349. doi: 10.1200/JCO.22.02093. Epub 2023 Feb 27. Nonmetastatic

Rhabdomyosarcoma in Children and Adolescents: Overall Results of the European Pediatric Soft Tissue Sarcoma Study Group RMS2005 Study.

- Delgouffe E, Braye A, Vloeberghs V, Mateizel I, Ernst C, Ferster A, Devalck C, Tournaye H, Gies I, Goossens E.Hum Reprod Open. 2023 Jul 31;2023(3):hoad029. doi: 10.1093/hropen/hoad029. eCollection 2023. Spermatogenesis after gonadotoxic childhood treatment: follow-up of 12 patients.
- Mañú Pereira MDM, Colombatti R, Alvarez F, Bartolucci P, Bento C, Brunetta AL, Cela E, Christou S, Collado A, de Montalembert M, Dedeken L, Fenaux P, Galacteros F, Glenthøj A, Gutiérrez Valle V, Kattamis A, Kunz J, Lobitz S, McMahon C, Pellegrini M, Reidel S, Russo G, Santos Freire M, van Beers E, Kountouris P, Gulbis B. Lancet Haematol. 2023 Aug;10(8):e687-e694. doi: 10.1016/S2352-3026(23)00182-5. Epub 2023 Jul 11. Sickle cell disease landscape and challenges in the EU: the ERN-EuroBloodNet perspective.
- Andrea Ferrari, Julia C Chisholm, Meriel Jenney, Veronique Minard-Colin, Daniel Orbach, Michela Casanova, Gabriela Guillen, Heidi Glosli, Rick R van Rijn, Reineke A Schoot, Alison L Cameron, Timothy Rogers, Rita Alaggio, Myriam Ben-Arush, Henry C Mandeville, Christine Devalck, Anne-Sophie Defachelles, Beatrice Coppadoro, Gianni Bisogno*, Johannes H M Merks*. The Lancet Published online June 8, 2022. doi. org/10.1016/S2352-4642(22)00121. Adolescents and young adults with rhabdomyosarcoma treated in the European paediatric Soft tissue sarcoma Study Group (EpSSG) protocols: a cohort study.

Pediatric Nephrology-Dialysis-Transplantation Unit

Purpose

The activities of the department of Pediatric Nephrology includes a large spectrum of renal diseases in children

Aim

To study:

- Viral and Urinary tract infections infections in the transplanted children,
- Genetical disease that may cause Proteinuria and gross hematuria in children

Team and infrastructure

The department includes (5 pediatric nephrologists, a hemodialysis center, 14-bed hospital Unit, and outpatient consultations.

Main projects

- BK polyomavirus in transplanted children
- Urinary tract infections in the transplanted children
- Evolution and determinants of BMI following pediatric kidney transplantation - Longitudinal multi-centric analysis
- Proteinuria due to genetical diseases.
- Causes of gross hematuria in children
- The role of staphylococcus in urinary tract infections in children

Recent achievements

- The first results of the study on BK polyomavirus infection in transplanted children have been published this year

Prof Khalid Ismaili, Dr Elise Hennaut, Dr Benedetta Chiodini

Selected publications

- Chiodini, B., Guillaume-Gentil, P., Vanhomwegen, C., Hennaut, E., Lolin, K., Tram, N., ... & Ismaili, K. (2024). BK Polyomavirus in Pediatric Renal Transplantation—What We Know and What We Do Not. Biomedicines, 12(5), 1093.
- Ismaili, K., Chiodini, B. D., Cassart, M., & Khelif, K. (2023). Antenatal assessment of kidney morphology and function. In Pediatric kidney disease (pp. 3-35). Cham: Springer International Publishing.
- Chiodini, B., Bellotti, A. S., Morello, W., Bulgaro, C., Farella, I., Giordano, M., ... & Wissing, K. M. (2023). Relapse rate in children with nephrotic syndrome during the SARS-CoV-2 pandemic. Pediatric Nephrology, 38(4), 1139-1146.
- Chiodini, B., Ghassemi, M., Khelif, K., & Ismaili, K. (2019). Clinical outcome of children with antenatally diagnosed hydronephrosis. Frontiers in pediatrics, 7, 103.
- Chiodini, B., Herman, J., Lolin, K., Adams, B., Hennaut, E., Lingier, P., ... & Ismaili, K. (2018). Outcomes of kidney transplantations in children weighing 15 kilograms or less: a retrospective cohort study. Transplant International, 31(7), 720-728.

Pediatric inflammatory and autoimmune rheumatic diseases Unit

Dr. Laurence Goffin and Guillaume Bonne.

Dr. Laurence Goffin

As a pediatric rheumatology Unit within the setup of an academic hospital, our clinical research primarily focuses on improving the diagnosis, treatment, and long-term outcomes of children affected by inflammatory and autoimmune rheumatic diseases. The team is composed by two senior pediatric rheumatologists (Dr. Laurence Goffin and Guillaume Bonne) is involved in the conduction of a wide range of clinical studies, including randomized controlled trials and observational cohort studies, targeting conditions such as juvenile idiopathic arthritis, systemic lupus erythematosus, and auto--inflammatory syndromes. A key objective of our work is to identify reliable biomarkers—such as serum calprotectin—to enhance early diagnosis and monitor disease activity more effectively. We also explore the efficacy and safety of innovative biologic therapies, including canakinumab, aiming to optimize treatment protocols and minimize side effects. Our research integrates multidisciplinary collaboration across specialties, ensuring comprehensive care for complex pediatric cases. Notably, we have adapted some of our clinical approaches in response to emerging challenges such as the COVID-19 pandemic. Through participation in national and international research networks, the team has contributed to advancing knowledge in pediatric rheumatology and improving patient care standards. Recent publications highlight promising developments in biomarker identification and therapeutic management, reflecting our commitment to translating research into meaningful clinical impact.

Selected publications

1. La, C., Lê, P.Q., Ferster, A., Goffin, L., Spruyt, D., Lauwerys, B., Durez, P., Boulanger, C., Sokolova, T., Rasschaert, J., Badot, V. (2021). Serum calprotectin (S100A8/A9): A promising biomarker in diagnosis and follow-up in different subgroups of juvenile idiopathic arthritis. RMD Open, 7(2), e001646. https://doi.org/10.1136/rmdopen-2017-001646
2. Quartier, P., Goffin, L., Le, P.-Q., et al. (2021). Tapering Canakinumab Monotherapy in Patients With Systemic Juvenile Idiopathic Arthritis in Clinical Remission: Results From a Phase IIIb/IV Open-Label, Randomized Study. Arthritis & Rheumatology, 73(2), 336-346. https://doi.org/10.1002/art.41506
3. Brogan, P.A., Hofer, M., Kuemmerle-Deschner, J.B., Koné-Paut, I., Roesler, J., Kallinich, T., Horneff, G., Calvo Penadés, I., Sevilla-Perez, B., Goffin, L., Lauwerys, B.R., Lachmann, H.J., Uziel, Y., Wei, X., Laxer, R.M. (2019). Rapid and Sustained Long-Term Efficacy and Safety of Canakinumab in Patients With Cryopyrin-Associated Periodic Syndrome Ages Five Years and Younger. Arthritis & Rheumatology, 71(11), 1955-1963. https://doi.org/10.1002/art.41026

Interventional Pediatric Unit
(Cardiology, Gastroenterology, Pneumology)

General purpose

The Interventional Pediatric Unit was established in 2022. It integrates three clinics that were already part of Sint-Pieter Hospital and the Université Libre de Bruxelles prior to the opening of the academic hospital Erasme and the Queen Fabiola Children's Hospital. These clinics (Cardiology, Gastroenterology-Hepatology, and Pneumology-Allergology-mucoviscidose) perform non-surgical diagnostic and therapeutic invasive procedures.

The Interventional Pediatric Unit aims to develop alternatives to open or minimally invasive surgeries and functional diagnostic tests, including motility investigations, cardiac echocardiography, rhythmology, pulmonary function, and screening for cystic fibrosis. Research and clinical care are designed to optimize follow-up and outcomes for children with congenital or acquired conditions. We also participate in international guidelines to promote best practices.

Specific aims

- Basic and translational research related to the diseases presented by children was followed up on in our center.
- Participate in clinical trials to develop pediatric indications for new drugs.
- Epidemiological approaches.
- Participation in international guidelines.

Team and infrastructure

A team of 28 doctors, including 7 with PhD degrees, is involved in clinics, research, and/or teaching for the Medical Degree, the Pediatric degree and/or the subspecialties. The team is led by Prof. P. Bontems, who also leads the Pediatric Gastroenterology-Hepatology Clinic, Prof. H. Dessy leads the Pediatric Gastroenterology Clinic, and Prof. L. Hanssens leads the Pediatric Pneumology-Allergology-Cystic Fibrosis Clinic. The medical team collaborates with 15 specialized nurses and an administrative staff of 3 individuals.

The team participates in National and European Scientific Societies, collaborates with research groups, and is recognized as a leader in their field. The Clinical Research Unit at the Queen Fabiola Children's University Hospital conducts the clinical trials and assists with the legal aspects of academic protocols.

The team publishes about 10 articles annually in top journals for the respective fields.

Main projects

1. Pediatric Pneumology-Allergology- Cystic Fibrosis

The Pneumology, Allergology and Cystic Fibrosis Clinic has a team of experienced clinicians who specialize in conducting sponsored and academic clinical studies. The clinic has

Pneumo team - Prof Laurence Hanssens, Dr Christine Quentin

Cardio team - Dr Nicolas Arribard, Dr Hugues Dessy, Dr Anna Bruscaglia

Gastro team - Prof Patrick Bontems (milieu), Dr Kaliroy Kotilea, Dr Julie Nguyen

advanced technologies to comprehensively assess children's respiratory function at rest or during exercise, including the latest techniques for measuring exhaled and nasal NO and pulmonary clearance.

The endoscopy Unit, equipped with flexible and rigid equipment, allows the realization of cellular, liquid and solid samples. The allergology team has extensive experience in carrying out diagnostic tests and allergic challenges.

Involved in numerous clinical trials, the clinic explores various areas, including cystic fibrosis, asthma, interstitial and infectious lung diseases, as well as evaluating respiratory disorders related to systemic conditions, such as sickle cell anemia, or neonatal issues, like broncho-dysplasia or congenital malformations.

Close collaborations with the pediatric laboratory also allow translational studies to integrate specific assays, strengthening the laboratory's pioneering role in pediatric research.

2. Pediatric Gastroenterology-Hepatology

The Gastroenterology Clinic is experienced in diagnostic and therapeutic endoscopy, assessing digestive motility

and functional tests involving H2 or stable isotope substrates.

Clinic members are involved in the executive boards of the national scientific societies (BESPGHAN) and the European ones (ESPGHAN).

We primarily specialize in the care of children with Inflammatory Bowel Disease (IBD), eosinophilic disorders, achalasia, hepatologic chronic disorders, polyposis, and functional disorders, for example.

Multidisciplinary teams collaborate to follow up on congenital and severe acquired diseases.

We participate in most clinical trials designed to define new indications for drugs for IBD and in many academic studies.

3. Pediatric Cardiology

The Cardiology Department is a center of excellence dedicated to the comprehensive management of heart conditions and rhythm problems in young patients.

With a constant focus on excellence and innovation, our medical team provides specialized services such as diagnostic and interventional catheterization, transthoracic and transesophageal Doppler echocardiography, Holter ECG and stress test.

Our department works closely with the adult cardiology department to treat grown up patients. We also maintain a relationship with Algeria to treat their most complex patients.

Recent achievements

- International guidelines on Helicobacter pylori infection in children, Botox use in digestive disorders, bowel dilatation in IBD
- PhD on the improvement of the efficacy of Helicobacter pylori eradication in children
- PhD on epidemiology of Helicobacter pylori infection in school attending children living in Ho Chi Minh City, Vietnam
- PhD on the clinical burden of H. pylori infection in children living in Ho Chi Minh City, Vietnam
- Bismuth-based quadruple therapy versus standard triple therapy for eradicating Helicobacter pylori in Belgium: a multicenter, non-blinded, randomized, prospective study
- An open-label trial of the long-term safety and tolerability of nintedanib in children and adolescents with clinically significant fibrosing Interstitial Lung Disease (InPedILD™-ON)
- RSV: a retrospective, multicenter, descriptive study of RSV-associated hospitalizations in children in Belgium
- ALPINE 2: a double-blind, phase 3 study including children with CF and new onset Pseudomonas infection to receive 75 mg AZLI three times daily for either 28 or 14 days followed by 14 days' matched placebo
- PTC-124: Phase 3, multicenter, randomized, double-blind, placebo-controlled, efficacy and safety study in children with CF due to a nonsense mutation (premature stop codon) in the CFTR gene
- SKYLUNG: use of the Lung Clearance Index to evaluate the respiratory disease in children with sickle cell anemia
- SPACE study: A European multicentre registry of pediatric patients with severe asthma
- Evaluation of the use of noninvasive ventilation in infants with BPD
- UROVATS: a randomized study to compare percutaneous chest drain with intrapleural urokinase and VATS in children with parapneumonic pleural effusion.
- Randomized study comparing the Influence of lung transplantation on the essential fatty acid profile in cystic fibrosis
- Use of Immunoglobulin G as a marker of follow-up in cystic fibrosis
- Congenitally corrected transposition of the great arteries: is it really a transposition? An anatomical study of the right ventricular septal surface
- Discovery of a genetic module essential for assigning left-right asymmetry in humans and ancestral vertebrates
- Pediatric Rheumatic Fever With Acute Fulminant Carditis: A Case Report

Selected publications

- Willaert C, Lecomte S, Arribard N, Sierra-Colomina M. Pediatric Rheumatic Fever With Acute Fulminant Carditis: A Case Report. Cureus. 2023 Oct 17;15(10):e47226. doi: 10.7759/cureus.47226.
- Popotas A, Casimir GJ, Corazza F, Lefèvre N. Sex-related immUnity: Could Toll-like receptors be the answer to acute inflammatory response? Front Immunol. 2024 May 21;15:1379754. doi: 10.3389/fimmu.2024.1379754.
- Thimmesch M, Berardis S, Hanssens L, Quentin C, Boemer F, Luis G, Dewulf JP, Marie S, Marcelis L, Lefèvre N, Libioulle C, Dideberg V, Philippeau M, Revencu N, Boboli H. Four-year evaluation of neonatal cystic fibrosis screening in Southern Belgium. Eur J Pediatr. 2024 Nov 21;184(1):38. doi: 10.1007/s00431-024-05845-4.
- Homan M, Thomson M, Bontems P, Saccomani MD, Dias JA, Faraci S, Furlano R, Hojsak I, Ledder O, Slae M, Narula P, Nita AF, Norsa L, Oliva S, Papadopoulou A, Romano C, Rybak A, Spyropoulou V, Tambucci R, Tzivinikos C, van Wijk M, Borrelli O; Endoscopy SIG and Motility SIG of ESPGHAN Organisation. Drugs in focus: Botulinum toxin in the therapy of gastrointestinal disorders in children. J Pediatr Gastroenterol Nutr. 2024 Dec;79(6):1096-1105. doi: 10.1002/jpn3.12376. Epub 2024 Sep 24.
- Kotilea K, Romano C, Miele E, Kindermann A, Dolstra Y, Misak Z, Urbonas V, Sykora J, Urruzuno P, Krauthammer A, Rogalidou M, Dimakou K, Zangen T, Roma E, Zellos A, Cilleruelo ML, M'Rini M, Bontems P, Sahin Y, Tavares M, Shahinyan T, Vuletic B, Kalach N, Kori M; ESPGHAN H. pylori special interest group. Helicobacter pylori infection found during upper endoscopy performed to diagnose celiac, inflammatory bowel diseases, and eosinophilic esophagitis: A multicenter pediatric European study. Helicobacter. 2024 May-Jun;29(3):e13092. doi: 10.1111/hel.13092. PMID: 38790089.

Endocrine, Diabetis and Metabolic disorders Unit

Purpose

To Contribute to the understanding of the pathogenesis of selected endocrine/metabolic conditions through retrospective studies of cohorts of patients harbouring rare monogenic conditions or more common conditions of the endocrine/metabolic system. IN its mission the EDM Unit works in close collaboration with the newborn screening laboratory.

EDM clinic

In addition to its busy clinical activity in the field of paediatric endocrinology, diabetes and metabolism, the EDM Unit of HUDERF HUB carries out clinical research in collaboration with other Units of HUB or with national or international collaborators. The main topics of interest recently focus on: precocious puberty, paediatric thyroid conditions (congenital hypothyroidism, autoimmune, nodules), rare adrenal, gonadal or pituitary monogenic conditions with new clinical insights, in the diabetes field (screening for subclinical diabetes-related complications, assessing and improving the quality of life of young children), rare monogenic diabetes (MODY), the disorders of small molecules (aminoacidopathies, organic acidurias, homocystinurias,...) and energy metabolism (fatty acid oxidation defects, glycogen storage diseases, ...), the nutritional status of hospitalised children.

Team and infrastructure

EDM clinic includes 10 physicians. Two PhD projects (Dr Emese Boros started in Sept 2022, Dr Aurélie Empain in Sept 2024) are ongoing, under the supervision of Cécile Brachet, Lionel Marcelis and Corinne De Laet.

Main projects

- PhD thesis project focusing on the "Newborn screening for congenital hypothyroidism in term and preterm newborns in Federation Wallonie Bruxelles: critical appraisal of real-life results." - E. Boros.
- PhD Thesis project focussed on the "Systematic newborn screening for hyperhomocystinemia" - A. Empain.
- Rising in body mass index during childhood in girls with idiopathic CPP: a 20-year experience in a tertiary Belgian centre, ongoing study Dr A. Vicinanza.
- Collaborations: NBSC Lab; clinical genetic team HUB; Adult Endocrinology Team HUB; Belgian Pediatric Endocrinology Units; translational research with laboratories abroad (Basel, C. Flücks Lab for the recent TXNRD2 study for example), E-IMD (intoxication metabolic diseases network), GalNet (network for galactosemias), E-HOD (homocystinuria's network), metabolics.be (Belgian society for metabolic diseases).
- Implementation of OCT-angiography as an alternative to fluangiography for ophthalmological screening, ongoing study Dr L Hajselova.

Dr Sylvie Tenoutasse, Prof Cécile Brachet, Dr Corinne De Laet

Recent achievements

- Revision of the TSH screening strategy in the Fédération Wallonie Bruxelles and Flanders by avoidance of home screening in favour of 48h of life-screening before discharge. Study of specific scores, combining different markers measured in newborn screening in order to improve the identification of metabolic diseases.

Selected publications

- Thyrotropin Screening of Newborns: Before or After 72 Hours of Life? Before Discharge or at Home? Boros E, Marcelis L, Van Vliet G, Elilie Mawa Ongoth F, Heinrichs C, Brachet C. Thyroid. 2023 Nov;33(11):1311-1317. doi: 10.1089/thy.2023.0114. Epub 2023 Sep 4. Insight into the role of TXNRD2 in steroidogenesis through a novel homozygous TXNRD2 splice variant
- C Brachet, A Laemmle, M Cools, K Sauter, E De Baere, A Vanlander , A V Pandey, . du Toit, C D Voegel, C Heinrichs, H Verdin, C E Flück Eur J Endocrinol 2024 Aug 5;191(2):144-155. doi: 10.1093/ejendo/lvae090.
- Hypothyroidism due to biallelic variants in IYD: description of 4 families and a novel variant E Boros, C Vilain, N Driessens, C Heinrichs, G Van Vliet, C Brachet Eur J Endocrinol 2024 Aug 5;191(2):K5-K9. doi: 10.1093/ejendo/lvae100.
- Childhood craniopharyngioma: a retrospective study of children followed in Hôpital Universitaire de Bruxelles C Magerman, E Boros, M Preziosi, S Lhoir, N Gilis, O De Witte, C Heinrichs, I Salmon, C Fricx, F Vermeulen, L Lebrun, C Brachet, Marine Rodesch (shared last authorship) Front Endocrinol 2024 Jun 19:15:1297132. doi: 10.3389/fendo.2024.1297132.
- Hypoglycemia awareness trajectories in young patients with type 1 diabetes using flash glucose monitoring. Messaaoui A, Hajselova L, Tenoutasse S, L. Crenier. Pediatric Diabetes. Volume 2023 | Article ID 4882902
- Empagliflozin for treating neutropenia and neutrophil dysfunction in 21 infants with glycogen storage disease 1b. Grünert SC, Gautschi M, Baker J, Boyer M, Burlina A, Casswall T, Corpeleijn W, Çıki K, Cotter M, Crushell E,

Derks TGJ, Haas D, Kilavuz S, Kingma SDK, Korman SH, Kozek A, De Laet C, Mundy H, Nassogne MC, Quintero V, Rossi A, Spenger J, Spiegel R, Stephenne X, Stojkov D, Tal G, Veiga-da Cunha M, Wortmann SB.Mol Genet Metab. 2024 Jun;142(2):108486.

- Impact of newborn screening for fatty acid oxidation disorders on neurological outcome: A Belgian retrospective and multicentric study. Everard E, Laeremans H, Boemer F, Marie S, Vincent MF, Dewulf JP, Debray FG, De Laet C, Nassogne MC.Eur J Paediatr Neurol. 2024 Mar;49:60-65. doi: 10.1016/j.ejpn.2024.02.003.

Newborn Screening Center and Metabolic Disease Laboratory (sub-Unit of the peadiatric lab)

Purpose

Many activities of the EDM and NBSC Laboratory coincide from a clinical point of vue. Research collaborations are built upon this convergence: this year, the main study topics are congenital hypothyroidism and homocysteine metabolism disorders.

EDM clinic

In addition to its busy clinical activity in the field of paediatric endocrinology, diabetes and metabolism, the EDM Unit of HUDERF HUB carries out clinical research in collaboration with the NBSC laboratory.

NBSC

The newborn screening centre is a reference laboratory for both newborn screening programs established in North and South of Belgium. It is the largest newborn screening center in Belgium, in charge of the screening of more than 50 000 babies annually, using dried blood spot samples ("Guthrie" cards) collected at the 2nd day of life for every baby born in one of the maternities of its network. Since the 70ies, it has been at the cutting edge of new biochemical techniques to enhance the efficiency and enlarge the scope of newborn screening programs, to allow a rapid and efficient clinical referral of children affected by congenital pathologies which, if remained untreated, could have irreversible health consequences. Along with its routine work at the benefice of children, the main aim of NBSC is to pave the way towards new generation of newborn screening strategies.

Team and infrastructure

- The NBSC laboratory is directed by Dr. Nicolas Lefevre and headed by Lionel Marcélis. Its team includes 2 quality coordinators, 5 lab technicians and administrative assistants. The lab is fully equipped to perform routine newborn screening, including mass spectrometry and automated immune assays.
- EDM clinic includes 10 physicians with two ongoing PhD projects (Dr Emese Boros started in sept 2022, Dr Aurélie Empain in sept 2024) under the supervision of Cécile Brachet and Corinne De Laet, both a collaboration between the EDM clinic and the NBSC Lab.

Main projects

NBSC and EDM

- Retrospective and prospective study of biological markers used in the newborn screening process to enhance the specificity of newborn screening via the development of new scoring systems.
- Multicentric prospective study using dried blood spot and urinary collection analysed using a new generation mass spectrometry to unravel new metabolic markers for screening and diagnosis of congenital pathologies.
- PhD thesis project focusing on the "Newborn screening for congenital hypothyroidism in term and preterm newborns in Federation Wallonie Bruxelles: critical appraisal of real-life results." - E. Boros
- PhD Thesis project focussed on the "Systematic newborn screening for hyperhomocystinemia" - A. Empain
- Collaborations: UZBrussel (studies on NTBC management of HT1 on mice model), Erasme (Development of an Enzyme-Linked Immunosorbent Assay for Newborns Dried Blood Spot Thyroglobulin)

Lionel Marcelis

Recent achievements

- Revision of the TSH screening strategy in the Fédération Wallonie Bruxelles by avoidance of home screening in favour of 48h-of-life-screening before discharge.

Selected publications

NBSC and EDM:

- Boros E, Marcelis L, Van Vliet G, Elilie Mawa Ongoth F, Heinrichs C, Brachet C. Thyrotropin Screening of Newborns: Before or After 72 Hours of Life? Before Discharge or at Home?. Thyroid. 2023;33(11):1311-1317. doi:10.1089/thy.2023.0114
- Neuckermans J, Lequeue S, Claes P, et al. Hereditary Tyrosinemia Type 1 Mice under Continuous Nitisinone Treatment Display Remnants of an Uncorrected Liver Disease Phenotype. Genes (Basel). 2023;14(3):693. Published 2023 Mar 11. doi:10.3390/genes14030693

Paediatric Neurology and Pediatric Epilepsy reference center-ULB

Purpose

Half of the 70 million individuals living with epilepsy are children. Beside epileptic seizures, epilepsy has also marked psychosocial and cognitive consequences. Therefore, three questions drive our research group: how does epilepsy affect learning processes and brain development in children? Why is epilepsy more common in children than in adults? And finally, how could we provide personalized care for each epileptic child? For this purpose our research and clinical team is specialized in the development of new biomarker for the detection and treatment of cognitive problems in epilepsy, the evaluation of efficacy / safety profile of new antiseizure medications (ASM) and in the study of mono and multigenic inheritance of epilepsies in paediatric patients in order to offer a personalized treatment.

Team and infrastructure

The Investigation center is headed by Alec Aeby, its team includes 1 PhD student (C. Rouge-neuropsychologist) and 1 post-doc fellow (S. Duerinckx, MD, PhD). The center has access to several innovative neuroimaging techniques, in particular magnetoencephalography (MEG), optic pump magnetometer (OPM) and 3T MR-PET in the "Laboratoire de neuroanatomie et neuroimagerie translationnelles-(L-N2T-ULB)". Experimental neuropsychological investigations are also developed with the collaboration of the "Unité de Neuropsychologie et de neuroimagerie fonctionnelle (UR2NF-ULB)". Monogenic and oligogoenic tests are performed with the help of the "service de génétique moléculaire". Finally, the center is member of the European Reference Network (ERN)-EpiCare BRACE (Brussels Rare and Complex Epilepsies) and collaborate with institutional, other national and international teams.

Main projects

- **Complex Genomics of Pediatric Epilepsy**

  It is now recognized that genetic factors contribute to the majority of epilepsy syndromes, and over the last ten years high throughput sequencing has led to the discovery of large numbers of genes. Moreover, precision medicine is developing fast in the field of epilepsy, and the identification of the genetic cause can directly impact the selection of anti-seizure medication. However, the exact genetic cause remains unexplained in most patients. It is expected that these patients have a complex genetic explanation for their pathology: monogenic variants in genes not yet associated with human pathologies, combinations of variants of moderate or low impact in several genes (oligogenic or polygenic inheritance), or anomalies affecting regulatory elements. In this project, we explore the multigenic inheritance of epilepsies in paediatric patients. We use three approaches: 1) analysing exomes from patients in search of non-classic monogenic causes of epilepsies; 2) analysing a cohort of cases and controls in search of oligogenic inheritance in epilepsies, using bioinformatics predictors developed at the Interuniversity Institute of Bioinformatics in Brussels (IB2); 3) accumulating genomes, transcriptomes and methylomes on selected patients and performing an integrated bioinformatics analysis of all datasets. Our project will contribute to a better understanding and improved diagnosis in children affected by this invalidating and stigmatizing pathology.

Prof Alec Aeby, Dr Pauline Vangyseghem, Coralie Lerouge

- **Investigation of brain connectivity associated with learning difficulties in self-limited focal epilepsy**

  The Self-limited Focal Epilepsy (SFE) syndrome in children is characterized by the atypical presence of Interictal Epileptiform Discharges (IEDs) during Slow Wave Sleep (SWS) which could interfere with the specific brain patterns underlying verbal (declarative) and motor (procedural) learning and/or sleep-dependent memory consolidation processes. Therefore, despite a remission of epileptic activity at adolescence, striking evidence showed that children with SFE syndrome have a high possibility of developing pervasive learning, cognitive, language and/or motor deficits. Yet the brain pathophysiological mechanisms associated with these deficits remain unexplored. To fill this gap, our research project aims at characterizing the impact of IEDs on brain-behaviour patterns related to verbal (using MagnetoEncephaloGraphy-MEG) and motor (using Optically Pumped Magnetometers-OPMs) learning and associated cognitive impairments in children with SFE. Results will provide a better understanding of the impact of IEDs on learning-related brain processes that may lead to cognitive/motor impairments observed in SFE and could be useful to explore if suppressing these IEDs during sleep with treatment might improve cognition in SFE children.

Selected publications

Collaborations:

- How the Spreading and Intensity of Interictal Epileptic Activity Are Associated with Visuo-Spatial Skills in Children with Self-Limited Focal Epilepsy with Centro-Temporal Spikes. Dontaine P., Rouge C., Urbain C., Galer S., Raffoul R., Nonclercq A., Van Dyck D., Baijot S., Aeby A. Brain Sci 2023 Nov;13(11):1566. doi:10.3390/brainsci13111566
- Phenotypes and genotypes in non-consanguineous and consanguineous primary microcephaly: High incidence of epilepsy. Duerinckx S, Désir J, Perazzolo C, Badoer C, Jacquemin V, Soblet J, Maystadt I, Tunca Y, Blaumeiser B, Ceulemans B, Courtens W, Debray FG, Destree A, Devriendt K, Jansen A, Keymolen K, Lederer D, Loeys B, Meuwissen M, Moortgat S, Mortier G, Nassogne MC, Sekhara T, Van Coster R, Van Den Ende J, Van der Aa N, Van Esch H, Vanakker O, Verhelst H, Vilain C, Weckhuysen S, Passemard S, Verloes A, Aeby A, Deconinck N, Van Bogaert P, Pirson I, Abramowicz M. Mol Genet Genomic Med. 2021 Sep;9(9):e1768. doi: 10.1002/mgg3.1768. Epub 2021 Aug 17.PMID: 34402213 Free PMC article.
- A qualitative awake EEG score for the diagnosis of continuous spike and waves during sleep (CSWS) syndrome in self-limited focal epilepsy (SFE): A case-control study. Aeby A, Santalucia R, Van Hecke A, Nebbioso A, Vermeiren J, Deconinck N, De Tiège X, Van Bogaert P. Seizure. 2021 Jan;84:34-39. doi: 10.1016/j.seizure.2020.11.008. Epub 2020 Nov 17.PMID: 33276197
- Molecular basis of ClC-6 function and its impairment in human disease. Zhang. B, Zhang S, Polovitskaya MM, Yi J, Ye B, Li R, Huang X, Yin J, Neuens S, Balfroid T, Soblet J, Vens D, Aeby A, Li X, Cai J, Song Y, Li Y, Tartaglia M, Li Y, Jentsch TJ, Yang M, Liu Z. Sci Adv. 2023 Oct 13;9(41):eadg4479. doi: 10.1126/sciadv.adg4479. Epub 2023 Oct 13.PMID: 37831762
- Frontoparietal18F-FDG-PEThypo-metabolismin Lennox-Gastaut syndrome: Further evidence highlighting the key network. Balfroid T, Warren AEL, Dalic LJ, Aeby A, Berlangieri SU, Archer JS. Epilepsy Res. 2023 May;192:107131. doi: 10.1016/j.eplepsyres.2023.107131. Epub 2023 Mar 30.PMID: 37054522

The Paediatric Neuromuscular Disorders Clinical Investigation Group (ULB)

Purpose

Our goal is to propose new therapeutic approaches for children and adolescents suffering from neuromuscular diseases which are disabling diseases and for whom therapeutic options for cure are currently limited. For this purpose our team specialized in the clinical evaluation and the efficacy / safety profile of new drugs (gene replacement therapy, exon skipping,...) with a special focus on Spinal Muscular Atrophy and Duchenne Muscular Dystrophy (DMD) the to most prevalent paediatric neuromuscular disorders. We also aim at better understand the natural history of these disorders in all its components (gait, strength, respiratory, swallowing,...)

Team and infrastructure

The Investigation center is headed by Nicolas Deconinck and Ana Cebolla, and its team includes 2 PhD students (1 MD, and one physiotherapist), one laboratory fellow, 1research fellow. The Center has access to several investigations techniques, in particular a gait analysis platform. It manages a large biobank of prospectively collected DNA samples. Thanks to collaboration with institutional, other national and international teams , it has access to other research platforms, in particular genomics, omics, anapathology...

Main projects

- Investigation Center (PI) in the context of multiple international sponsored multicenter clinical studies focused on innovative therapeutic approaches for Duchenne muscular dystrophy (DMD) and Spinal Muscular Atrophy (SMA): Exon skipping therapy for Duchenne disease, treatment by modulation of alternative splicing of the SMN2 gene or replacement of the SMN1 gene within motor neurons for spinal muscular atrophy
- Identification of new genes responsible for rare neuromuscular disease. From patients followed within the cohort of patients followed at the CRNM, a new JAG2 gene causing congenital myopathy was recently identified (across several families) in our group (DR. S. Coppens; American Journal of Human Genetics, 2022). Identification of severe forms of congenital myopathies with mutations within Titin (article accepted for publication)
- Identification of modifying genes" in the specific group of patients suffering from collagen 6 related-myopathies; No. B670201733653. Mutations within one of the three COL 6 genes are responsible for a wide range of congenital myopathies or limb-girdle muscular dystrophies. We have published several

Prof N. Deconinck, Dr P. Dontaine

articles (see CV) focusing on the evolution of the phenotype and muscle MRI aspects of myopathies linked to COL6. Initiation of a large international project (Europe: Principal investigator N. Deconinck, US: C. Bonneman (NIH); R. Butterfield (Utah University).

- Design and initiation of several of academic natural history studies across SMA and DMD
    - o An evaluation of gait kinetics as a practical early sensitive outcome measure of muscle function in Duchenne Muscular Dystrophy". Obtaining a CDR credit from the FNRS (N. Deconinck, principal investigator (CE Erasme B4062020000102; 2019-2021) in collaboration with the biomechanics and neurophysiology laboratory (Prof. G. Cheron, Dr A. Cebolla, ULB).
    - o Development of new investigation tools for the evaluation of swallowing in SMA
    - o Evaluation of cognition in SMA (treated and untreated patients)

Recent achievements

- Conducted the first study looking at the dynamics of gait in in DMD, DMD patients who received micro-dystrophin gene therapy, and healthy aged matched children
- Involved as PI in the Phase 3 pivotal trials that allowed market access to new SMA disease modifying drugs (Spinraza, Risdiplam, Zolgensma)
- Identification of new gene causing severe a severe form of congenital muscular Dystrophy (Titin, JAG2, CTBP1,...)
- A recent mono centric and a multicentric study aiming evaluating the clinical relevance of new non invasive tool in the evaluation of swallowing in SMA in particular type 1 SMA , at the era of new disease modifying treatments

Selected publications

- E. Mercuri, F. Muntoni; G. Baranello; R. Masson; O. Boespflug-Tanguy; C. Bruno; S. Corti; A. Daron; N. Deconinck; L. Servais; V. Straub; H. Ouyang; D. Chand; S. Tauscher-Wisniewski; N. Mendonca; A. Lavrov. Onasemnogene abeparvovec for symptomatic spinal muscular atrophy type 1: results of the phase 3 STR1VE-EU; The Lancet Neurology (2021)
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Child and Adolescent Psychiatry Department

Purpose

The Research Unit in Child and Adolescent Psychiatry focuses on advancing clinical research in child and adolescent mental health. The research Unit is dedicated to exploring the etiopathogenesis and treatment of mental health conditions, including neurodevelopmental disorders, such as autism spectrum disorders (ASD), attention deficit hyperactivity disorder (ADHD), and learning disorders. The Unit also addresses important clinical research questions in the field of adolescent psychopathology, such as school refusal, anxiety, and eating disorders, as well as the mental health challenges faced by transitional-age youth (16-24 years old). By collaborating with national and international clinical and research partners, the Unit integrates multidisciplinary approaches to improve diagnostic, therapeutic, and preventive strategies for these conditions across diverse populations.

Aim

- The primary aim of the Research Unit in Child and Adolescent Psychiatry is to enhance the understanding of the etiopathogenesis of mental health disorders in children, adolescents, and young adults. This involves comprehensive studies on the biological, environmental, familial, and psychosocial factors contributing to these conditions. Additionally, the Unit is committed to developing and refining diagnostic tools and therapeutic approaches that are tailored to the specific needs of these populations. Through its research, the Unit seeks to provide evidence-based interventions that can be implemented in both clinical practice and public health initiatives.

Team and infrastructure

The laboratory includes a multidisciplinary team of 13 researchers (of which 2 PhD and 6 PhD candidates), comprising child and adolescent psychiatrists, adult psychiatrists, neuropsychologists, psychologists, geneticists, also well as the partnership of other clinicians. The infrastructure located at the child and adolescent psychiatry department at the HUB (Hôpital Universitaire de Bruxelles) supports all research activities, conducted in collaboration with other national and international clinical settings and research teams.

Main projects

- **Perinatology (2020-present)**
  - Research on the effect of Covid-19 on stress in mothers and babies, using the NBO tool, in partnership with the Cambridge Brazelton institute.

Dr Mouna Al Husni Al Keilani, Pr Véronique Delvenne, Dr Joana Figueiredo Oliveira Reis, Dr Simone Marchini

- **ASD**
  - **Early Intervention in Senegal (2017-present):** This study evaluates the implementation of the Denver Model for early ASD management in Senegal. It focuses on clinical and diagnostic characterization of the population and assesses the developmental outcomes of children receiving day care treatment in this context.
  - **Multi-omics Analysis and Multidimensional Phenotypic Characteristics of Autism (GxA Project) (2021-present):** This project includes two main components: increasing the yield of genetic diagnosis through advanced long-read sequencing and transcriptomics, and the French validation of the Broad Autism Phenotype Questionnaire (BAPQ), a tool for assessing broader autism phenotypes.
  - **Autism Resource Centre (CRA) Retrospective Study (2023-present):** This project focuses on the analysis of a large database containing the multidimensional phenotypic data of 1000 patients registered at the HUDERF's CRA.
  - **CAP48 Medical Research Project (2023-present):** A collaborative project involving all French-speaking CRA in Belgium. The project aims to evaluate the follow-up care of children diagnosed with ASD, optimizing diagnostic protocols and improving the quality and accessibility of care across French-speaking Belgium.
- **ADHD**
  - Contributions of Attachment and Cognitive Functioning to ADHD Symptoms (2019-present): This project explores how environmental factors, particularly the parent-child relationship, and cognitive characteristics influence the expression of ADHD symptoms.
  - Microbiota-Gut-Brain Axis and ADHD: Innovative research exploring benefits of Pycnogenol®, a dietary supplement, on ADHD Symptoms and associated Cognitive Functions.

- **School Refusal**
  - Etiopathogenic Aspects of Anxiety-Based School Refusal: This project evaluates the different forms and clinical characteristics of anxiety-based school refusal. The study consists of three phases: clinical and diagnostic characterization, identification of personal and environmental contributing factors, and a qualitative analysis of the management strategies employed at Robert Dubois School.
- **Transitional-Age Youth (16-24 years old)**
  - Transition_psy Study (2019-present): A multicentre, longitudinal cohort study that seeks to determine the risk and protective factors for developing psychopathology in transitional-age youth, using a transdiagnostic and dimensional approach.
  - Outpatient Care Models (2020-present): This project involves a retrospective study on outpatient care provided for transitional-age youth. It aims to analyse clinical characteristics and trajectories of care of patients. Additionally, the TAY-MOC systematic review and meta-analysis will assess the effectiveness of various outpatient psychiatry care models used worldwide.
  - POPAY Study (2021-present): This study investigates how overprotective parenting practices influence the development of psychopathology in both help-seeking populations and the general youth population.
  - EARLY Project (2024-present): Funded by the European Commission, this 4-year international collaborative project aims to reduce the burden of mental health conditions in youth by identifying and mitigating modifiable risk factors. The project involves a broad consortium of European partners and seeks to implement preventive strategies at the population level.

Recent achievements

- Research grant with the support of Julie Renson Fund, the Queen Fabiola Fund and the King Baudouin Foundation for the Chair in Transition Psychiatry in French-speaking Belgium (2019-2023)
- Publications from the Chair in Transition Psychiatry in 2023 and dissemination in IACAPAP Brazil 2024 of the first results of the Transition_psy Study, specifically on the dimensional model identifying risk factors of psychopathology in transitional age youth.
- Initiation in December 2023 of the 4-year EARLY project, funded by the European Commission, aimed at reducing the burden of mental health conditions in youth across Europe.
- Organization of a symposium on "Le microbiote intestinal régule-t-il notre cerveau et nos comportements ?" at the Palais des Académies, Brussels, Mai 2024.
- Sharing the 4-year experience of Natus team in 2 congresses (Rennes, France and WAIMHS International Congress in Tampere, Finland).

Selected publications

- Marchini S, Reis J, Ben-Shaool E, et al. (2023). Dimensional model on how familial vulnerability and environmental factors impact transitional age youth psychopathology: The Transition_psy study. Front Psychiatry, 14:1103030.
- Wylock JF, Borghini A, Slama H, Delvenne V. (2023). Child attachment and ADHD: a systematic review. Eur Child Adolesc Psychiatry, 32(1):5-16.
- Moureau A, Cordemans L, Gregoire C, Benoît P, Delvenne V. (2023). A 5 years' experience of a parent-baby day Unit: impact on baby's development. Front Psychiatry, 14:1121894.
- Al-Husni Al-Keilani M, Dramaix M, Delvenne V. (2023). Risk factor profile in inpatients with school refusal : a dimensional model. Psychiatria Danubina, 35(2): 364-69.
- Luyens B, Felgueroso-Bueno F, Massat I. (2024). Beneficial Effects of Pycnogenol® on Attention Deficit Hyperactivity Disorder (ADHD) : A Review of Clinical Outcomes and Mechanistic Insights. Arch Pediatr. 9: 317. https://doi.org/10.29011/2575-825X.100317

The ULB's Human Genetics Centre

Purpose

Neurodevelopmental disorders (NDD) are a highly heterogenous set of disorders, characterized by developmental deficits that lead to impairments of personal, social, academic or occupational functioning. Intellectual disability, and autistic spectrum disorders affect more than 3% of the children. Most of NDD are being suspected to have a genetic basis. Establishing a clear genetic diagnosis is critical for multiple reasons. It ends the "diagnostic odyssey" that patients and families often endure. It might open the door for an etiology specific treatment, help to detect and treat associated comorbidities and to limit potentially harmful treatments or unnecessary diagnostic procedures. It is also essential for genetic counseling and to assess the risk of recurrence.

The aim of our work is to bring a molecular diagnosis for a growing number of children.

Team and infrastructure

The principal investigators are Guillaume Smits, and Catheline Vilain. The team includes 3 PhD students (Sebastian Neuens, Claire Detry, and Pauline Dacremont). Our group works in synergy with the laboratory of genetics at the HUB, bridging the gap between research, development and validated diagnostic tools. We also collaborate with bio-informaticians at IBsquare (https://ibsquare.be), in particular the team of Matthieu Defrance. Whenever needed we develop short collaborations with research teams worldwide to validate some ultra-rare diagnosis.

Main projects

- **FUNctional Genomics in PEDIAtrics (FunPedia)**

The advent of massive parallel sequencing during the last decade has started a golden age of genomic medicine, with hundreds of new disease-associated genes being discovered each year. But despite the identification of this impressive number of new genes, and increased diagnostic yields, over half of all neurodevelopmental disease cases remain unsolved, or end with the identification of variants of unknown significance. To tackle this, our work focus on several sets of data - whole genome sequencing, epigenetic and transcriptomic data, long read sequencing and phenotyping – to see how we can integrate them to increase diagnostic yield and contribute to a better understanding of the genetic landscape of NDD.

- Routine genetic testing focus on protein coding regions or "exome", which represent only 1% of the entire genome. Although an important amount of information lies in the mostly unexplored 99% of our DNA, the era of understanding the clinical relevance of the enormous number of variations found in whole genome is in its infancy.

Pauline Dacremont, Claire Detry, Dr Sébastien Neuyens, Prof Guillaume Smits, Prof Catheline Vilain

- Epigenetics marks have been increasingly studied and episignatures specific to certain disorders have been recognized. Since our interest in the field, bioinformatic tools to visualize those epigenetic modifications have been designed by Matthieu Defrance team at IBsquare, and our clinical lab is integrating Epicarrays in its routine.

- RNA-sequencing allows the identification of modifications in the transcription of DNA to messenger RNA. Those modifications can reflect the presence of non-coding variation that will impact protein formation.

- Long reads sequencing can, in a single run, detect and analyze structural variants (SVs), indels and SNVs, "phase" alleles and study modified bases (methylation), repeated coding and non-coding regions of the genome, in the nuclear and mitochondrial genomes. Learning how to combine bioinformatic tools to analyze these data, and to integrate the information they provide will improve our capacity for diagnosis.

- Phenotyping helps understand disorders spectrum, and how they correlate to genetics. To evaluate how this is true for autism spectrum disorder, we collected phenotype of about a thousand individuals attending the Centre Ressource Autism, studied the spectrum breadth, and linked it with the results of genetic testing performed on routine basis for some of the children.

Collaborations

- PhD students were supported by the Belgian Kids' Fund, and by Professor Gilbert Vassart.
- Although the burden of neurodevelopmental disorders is high, most molecular diagnosis ends up in identifying an extremely rare conditions. We thus took part at several projects, in the frame of the European network for Rare Disease Ithaca (https://ern-ithaca.eu) aiming at a better understanding of clinical consequences of rare disorders.
- Short collaborations with to validate some ultra-rare diagnosi (see for expel our ref number 1 by S Neuens et al).
- This project was in part imbedded in the IGenCare project, in collaboration with the BrightCore and the UZ Brussels Genetic Center of Human Genetics, funded by Innoviris.

- We also contributed to BeSolveRD, a project led by the genetic center of KUL, and implicating clinicians, and lab scientists of the 8 belgian Human Genetic Centers to evaluate the potential added value of Whole Genome sequencing towards standard of care.

Selected publications

- A milder form of NSRP1-associated neurodevelopmental disorder, caused by a missense variant in the nuclear localization signal. Sebastian Neuens, Maiza Kausar, Sun-Kyoung Kang, Julie Soblet, Sonia Van Dooren, Toon Janssen, Ben Caljon, Chang-Duk Jun, Guillaume Smits, Sandra Coppens, Catheline Vilain. Am J Med Genet A. 2024 Oct;194(10):e63727. doi: 10.1002/ajmg.a.63727
- Comprehensive evaluation of the implementation of episignatures for diagnosis of neurodevelopmental disorders (NDDs). Edoardo Giuili, Robin Grolaux, Catarina Z N M Macedo, Laurence Desmyter, Bruno Pichon, Sebastian Neuens, Catheline Vilain, Catharina Olsen, Sonia Van Dooren, Guillaume Smits, Matthieu Defrance. H um Genet. 2023 Dec;142(12):1721-1735. doi: 10.1007/s00439-023-02609-2. Epub 2023 Oct 27.
- Digestive involvement in a severe form of Snyder-Robinson syndrome: Possible expansion of the phenotype. Pauline Dontaine, Elisa Kottos, Martine Dassonville, Ovidiu Balasel, Véronique Catros, Julie Soblet, Pascale Perlot, Catheline Vilain. Eur J Med Genet 2021 Jan;64(1):104097. doi: 10.1016/j.ejmg.2020.104097
- Novel homozygous variant of carbonic anhydrase 8 gene expanding the phenotype of cerebellar ataxia, mental retardation, and disequilibrium syndrome subtype 3.Paternoster L, Soblet J, Aeby A, De Tiège X, Goldman S, Yue WW, Coppens S, Smits G, Vilain C, Deconinck N. Am J Med Genet A. 2020 Nov;182(11):2685-2693. doi: 10.1002/ajmg.a.61805. Epub 2020 Aug 18.
- FGFR1 mutations cause Hartsfield syndrome, the unique association of holoprosencephaly and ectrodactyly. Nicolas Simonis, Isabelle Migeotte, Nelle Lambert, Camille Perazzolo, Deepthi C de Silva, Boyan Dimitrov, Claudine Heinrichs, Sandra Janssens, Bronwyn Kerr, Geert Mortier, Guy Van Vliet, Philippe Lepage, Georges Casimir, Marc Abramowicz, Guillaume Smits, Catheline Vilain. J Med Genet. 2013 Sep;50(9):585-92. doi: 10.1136/jmedgenet-2013-101603. Epub 2013 Jun 28.

Paediatric Surgery Research Group

Purpose

The HUB Pediatric Surgery Research Group has its focus on clinical research evaluating minimally invasive techniques in visceral pediatric surgery (for example in inguinal hernia, in esophageal atresia, and in certain solid tissue tumors) as well as optimizing outcomes in pediatric surgical oncology (participation in national and international oncology studies). Another important study subject is prevention of pediatric illnesses requiring surgery (prevention of obesity, early conservative treatment in necrotizing enterocolitis). Moreover, the team is involved in education of surgeons overseas, and the education itself as well as the implementation of minimally invasive techniques in lower income settings are studied. Last but not least - as this is of utmost importance of the very patient group we serve - we are invested in studying ways to minimize surgical waste.

Team

Director: Víola B. Weeda MD PhD – member of the Université Libre de Bruxelles LAB-PED

Co-director: Helena Reusens MD

Members: Pierre Lingier MD – head of department, Gregory Rodesch MD, Eva Stortelder MD

Main projects

- Evaluation of minimally invasive surgical treatment for congenital diaphragmatic hernia and esophageal atresia
- Comparison of minimally invasive versus open surgical technique for pediatric inguinal hernia repair for a BELgian Association of Pediatric Surgery (BELAPS) prospective consortium study
- Evaluation of the role of lymph nodes in hepatoblastoma in collaboration with Université Catholique de Louvain (UCL)
- Development of a worldwide guideline for hepatoblastoma treatment in all settings on the Adapted Resource and Implementation Application (ARIA) platform
- Evaluation of outcome in pediatric versus adult patients for fibrolamellar hepatocellular carcinoma in collaboration with University Medical Center Amsterdam (A-UMC) and University Medical Center Maastricht (MUMC)
- Continuous active membership of the international pediatric liver tumor (SIOPEL) surgical working group
- Forthcoming: participation in an international study comparing conservative versus surgical approach for lung developmental disorders

Prof Viola Weeda

- Audit of conservative versus surgical treatment for necrotizing enterocolitis within Hôpitaux Universitaires de Bruxelles (HUB)
- Nationwide evaluation of minimally invasive surgery for neuroblastoma
- Evaluation of preventive measures in pediatric obesity within HUB
- Study of simple but effective and sustainable measures in minimizing surgical waste at the Hôpital Universitaire Des Enfants Reine Fabiola (HUDERF) site of HUB

Recent achievements

- End-of-study thesis (TFE) on quality of life in esophageal atresia patients (Dr Lingier, Dr Weeda) as base for a novel nation-wide registry
- End-of-study thesis (TFE) on minimally invasive surgery for neuroblastoma (Dr Weeda, Dr Rodesch) as base for a multi-center study
- Presentation at ESPES of a study comparing open and minimally invasive surgery for pediatric inguinal hernia as base for a multi-center prospective consortium study (Dr Reusens, Dr Weeda)
- Surgical waste sensibilisation week (Dr Reusens, Dr Weeda) as intervention for a local pilot study (see also:) https://www.linkedin.com/posts/hopital-universitaire-des-enfants_recyclage-ecologie-santaez-activity-7206943331258380288-Y9Kq?utm_source=share&utm_medium=member_ios

Selected publications

- Van Egmond R, Van Kesteren J; Kaomba L, (...), Stortelder E. Empowering tomorrow's cancer specialists: evaluating the co-creation and impact of Malawi's first surgical oncology summerschool. J Cancer Educ 2024; 39(3): 234-43.

- Markel M, Lacher M, Hall NJ, (...) , Reusens H, (...). Training in minimally invasive surgery: experience of paediatric surgery trainees in Europe. Br J Surg. 2023 Sep 6;110(10):1397-9.
- Murawski M, Weeda VB, Czauderna P. Surgical management in hepatoblastoma – points to take. Pediatr Surg Int 2023; 39(1): 81.
- Essola B, Himpens J, Ndamba JE, (...), Lingier P, (...). Prospective, randomized clinical trial of laparoscopic totally extraperitoneal inguinal hernia repair using conventional versus custom-made (mosquito) mesh performed in Cameroon: short-term outcomes. Surg Endosc 2022; 36(9): 6558-66.
- Reusens H, Leonard K, Moretti M, et al. Bariatric surgery in adolescents: information for the general pediatrician. Belg J Pediatr 2020; 55(4).

Orthopedics and Traumatology Unit

Purpose

The general objective of the research Unit (Dr. Jean Paul Kaleeta Maalu) is to develop, validate and exploit a multi-body biomechanical model of idiopathic scoliosis integrating the study of personalized flexibility of the spine for the planning of either conservative or surgical treatment. The first specific objective is to carry out an analysis of the flexibility of the scoliotic spine in the context of treatment by corset and surgery. The second objective is to create a flexible digital tool with multi-body systems of a scoliotic spine integrating the study of its flexibility.

Dr Jean Paul Kaleeta Maalu

Paediatric Ophtalmology Research Unit

Purpose

Clinical research

Aim

- Our clinical research center is dedicated to advancing the field of ophthalmology through comprehensive investigations into ocular eye diseases, congenital anomalies, refractive errors, and strabismus. The primary aim of our research is to deepen the understanding of these conditions and develop innovative, effective treatments that enhance the quality of life for patients.

Dr Sophie Lhoir, Prof Lavinia Postolache, Dr Martina Delle Fave

General activity

The pediatric ophthalmology service aims to centralize healthcare by providing tertiary experience in the field of pediatric ophthalmology and the monitoring of complex patients. The pediatric ophthalmology team offers a multitude of subspecialized activities in interaction with other pediatric specialties. This include a series of ophthalmologic consultations addressing strabismus, amblyopia, medical retinal diseases, inflammatory eye diseases as well as ocular surgery. We have a particularly expertise in strabismus surgery, congenital cataracts and infantile and juvenile glaucoma surgery. We seek to develop the tertiary aspect firstly with new projects in the monitoring of rare diseases), for children with specific needs (intellectual disability, behavioral disorder, low vision), with an emphasis on the modalities reception (adapted setting).

Part of the consultation is dedicated to general pediatric ophthalmology consultation because the prevalence of eye pathologies in children is growing due to changes in living conditions (e.g. urbanization, screens). This, together with systematic visual screening carried out by ONE, K&G and PMS have sharply increased requests for pediatric ophthalmology consultations in recent years.

Research objectives

At our clinical research center, we are dedicated to advancing the understanding and treatment of a wide array of ocular conditions. Our primary focus is on eye rare diseases, ocular congenital anomalies, refractive errors, and strabismus. Through rigorous research and innovative methodologies, we aim to improve patient outcomes and enhance the quality of life for individuals affected by these vision-related issues.
Our research on rare eye diseases encompasses a broad spectrum of conditions, including glaucoma, optic atrophy, Down syndrome and retinal anomalies. We utilize cutting-edge diagnostic tools and therapeutic interventions to explore new ways to prevent, manage, and treat these debilitating diseases. Our goal is to contribute to the development of more effective treatments that can preserve and restore vision.

In the realm of ocular congenital anomalies, our work focuses on identifying the genetic and environmental factors that contribute to these conditions. By understanding the underlying causes, we strive to create targeted therapies that can improve outcomes for affected individuals from birth.

Refractive errors, including myopia, hyperopia, and astigmatism, are another key area of our research. We investigate the etiology and progression of these conditions, with an emphasis on developing advanced corrective measures.

Strabismus, characterized by the misalignment of the eyes, is a significant focus of our research efforts. We study the underlying neurological and muscular factors contributing to this condition and evaluate the effectiveness of different treatment modalities, including surgical correction, vision therapy, and botulinum toxin injections. Our objective is to enhance treatment protocols and optimize visual outcomes for patients with strabismus.

Overall, our research center is committed to pushing the boundaries of knowledge in ocular health. By fostering a collaborative environment and leveraging the expertise of our multidisciplinary team, we aim to make significant contributions to the field of ophthalmology and improve the lives of individuals affected by eye diseases and conditions.

Team and infrastructure

Lavinia Postolache, Md , PhD; Martina Delle Fave MD, Lhoir Sophie MD, Deborah Buisseret MD , Depasse Fanny MD, Dafina Draganova MD, Mihaela Macau MD. Infrastructure available in the ophthalmology clinic

Main projects

- Optic atrophy in children.
- Contribution of amblyopia on OCT parameters in children.
- Optical coherence tomography (OCT) findings in children with Down syndrome.

Selected publications

- Tran NAP, Caspers S, Delle Fave MM, Postolache L. Manifestations oculaires de la toxoplasmose congénitale [Ocular manifestations of congenital toxoplasmosis]. J Fr Ophtalmol. 2023 Apr;46(4):426-429. French. doi: 10.1016/j.jfo.2022.09.044. Epub 2023 Mar 8. PMID: 36898870.
- Bradly D, Lhoir S, Postolache L. Hypoplasie unilatérale du nerf optique cause d'une exotropie sensorielle [Unilateral optic nerve hypoplasia causing sensory exotropia]. J Fr Ophtalmol. 2023 Nov;46(9):1131-1133. French. doi: 10.1016/j.jfo.2023.06.007. Epub 2023 Sep 2. PMID: 37666740.
- Hemptinne C, Willermain F, de Jong C, Postolache L, Postelmans L. Autosomal recessive bestrophinopathy associated with compound heterozygous variants in the BEST1 gene. Ophthalmic Genet. 2023 Jun;44(3):318-320. doi: 10.1080/13816810.2022.2116649. Epub 2022 Sep 4. PMID: 36062537.
- Chauveau E, Baranski M, Ehongo A, Fave MMD. Iconographie d'une persistance de la vascularisation fœtale [Imaging of posterior persistent fetal vasculature]. J Fr Ophtalmol. 2023 Jun;46(6):693-695. French. doi: 10.1016/j.jfo.2022.12.016. Epub 2023 Apr 21. PMID: 37088624
- Magerman C, Boros E, Preziosi M, Lhoir S, Gilis N, De Witte O, Heinrichs C, Salmon I, Fricx C, Vermeulen F, Lebrun L, Brachet C, Rodesch M. Childhood craniopharyngioma: a retrospective study of children followed in Hôpital Universitaire de Bruxelles. Front Endocrinol (Lausanne). 2024 Jun 19;15:1297132. doi: 10.3389/fendo.2024.1297132. PMID: 38962684; PMCID: PMC11220494.

Pediatric Anesthesia Unit

Purpose

The purpose of the Pediatric Anesthesia Unit is to ensure the safety and comfort of children undergoing medical procedures. This involves evaluating the child, adjusting treatments, and planning the safest anesthesia before the procedure. During the procedure, the team provides general and regional anesthesia, including lighter sedation for non-painful exams, while keeping the child unconscious, comfortable and well-monitored. Postoperatively, they oversee recovery, manage pain and nausea, and monitor vital functions. The team has specialized expertise in neonatal anesthesia, pediatric cardiac anesthesia, minimally invasive procedures, and caring for children with chronic, congenital, and syndromic conditions. They also handle special intravenous access needs, such as difficult IVs, central lines, and PICC lines for long-term medication administration.

Aim

- For this coming year we want to start several new research studies.
- First of all, the paediatric anesthesia team is participating in a international study, named Cricket, which aim to investigate the critical events related to tracheal intubation in children.
- As part of Dr. Valentina Bendinelli's doctoral studies, a clinical trial will be initiated to evaluate the performance of a new minimally invasive cardiac output monitoring system, based on the expiratory CO_2, in young patients.

Team and infrastructure

The pediatric anesthesia Unit is part of the anesthesia service of Hôpital Universitaire de Bruxelles, headed by Pr. Turgay TUNA. The pediatric anesthesia team, headed by Dr. Mario Giancursio, operates in the new operating theatre of the Hôpital Universitaire des Enfants Reine Fabiola working closely with nurses and surgeons. The team is composed by 1 PhD student and 13 pediatric anesthesiologists with different field of expertise as

Neonatal anesthesia, Cardiac Surgery anesthesia, Thoracic Surgery anesthesia, Visceral Surgery anesthesia, Neurosurgery anesthesia.

The team is completed with 3 anesthesia nurses.

Dr Mario Giancursio, Dr Françoise De Groote, Dr Françoise De Pooter, Iris Baltsavias, Dr Caroline Schollaert, Dr Mélanie Dumoulin, Dr Giulia Caruso, Dr Mariane Yanou, Dr Valentina Bendinelli, Anna Sarah Di Marzio, Hélène Touil, Lucelia Fernandes Ricciardi, Lucia Marullo, Irène Regeni, Chloé Gobin, Rita Sawaya, Pauline Tournut

Main projects

Education:

HUDERF serves as a training ground for anaesthesiologists in training. They receive guidance and supervision from experienced professionals, enhancing their skills in paediatric anesthesia.

Continuing Education:

The team responsible for simulation regularly organises scenario-based training sessions to better understand how to handle emergencies and critical situations that may occur in the operating room.

Weekly, the paediatric anesthesia team participates in the HUB anesthesia seminar.

Research:

The team participates in international studies on paediatric anesthesia aimed at analysing and improving the care of our young patients.

In the past year alone, two trainee anaesthesiologists completed their master's degrees in anesthesia and intensive care, each focusing on different studies. One investigated pulmonary physiology and mechanical ventilation, while the other explored the correlation between haematological disorders and morbidity and mortality following cardiac surgery.

Recent achievements

- In the past year alone, two trainee anaesthesiologists completed their master's degrees in anesthesia and intensive care, each focusing on different studies. One investigated pulmonary physiology and mechanical ventilation, while the other explored the correlation between haematological disorders and morbidity and mortality following cardiac surgery.

Facilities will bring New OpportUnities for Research

Pediatric research thrives when supported by a well-established network of laboratories, as seen within the Faculty of Medicine at ULB. This environment facilitates the use of diverse technological platforms to address key questions in pediatric physiology, pathophysiology, and pharmacology. With specialized expertise in neuroscience, immunology, vaccinology, screening, and fertility, these laboratories offer a comprehensive approach to advancing pediatric health. This collaborative setting not only fosters more effective translational research but also strengthens a pediatric research network, benefiting both the scientific commUnity and families with children

Laboratory of Pediatrics (ULB)

Purpose

The laboratory's activities focused on the mechanisms of inflammation in pediatric diseases and the studies of metabolic diseases and nutritional pediatric problematics.

Aim

- It studies the contribution of the TLR signaling pathways and the microRNAs to modulating the inflammatory process in pediatric diseases.
- The laboratory also intends to identify early inflammatory, cell adhesion and hemostatic plasmatic markers of endothelial dysfunction in children with SCD.
- The laboratory also develops new tests to improve the diagnosis and management of metabolic diseases.

Prof Mustapha Chamekh, Prof Nicolas Lefevre

Infrastructure

- Cell culture room
- RT-PCR - CFX96 Real-Time PCR System machine (ref.: LSG/KBG/21530)
- Three Tandem Mass Spectrometers: API 3200 with Shimadzu, API 4000 with Shimadzu and API 4000 with Agilent 1200 (SCIEX)
- Automatic fluorescence spectrometer: Autodelfia 123 (PERKIN ELMER)
- Genetic screening processor (PERKIN ELMER)

Main projects

- In vitro characterization of microRNAs potentially involved in the modulation of the inflammatory process of the endothelial cells in chorioamnionitis.
- In vivo study of the contribution of miRNAs in the alteration of the monocytic response in pediatric sepsis.
- Animal model for investigating the role of neutrophil microvesicle-derived microRNA-223 in the inflammatory response in pneumococcal pneumonia.
- Prospective multicentric international study of the sex differences in pediatric sepsis.
- cell adhesion and hemostatic plasmatic markers of endothelial dysfunction in children with SCD.

Recent achievements

- Better understanding of the genetic mechanisms responsible for sex differences in inflammatory diseases.
- Identification of x-linked microRNAs with potent regulatory effect on the inflammatory response in children with cystic fibrosis.
- First long-term prospective follow-up of biological and clinical markers of organ failure in children with sickle cell disease.

Selected publications

- Popotas A, Casimir GJ, Corazza F, Lefèvre N. Sex-related immUnity: could Toll-like receptors be the answer in acute inflammatory response? Front Immunol. 2024 May 21;15:1379754. doi: 10.3389/fimmu.2024.1379754.
- Deny M, Popotas A, Hanssens L, Lefèvre N, Arroba Nuñez LA, Ouafo GS, Corazza F, Casimir G, Chamekh M. Sex-biased expression of selected chromosome x-linked microRNAs with potent regulatory effect on the

inflammatory response in children with cystic fibrosis: A preliminary pilot investigation. Front Immunol. 2023 Apr 3;14:1114239.

- Deny M, Arroba Nuñez LA, Romano M, Denis O, Casimir G, Chamekh M. Sex difference in innate inflammatory response and macrophage polarization in Streptococcus agalactiae-induced pneumonia and potential role of microRNA-223-3p. Sci Rep. 2022 Oct 12;12(1):17126. doi: 10.1038/s41598-022-21587-5
- Deny M, Romano M, Denis O, Casimir G, Chamekh M. Progressive Control of Streptococcus agalactiae-Induced Innate Inflammatory Response Is Associated with Time Course Expression of MicroRNA-223 by Neutrophils. Infect Immun. 2020 Nov 16;88(12):e00563-20. doi: 10.1128/IAI.00563-20. Print 2020 Nov 16.

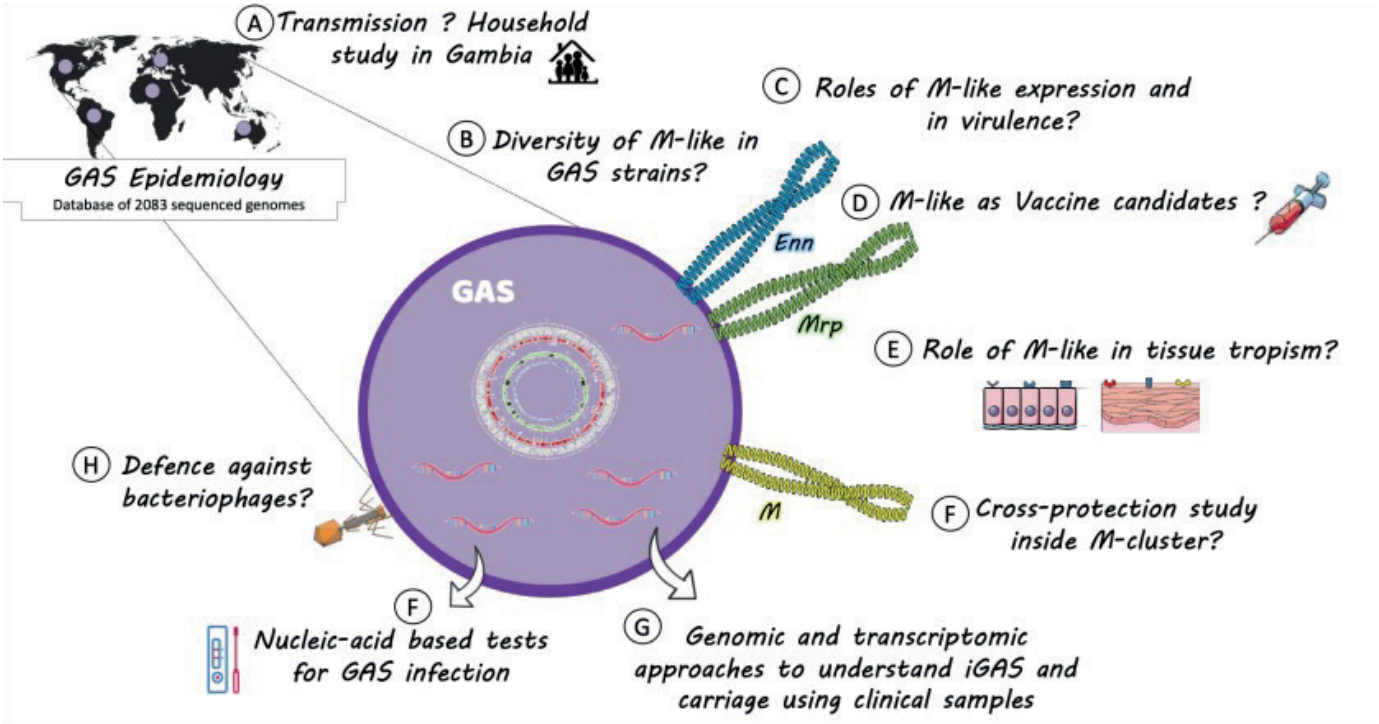
Plotkin: The Molecular Bacteriology Laboratory Pr Pierre Smeesters and Pr Anne Botteaux

Our laboratory is currently composed of 2 permanent research, six PhD students on basic science microbiology projects dealing with the role of surface proteins in Strep A virulence and as potential vaccine candidates, genomic and transcriptomic approaches to understand invasive infections as well as more applicated projects on OMA diagnostic tests and GAS carriage in children (Fig.1). They are helped by 2 full-time and one half-time technicians as well as 3 Master students and 3 bachelors students. Since October 2019, our team has been reinforced by a Post-doc (Lionel Schiavolin) who has been awarded a 3 years postdoctoral fellowship from FNRS (chargé de recherche FNRS) with a project entirely dedicated to Strep A bacteriophages and a Post-doc working on OMA diagnostic tests granted by the Wallinov program. The main objectives of research are (Figure 6):

1. To understand GAS transmission and tissue tropism (Fig.1A, B and E) by collection of samples (blood, NP/skin swabs, saliva) in a household study including 444 people (60 families) in Gambia (with Pr.T. DeSilva, MRC Gambia, FNRS PDR, 'Aspirant FNRS' fellowship).
2. To characterize role of M-like surface proteins, whose genes are found on the majority of GAS isolates, in virulence, tissue tropism, and as potential vaccine candidates (Fig.1B, C, D and E) (FNRS PDR and CDR

Prof Pierre Smeesters, Prof Anne Botteaux

3. To use the cluster system we have defined, to study cross-protection among strains from a same cluster and inform M-based vaccine candidate composition (Fig.1F) (with Pr J. Dale, University of Memphis, NIH Grant)
4. To understand the switch from superficial to invasive infection using a hyper-necrotic strain isolated from 2 clinical cases, using genomic and transcriptomic approaches (FNRS CDR and PDR, FRIA fellowhip)
5. To study genes expressed by GAS in situ using tonsils samples from Belgian children carrying GAS strains (IRIS research Grant)
6. To improve GAS (and others respiratory pathogens) rapid detection in clinical samples by nucleic acids isothermal amplification (Wallinov Grant and fellowship)
7. To understand GAS-phages interactions and their role in virulence (FNRS PDR, 'Chargé de recherche' FNRS fellowship



Main projects

- Welbio competitive funding for the development à a new vaccine against Streptococcus pyogenes.
- Project grant from FNRS and Win2Wal grant from Région Wallonne
- Key publications in top tier journal.

Selected publications

- Flamant A., Demirjian A., Lamagni T., Toubiana J., Smeesters P.R. and Cohen J. Invasive group A streptococcal infections: Lessons learned from the 2022-2023 upsurge. Lancet Infectious Disease. In press
- Keeley A.J., Camara F.E., Armitage E., de Crombrugghe G., Sillah J., Fofana M.L .,Rollinson V., Senghore E., Jammeh M., Whitcombe A.L., Bittaye A., Ceesay H., Ceesay I., Samateh B., Manneh M., Carducci M., Rovetini L., Boero E., Massai L., Sanyang C., Camara O., Cessay E., Iturriza M., Moriel Gomes D., Kucharski A., Smeesters P.R., Botteaux A., Jankey Jayne Y., Moreland N.J., Clarke E., Kampmann B., Marks M., Rossi O, Salje H., Turner C.E. and de Silva T.E. Early life serological profiles and the development of natural protective humoral immunity to Streptococcus pyogenes in a high burden setting. Nature Medicine. In press
- de Crombrugghe G., Schiavolin L., Osowicki J., Steer A.C., Botteaux A., Smeesters P.R. M1 and done? Global Assessment of the Invasive Potential of Group A Streptococcal Strains. Lancet Microbe. In press
- Osowicki J, Frost HRC, Azzopardi KI, McGregor R, Whitcombe AL, Carlton L.H., Baker C, Fabri F, Pandey P, Good MF, Walker MJ, Smeesters P.R., Licciardi PV, Moreland N, Hill D, Steer AC. Experimental human Streptococcus pyogenes pharyngitis elicits diverse systemic and mucosal antibody responses to key vaccine antigens. Nature Communications (2024) Dec 3 ;15(1):10506.
- Armitage E, de Crombrugghe G, Keeley AJ, Senghore E, Camara F, Jammeh M, Bittaye A, Ceesay H, Ceesay I, Samateh B, Manneh M, Kampmann B, Turner CE, Smeesters P.R., Botteaux A, Kucharski A, de Silva TI and Marks M on behalf of the MRCG StrepA Study Group. Streptococcus pyogenes carriage, infection epidemiology and risk factors for acquisition within households in The Gambia: a longitudinal cohort study. Lancet Microbe. (2024) Jul;5(7):579-688.
- Smeesters P.R., de Crombrugghe G, Tsoi S., Leclercq C., Baker C.,Osowicki J., Botteaux A., and Steer A.C. Global systematic review of group A streptococcal disease – worldwide vaccine priorities and tissue tropism. Lancet Microbe (2024) Feb;5(2):e181-e193.

Plotkin laboratory

Context and Genesis

The EPIV is the result of a collaboration between the Free University of Brussels (ULB) and the University of Antwerp, launched in May 2020 following the initiative of the Belgian federal government to enhance scientific and medical capabilities around vaccines against emerging and re-emerging viral diseases. An initial inauguration took place at the Academy Palace in Brussels on May 24, 2022, attended by Professor Stanley Plotkin — a prominent figure in vaccinology, notably for his key role in the fight against rubella — as well as other renowned scientific personalities.

Infrastructure and Platforms

State-of-the-art Building

In September 2023, a large 3,600 m² complex was inaugurated on the main HUB site in Anderlecht, equipped with modern laboratories designed for the safe handling of high-risk pathogens, with high-throughput testing capabilities and biobanks for viruses, bacteria, parasites, and human samples (blood, saliva, serum).

Vaccinopolis

EPIV collaborates with Vaccinopolis, a 6,000 m² clinical center featuring BSL 2/3 laboratories, outpatient clinical trial research Units (phases I-IV), and even quarantine zones for controlled infection studies, thereby strengthening international expertise in translational vaccinology.

Missions and Teams

Multidisciplinary Mission

The institute brings together five research teams covering immunology, bacteriology, virology, clinical microbiology, and vaccinology. Currently, more than fifty researchers are employed — with capacity increased to 80 — working closely on the prevention, analysis, and response to infectious diseases.

EPIV's objectives include:

- Thoroughly analyzing host-pathogen interactions;
- Identifying and evaluating new protection strategies (vaccines, phages, treatments);
- Studying immune responses induced by vaccination;
- Targeting the specific needs of vulnerable populations;
- Developing tools to anticipate pandemics.

Translational Research

EPIV incorporates a strong clinical component via the University Hospital of Brussels (HUB), ensuring that fundamental advances are rapidly translated into practical applications for patients.

A large 3,600 m² complex

Scientific Leadership

Education:

Professor Arnaud Marchant is the director of EPIV-ULB, recognized for his expertise in immunology and vaccinology. The institute also brings together several renowned specialists:

- Anne Botteaux (bacteriology),
- Pierre Smeesters (pediatrics, infectious diseases),
- Anne Op de Beeck (virology),
- Marie Hallin (clinical microbiology).

  Support from figures such as Jean Michel Hougardy (medical director of HUB) and scientific coordinators strengthens the institute's integration into the hospital and university network, fostering synergies between care, research, and education.

Networks & Partnerships

International

EPIV is integrated into several international networks, participating in initiatives such as the Belgian economic mission to Norway, with multiple partnerships strengthened internationally.

National

It operates in tandem with the University of Antwerp, sharing infrastructure, governance, and expertise, supported with €20 million from the Belgian state. It collaborates with all Belgian universities.

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Research Laboratory on Human reproduction (ULB) Isabelle de Meestere

Purpose

The laboratory's research activities focus on reproductive issues in cancer patients, with the primary objective of offering personalized, efficient, and safe fertility preservation procedures tailored to their individual contexts.

Aim

- To investigate the mechanisms leading to gonadotoxicity of standard /new cancer drugs
- To develop innovative and safe fertility preservation strategies such as pharmacoprotective approaches
- To investigate the impact of patient's characteristics such as age or gene mutations on reproductive outcomes

Infrastructure

- Cell culture rooms
- Real-Time PCR System machine
- CASA system for sperm analysis `
- Immunohistology (microtome, automatic tissue processor, digital pathology scanner, light and fluorescent microscopes)
- Spectrophotometer
- Biobank

Main translational projects

- Study of the mechanisms of chemotherapy-induced alterations of the human ovarian environment using multi-omics approach.
- Evaluate the impact of BRCA gene mutations on oocyte quality by assessing ageing process and DNA repair response to chemotherapy.
- Prospective multicentric trial evaluating the relevance of Anti-Mullerian Hormone (AMH) as biomarkers of chemotherapy-induced ovarian damage in a prepubertal population.
- Address the access to reproductive counselling in cancer survivors (including contraception and sexuality issues).

Recent achievements

- New insights into gonadotoxicity mechanisms
- First data on the impact of BRCA mutations on chemotherapy-induced ovarian damage risk .
- Reassuring data on the safety and efficiency of ovarian stimulation protocol for fertility preservation in breast cancer patients.

Prof Isabelle Demeestere & Research team

Selected publications

- Devos M, Diaz Vidal P, Bouziotis J, Anckaert E, Dolmans MM, Demeestere I. Impact of first chemotherapy exposure on follicle activation and survival in human cryopreserved ovarian tissue. Human Reproduction. 2023;38(3):408-420
- Lambertini M, Ceppi M, Anderson RA, Cameron DA, Bruzzone M, Franzoi MA, Massarotti C, El-Abed S, Wang Y, Lecocq C, Nuciforo P, Rolyance R, Pusztai L, Sohn J, Latocca MM, Arecco L, Pistilli B, Ruddy KJ, Ballestrero A, Del Mastro L, Peccatori FA, Partridge AH, Saura C, Untch M, Piccart M, Di Cosimo S, de Azambuja E, Demeestere I. Impact of Anti-HER2 Therapy Alone and With Weekly Paclitaxel on the Ovarian Reserve of Young Women With HER2-Positive Breast Cancer. J Natl Compr Canc Netw. 2023;21(1):33-41
- Demeestere I, Racape J, Dechene J, Dupuis J, Morschhauser F, De Wilde V, Lazarovici J, Ghesquieres H, Touati M, Sibon D, Alexis M, Gac AC, Moatti H, Virelizier E, Maisonneuve H, Pranger D, Houot R, Fornecker LM, Tempescul A, André M, Casasnovas RO. Gonadal Function Recovery in Patients With Advanced Hodgkin Lymphoma Treated With a PET-Adapted Regimen: Prospective Analysis of a Randomized Phase III Trial (AHL2011) Journal of Clinical Oncology (JCO) 2021; 39(29):3251-3260
- Grosbois J., Devos M., Demeestere I. Implications of non-physiological ovarian primordial follicle activation for fertility preservation. Endocrine Reviews. 2020 ;41(6);bnaa020.

Laboratory of Neurophysiology and Movement Biomechanics (LNMB)

Purpose

The LNMB team operates under a shared premise: movement is essential to understanding the human essence of sensorimotor, cognitive, emotional, and social communication processes. Oscillatory brain activity is a crucial underlying functional mechanism.

Aim

- To characterize movement and its orchestration from synchronized recordings of multimodal physiological non-invasive signals during movement in humans particularly in children.

Infrastructure

- Motion capture recording systems (VICON optoelectronic and Theia markerless system)
- Electroencephalography (high density)/ Evoked potentials
- Electromyography (wireless)
- Electroencephalography (high density)/ Evoked potentials
- Instrumentalized treadmill
- Virtual reality (immersive and semi-immersive)
- Transcranial direct current stimulation

Main projects

- Gait analysis in Typically developed and in Duchenne Muscular Dystrophy children and neuromuscular disorders
- Brain function on astronauts on board the International Space Station
- The role of alpha oscillations in the inhibition/ repression of linguistic stimuli: a study at the intersection of psychoanalysis and motor neuroscience
- Modulation of EEG activity induced by the control of respiratory muscles during phonation
- Brain oscillations underlying suggestion
- Neurosciences in Sports
- Median Nerve Stimulation During General Anesthesia

Selected publications

- Colot Martin, Simar Cédric, Cebolla Ana Maria, Bontempi Gianluca. Linear Non-Conservative Unsupervised Domain Adaptation for Cross-Subject Emg Gesture Recognition. January 2025. DOI: 10.2139/ssrn.5099691. (In revision, Biomedical Signal Processing and Control)
- Hashemi Saïd-Iraj, Cheron Guy, Demolin Didier, Cebolla Ana Maria: A New Perspective on the Modulation Brain Rhythms in controlled Muscle Dynamics during Phonation. (In revision, Scientific Reports)
- Vitkova V, Ristori D, Cheron G, Bazan A, Cebolla AM. Long-lasting negativity in the left motoric brain structures during word memory inhibition in the Think/ No-Think paradigm. Sci Rep. 2024 May 13;14(1):10907. doi: 10.1038/s41598-024-60378-y. PMID: 38740808; PMCID: PMC11091218
- Prigogine C, Ruiz JM, Cebolla AM, Deconinck N, Servais L, Gailly P, Dan B, Cheron G. Cerebellar dysfunction in the mdx mouse model of Duchenne muscular dystrophy: An electrophysiological and behavioural study. Eur J Neurosci. 2024 Nov;60(10):6470-6489. doi: 10.1111/ejn.16566. Epub 2024 Oct 16. PMID: 39415418.
- Valérie Marissens Cueva, Sébastien Rimbert, Ana Maria Cebolla Alvarez, Mathieu Petieau, Viktoriya Vitkova, Iraj Hashemi, Guy Cheron, Claude Meistelman, Philippe Guerci, Denis Schmartz, Seyed Javad Bidgoli, Laurent Bougrain, Fabien Lotte. Towards Riemannian EEG classifiers to detect awake and anesthetized states using median nerve stimulation. 9th International Graz Brain-Computer Interface Conference. 9/9/2024

Prof Ana Maria Cebolla Alvarez, Pr Nicolas Deconinck

Organisation of research

Since its creation, HUDERF,has always been an important actor in clinical and translational research. Over several decades, a few departments which are very active in their respective fields, have developed extensive expertise and specific skills in research activities, ranging from the design of ambitious scientific projects to proficiency in operational management.

In the context of its association with Institut Jules Bordet and Hôpital Erasme, and having identified the need for professional support in their set-up and conduct, HUDERF has integrated a new HUB centralised research infrastructure, but with its clear identification as a specific line of" mother and child research" and the reinforcement of a specific team supportign PIs in the launch and monitoring of their own studies.

The purpose of this organisation, which has now been in place for over 1 year, is to stimulate scientific creativity by providing efficient medical and scientific support to researchers and also to provide professional support to clinical research by centralising and harmonising administrative, operational, contractual, and financial management aspects.

The HUDERF's research organisation is now part of the H.U.B's overall research organisation, a network within which the scope and methods of collaboration have been further expanded. The administrative and operational support structures for research now form a single H.U.B Clinical Trials Centre (CTC). The teams responsible for conducting clinical trials in the field, following-up and monitoring the progress of patients participating in clinical studies remain part of a Clinical Trials Conduct Unit (CTCU) fully dedicated to pediatrics.

Governance

Successful research projects require strong collaboration between medical, scientific, and operational teams. HUDERF organises and conducts research by gathering scientific, medical, and operational skills and expertise from all departments.

Research activities are organised through two main structures, which work in close collaboration:

- A medical and scientific team, responsible for the development of new research projects and clinical trials, patient enrollment and follow-up, data collection and analysis, and publication of the results in collaboration with the statistical team
- An operational team supporting the set-up and conduct of research projects and clinical trials, compliance with all legal and regulatory obligations and ensuring administrative and financial follow-up.

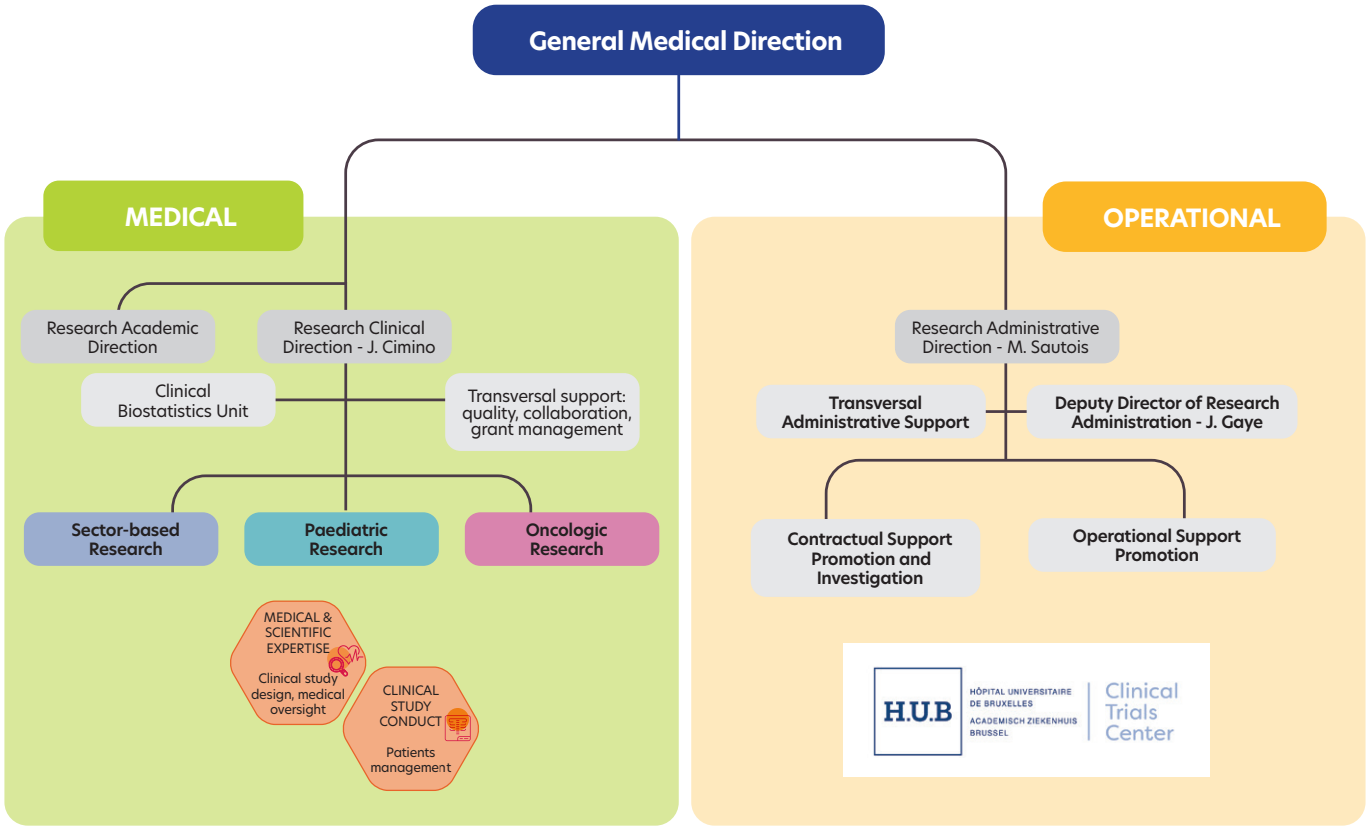
As part of its integration into the H.U.B, research at HUDERF is overseen by a **Research Steering Committee (RSC)** made up of key representatives from research at the three hospitals. The H.U.B RSC is composed of:

- The General Medical Director
- The Clinical Director of Research
- The Administrative Director of Research
- The Deputy Administrative Director of Research
- The Academic Director of Research
- The five Scientific Directors: Oncology, Paediatrics (Family Child), Neurosciences, MIAM, and Cardio-thoracic
- Five members, each from one of these 3 sectors (validated by the medical council)
- The permanent guests are:
- The Vice-Rector for Research (U.L.B.)
- The Vice-Dean for Research (U.L.B.)
- The Chairman of the H.U.B Ethics Committee
- The scientific representatives of the main support funds: Association Jules Bordet, Fonds Erasme, Kids Foundation

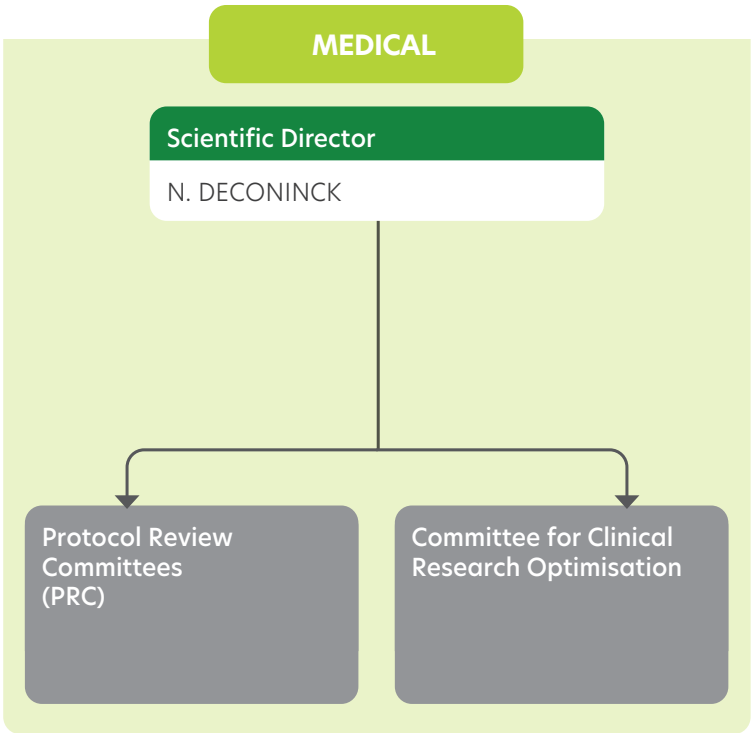
The Research Steering Committee is both a strategic and operational body with the power to take high-level decisions on all research activities.

HUDERF also has a governance body dedicated to family and child medicine, the Comprehensive Child Familiy Center Board. In practice, the Board delegates strategic and operantional research and receives regular operational reports on family and child research activities.

H.U.B Research Organigram



Paediatric Research



HUDERF participates in many clinical trials with external sponsors, both from the pharmaceutical industry and academia, but also runs its own academic trials, many of them being international interventional trials with investigational medicinal products.

With its dedicated structures, HUDERF can efficiently carry out the responsibilities of a clinical trial sponsor.

Working in close collaboration with the above, specific decision-making bodies ensure the good governance of research activities:

Project Review Committees

Beyond this executive board, which aim to optimise, stimulate, and streamline the procedures related to the assessment and set-up of paediatric research projects, some specific committees are in place:

- **Protocol Review Committees (PRC)**

  These committees aim to assess in an efficient and timely manner the clinical trial proposals coming from Huderf's medical departments and that involve external sponsors.

- **Committee for Clinical Research Optimisation**

  This committee aims to assess and provide strong scientific support to the research projects proposed by Huderf's study chairs. These projects, sponsored in-house, can be retrospective (RPC) or prospective (CPC) and may include human biological material.

- **Ethics Committee**

  HUB ethics committeee is an independent body whose role includes:

  - Prior to implementation, giving an opinion on all research projects for experimentation on humans, including interventional trials but also observational studies and retrospective research projects.
  - Monitoring and advising on ethical aspects of hospital care practices.
  - Assisting in decision-making on ethical aspects of individual cases.

Clinical Biostatistics Unit (CBU)

The Clinical Biostatistics Unit (CBU) is a multidisciplinary team that collaborates with all Departments and Research Units within the H.U.B. The CBU provides researchers and clinicians with essential expertise for designing and conducting studies, from formulating research questions to presenting and interpreting study results. This includes assistance with protocol development, preparing submissions for ethics committees, field implementation, data encoding and storage, and statistical analysis using software like R, SAS, or JMP. With years of experience, the CBU has supported numerous projects in the medical field, collaborating with researchers, clinicians, public health organizations, and pharmaceutical companies. The CBU works closely with medical teams, researchers, and other stakeholders in clinical research to support the design, analysis, and interpretation of data from clinical studies and research projects, ensuring reliable and actionable results. As a crucial driver of biostatistics support at the H.U.B., the CBU plays an essential role in advancing research objectives and strategies. Key tasks include:

- Collaborating with stakeholders to design and plan the methodological aspects of clinical studies, including the development of study protocols, selection of appropriate statistical methods, and determining sample size and randomisation techniques.
- Providing expert advice to clinicians and researchers on statistical considerations for clinical trials and research projects, especially regarding variables of interest.
- Validating the selection and format of data to be collected, as well as database design, and overseeing complex statistical analyses to extract meaningful results from clinical data.
- Ensuring the quality, reliability, and interpretability of statistical results by managing missing, aberrant, and usable data.
- Safeguarding the integrity of data, ensuring compliance with security and confidentiality standards.
- Actively contributing to the writing and revision of scientific articles, particularly by validating statistical analyses and the interpretation of results.
- Assisting with the preparation of reports for ethics committees, regulatory bodies, and funding applications.
- Developing research programs within the Unit and supervising researchers, including doctoral students and postdoctoral fellows.
- Offering continuing education in biostatistics and data analysis to H.U.B. researchers through training and teaching initiatives.
- Promoting academic and industrial collaboration by delivering high-quality methodological and statistical services.
- Representing biostatistics research at the H.U.B. in consultation councils, advising various working or study groups.
- Contributing to the dissemination of research findings at conferences, seminars, and other scientific events.

Research Grant Management

The advancement of scientific paediatric research relies on participation in national, European, and international project calls. To improve the visibility of these opportUnities and available funding, streamline submission processes, and enhance the management of ongoing and future applications, Dr. David Bergemann, Grant Manager, has established a centralised system for reviewing funding requests for research projects. This initiative aims to support researchers throughout the submission process, maximizing their chances of success and ensuring effective follow-up. By harmonising the preparation of proposals, offering critical reviews, ensuring project eligibility, tracking ongoing research, and guaranteeing timely availability of necessary documents for applications and reports, this system has significantly improved the efficiency of research funding submissions.

From 2022 to 2024, HUDERF researchers have been awarded highly prestigious research grants provided by the organisations listed hereafter.

Funders Name

- Innoviris
- KCE
- Plan National Cancer
- Télévie (FNRS)

Research Support Units

Clinical Trials Conduct Unit

The Clinical Trials Conduct Unit (CTCU) is an entity dedicated to the management and coordination of clinical trials, specialised in pediatrics research. Over the past forty years, the foundations of this research Unit have evolved steadily to become the CTCU, which plays a central role in the advancement of treatments, facilitating access to the latest therapeutic innovations for pediatrics patients, ensuring their safety.

Mission and objectives

The main mission of the CTCU is to coordinate clinical trials, ensuring that they are conducted to the highest professional, ethical and scientific standards in compliance with European Directives, applicable regulations and Good Clinical Practice (GCP).

Team, infrastructure and expertise

The CTCU's team representing all pediatrics specialisations is made up of specialist physicians and investigators, Study Coordinators (nurses or research assistants), data managers, a Quality Manager and a management team with administrative support, all experts in ensuring that clinical trials are conducted with rigor and commitment.

Impact and contributions

The CTCU has made a significant contribution to improving treatment by participating in early- and late-stage clinical trials and international multicenter studies, and has helped to develop innovative new therapies that have changed patients' lives. Today, the CTCU continues to play a key role by collaborating with Bordet and Erasme within the H.U.B to standardise procedures. It plays a leading role in "Precision Medicine" trials, actively involved in academic vs industrial clinical trials and develops early academic proof-of-concept clinical trials sponsored by HUDERF.

Clinical Trials Centre

The H.U.B. **Clinical Trials Centre (CTC)** is a support service for commercial and academic clinical research conducted within the H.U.B. Its mission is to provide professional assistance to clinical research by centralising and harmonising the administrative, contractual, financial and operational management (e.g. data management, monitoring, regulatory affairs) of clinical trials.

The CTC can manage a clinical study from A to Z or can collaborate with partners on specific activities. CTC activities include:

Antoine Nortier, Angeline Fages, Bernard Wenderickx, Merry Van Puyvelde

PROJECT MANAGEMENT:
Operational coordination, communication.

LEGAL MANAGEMENT:
Legal expertise, financial management.

FINANCIAL MANAGEMENT:
Budget control&reporting.
Sites fees budgeting and negociations.

REGULATORY AFFAIRS:
EU submissions, regulatory compliance.

PHARMACOVIGILANCE:
Safety reporting, adverse events oversight.

SITE MONITORING:
Site initiation visits, on- and off-site visits.

DATA MANAGEMENT:
eCRF design, data quality control.

IT RESEARCH:
Development and maintenance of software, users support.

QUALITY ASSURANCE:
Ensures that clinical processes are conducted in accordance with Good Clinical Practice, guidelines and external partner's contracts in place.

The CTC assists researchers from academia and industry in the development and conduct of phase I, II, and III clinical trials:

- In early disease (neoadjuvant, adjuvant) and advanced disease).
- For all treatment and diagnostic modalities.

CTC Team

Research in network/collaboration

Le Réseau Mère-Enfant de la Francophonie (RMEF): share of good practices and research between French-speaking children's hospitals.

The Réseau Mère-Enfant de la Francophonie (RMEF) is an international non-profit organisation founded in 2003 at the initiative of the Sainte-Justine University Hospital in Montréal. This network brings together university hospitals, specialised hospital centres, research institutes and medical experts from the Francophonie. They are all committed to improving the health of mothers, children and adolescents in French-speaking countries.

The RMEF's mission is to encourage collaboration, the sharing of good practices and training between its members in order to boost the capacities of health professionals and improve care quality. It is structured around three main areas: skills development, collaborative research and support for hospital management. In implementing joint projects, training workshops, webinars and missions in the field, the network makes it possible to build bridges between the institutions and to adopt a collective response to the health challenges of mothers and children.

The Queen Fabiola Children's University Hospital (HUDERF, HUB) has been an active member of the RMEF for a number of years. The Erasmus Hospital also recently joined the network, thereby enabling obstetric gynaecology and fertility (HUB family-child pole) to be a part of this wonderful initiative. The HUDERF's participation is testimony to its desire to contribute to improving care and treatment for children at the international level and to share its expertise in such varied fields as paediatric surgery, cardiology and paediatric nephrology, rare children's diseases, neonatology, child psychiatry and, more recently, perinatal care.

Within the RMEF, the HUDERF participates in missions for the exchange of skills and multicentric research projects. In the field of research, the hospital plays a central coordinating role in organising a clinical research project centred on a study of the difference in the inflammatory reaction in cases of severe sepsis in children according to gender (Professor Casimir, Professor N. Lefevre). The hospital is also involved in mentoring programmes and hospital partnerships, thereby strengthening Belgium's role in international medical cooperation. Its medical and paramedical teams take part in training workshops, both face to face and virtual, in which they share their know-how with health professionals from other French-speaking countries (Quebec, France, Switzerland, Morocco, Lebanon, etc.). The HUB family-child pole is the driving force behind the organisation of training workshops and research in the area of perinatal care, during the first 100 days after childbirth, in cooperation with the Necker Hospital and Geneva.

Through its commitment within the RMEF, the HUDERF contributes actively to the network's mission of reducing inequalities of access to quality care for mothers and children in the Francophone area

Funding

30 Years of Pediatric Research with the Belgian Kids' Fund

Professor Georges Casimir, Secretary

The Belgian Kids' Fund (BKF), founded in 1996 within the Queen Fabiola University Children's Hospital (HUDERF), celebrates three decades of support for pediatric research. Born from the initiative of visionary physicians, the Fund enables young researchers to devote themselves to both fundamental and applied research, with one key goal: improving children's health.

A Human and Scientific Commitment

The BKF has supported 113 fellows and contributed to the completion of nearly 80 doctoral theses. Key figures such as Professors Henri Vis, André Kahn, Georges Casimir, and philanthropic leaders like Elisabeth Strauss-Freidberg have shaped its development. The Fund operates thanks to the broad mobilization of volunteers and loyal donors, who have made possible major charitable and scientific events.

Innovative Research

The projects funded have covered a wide range of fields: genetics, oncology, cardiology, infectious diseases. Notable examples include:

- Pierre Smeesters: research on beta-hemolytic streptococcus (a bacterium responsible for severe illnesses).
- Aline Vuckovic: in utero interventions to treat diaphragmatic hernia.
- Denis Chamberlain: complications related to sickle cell disease.
- Lavinia Postolache: ocular disorders in children with Down syndrome.
- Nicolas Arribard: congenital heart defects in newborns.

Genetics, a Cornerstone of Modern Pediatrics

With the support of the BKF, cutting-edge genetic projects have been conducted, especially in epilepsy and rare diseases such as spinal muscular atrophy. The objective: to anticipate disease, personalize treatments, and integrate families into the care pathway.

Prof Georges Casimir

The Challenges of Pediatric Research

In Belgium, pediatric research suffers from underfunding by public institutions. The BKF plays a vital role in filling this gap, particularly for projects led by young researchers. Nevertheless, a call is being made for increased structural support through dedicated public funding and stronger international cooperation.

A Launchpad for Many Careers

Testimonials from former fellows (Simon Baijot, Alexandros Popotas, Nicolas Arribard) illustrate the pivotal impact of the BKF on their professional paths, enabling them to combine research, clinical work, and teaching in the service of children.

Looking Ahead: Artificial Intelligence and Integrated Pediatrics

The Fund is exploring new frontiers, particularly artificial intelligence (AI) applied to pediatrics, offering promising advances in early diagnosis, personalized treatments, and big data management. The integration of HUDERF into the university hospital network (HUB) also fosters unprecedented interdisciplinary synergies.

National and international collaborations

National Collaborations

Scientific Societies & Associations

- Association Belge de Lutte contre la Mucoviscidose
- Belgian Association of Pediatric Allergists (BAPALL)
- Belgian Cancer Registry (BCR)
- Belgian Respiratory Society (BeRS)
- Belgian Society of Medical Oncology (BSMO)
- Belgian Society of Paediatric Haematology Oncology (BSPHO)
- Belgian Society of Pediatric Hospital Oncology
- BioCINBIOS
- BSA (Belgian Strabismological Association)
- Metabolics.be (Belgian Society for Metabolic Diseases)
- Sciensano
- Société Belge de Cardiologie Pédiatrique (SBCP)
- Société Belge de Chirurgie Pédiatrique (SBCP)
- Société Belge de Gastroentérologie Pédiatrique (SBGP)
- Société Belge de Gynécologie et Obstétrique (SBGO)
- Société Belge de Néonatologie (SBN)
- Société Belge de Neurologie Pédiatrique (SBPN)
- Société Belge de Soins Intensifs Pédiatriques (SBSIP)

Hospitals, Universities & Research Institutes

- CHIREC Hospitals
- Cliniques Universitaires Saint-Luc
- David Communi, IRIBHM, ULB
- Erasme Hospital
- GZA Hospitals Sint-Augustinus
- Hôpital Civil de Charleroi
- Hôpital Militaire Reine Astrid
- Hôpital Saint-Pierre (Brussels)
- Hôpital Tivoli
- IBsquare
- iTeos Therapeutics
- IRIBHM (ULB)
- Institut d'Immunologie Médicale, ULB
- KU Leuven
- Molecular Bacteriology, ULB
- UCLouvain
- ULB
- University of Antwerp
- University of Ghent
- University of Liège
- University of Mons
- UZ Brussel
- VUB

Pan-European Organizations Based in Belgium

- EORTC (European Organisation for Research and Treatment of Cancer)

European Collaborations

European level :

- AEPC (Association for European Paediatric Cardiology)
- BELSPEED (Belux Society for Pediatric Endocrinology and Diabetology)
- CERTAIN (Cooperative European Paediatric Renal Transplant Initiative)
- Conect4Children (C4C)
- E-IMD (European Network for Inherited Metabolic Disorders)
- EACD (European Academy of Childhood Disability)
- EAACI (European Academy of Allergy and Clinical Immunology)
- EAPM (European Association of Perinatal Medicine)
- EAPO (European Academy of Paediatric Otorhinolaryngology)
- ECFS (European Cystic Fibrosis Society)
- EGGT (European Galactosemia Network)
- EHOD (European Network on Homocystinuria)
- ENDO-ERN (European Reference Network on Endocrine Conditions, in collaboration with Erasme Hospital)
- ENNA (European Neonatal Nurses Association)
- EPNS (European Paediatric Neurology Society)
- EPTRI (European Paediatric Translational Research Infrastructure)
- ESPNIC (European Society of Paediatric and Neonatal Intensive Care)
- ESPGHAN (European Society for Paediatric Gastroenterology, Hepatology and Nutrition)
- ESPR (European Society for Paediatric Research)
- ESPO (European Society of Paediatric Otorhinolaryngology)
- ESPS (European Society of Paediatric Surgery)
- ESGO (European Society of Gynaecological Oncology)
- ESOG (European Society of Obstetrics and Gynaecology)
- EUPSA (European Paediatric Surgeons' Association)
- GalNet (European Galactosaemia Network)
- Metab-ERN (European Reference Network for Hereditary Metabolic Disorders, in collaboration with UZ Brussel)
- SFNP (Société Française de Neurologie Pédiatrique – Francophone European Network)
- World Muscle Society (WMS)

International Collaborations Grouped by Country

Australia

- Andrew Steer, Centre for International Child Health, University of Melbourne
- Mark Davies, Centre for International Child Health, University of Melbourne
- Michael Good, Glycomics Institute, Griffith University, Gold Coast

France

- Bicêtre Hospital (Paris)
- CHU de Montpellier – La Colombière
- CHU Lyon (Laboratory, Bron)
- EuroBloodNet
- Hôpital Femme Mère Enfant (Hospices Civils de Lyon)
- Hôpital Jeanne de Flandre (Lille)
- Hôpital Necker des Enfants Malades
- Hôpital Robert Debré
- Hôpital Sainte-Anne, GHU Paris Psychiatrie et Neurosciences
- Institut Curie
- Institut Gustave Roussy
- Rennes University Hospital (CHU Rennes)

Italy

- Bambino Gesù Children's Hospital, Rome
- Università degli Studi di Roma Tor Vergata

Luxembourg

- Centre Hospitalier de Luxembourg (CHL)

Netherlands

- Erasmus MC – Sophia Children's Hospital
- Leiden University Medical Center
- UMC Groningen

New Zealand

- University of Auckland

Spain

- Sant Joan de Déu Children's Hospital, Barcelona

United Kingdom

- Claire Turner, University of Sheffield
- Great Ormond Street Hospital (GOSH), London
- John Walton Muscular Dystrophy Research Centre, Newcastle
- Michael Marks, Imperial College London
- Tushan De Silva, University of Sheffield

United States

- Gosh Partho, Department of Chemistry and Biochemistry, University of California
- Jim Dale, University of Tennessee, Memphis
- NIH (Prof. C. Bonneman), Washington D.C.
- University of Utah (Prof. Russell Butterfield)

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