# BORDEAUX POPULATION HEALTH | Research Center - U1219

# YEAR BOOK 2022

BORDEAUX POPULATION HEALTH | Research Center - U1219

RÉPUBLIQUE FRANÇAISE
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La science pour la santé
From science to health

université de BORDEAUX

# CONTENTS

Created in January 2016, under the direction of Prof. Christophe Tzourio, the Bordeaux Population Health Research Centre is a Mixed Research Unit (UMR) affiliated to the National Institute of Health and Medical Research INSERM and the University of Bordeaux. The Centre and its teams are evaluated for renewal every five to six years on the basis of the quality of their activity and the relevance of their scientific projects.

Since January 2022, the centre is directed by Prof. Stéphanie Debette.

# FROM THE DIRECTION

## Stéphanie Debette

Director, Bordeaux
Population Health research center, 2022-2027

Stéphanie Debette, MD PhD, is Professor of Epidemiology at University of Bordeaux and practicing Neurologist at Bordeaux University Hospital. She serves as current director of the BPH. Prof. Debette has been coordinating large genomic and epidemiological studies on stroke, cognitive traits, and imaging markers of brain aging, especially cerebral small vessel disease, aiming to decipher underlying molecular mechanisms and to improve prevention and treatment of stroke and dementia. Prof. Debette leads an ERC grant, is PI of a national investment for the future grant (RHU-SHIVA) and has been coordinating the EU-JPND BRIDGET initiative. She received the Claude Pompidou Foundation prize for dementia research, and the scientific excellence award of the European Stroke Organization. A former Fulbright and Bettencourt-Schueller fellow and adjunct associate professor at Boston University, she was a visiting professor at Kyoto University. She serves in the research steering committee of the Cohorts for Heart and Aging Research in Genomic Epidemiology (CHARGE) consortium and chaired the International Stroke Genetics Consortium (ISGC, 2017-2019). As former vice-president for external relations at the University of Bordeaux (2018-21) she led a H2020 program to establish a joint research and innovation agenda for the ENLIGHT European University Alliance.

It is a great pleasure to introduce the second Yearbook of the Bordeaux Population Health research center (BPH). Besides a presentation of the research teams and 2022 research highlights, the following pages also include a few facts and figures describing the center and its environment.

Co-hosted by the University of Bordeaux and INSERM, the BPH brings together approximately 500 staff members with a common goal: to explore and address major public health challenges and priorities with a multidisciplinary perspective and robust methodological approaches. Our mission is to generate high-quality scientific evidence to better understand disease mechanisms, prevent disease occurrence in the population and provide optimal care to patients.

The center comprises 10 research teams, as well as a scientific coordination across teams covering (i) brain health across the lifecourse, (ii) data science (AI, omics, longitudinal data, real world health data research), (iii) infectious diseases and preparedness, (iv) aging and resilience, and (v) environmental and social determinants of health, with research objects ranging from observational studies to interventions.

I would like to seize the opportunity of these introductory words to extend my thanks to all BPH researchers and staff members for their outstanding commitment and achievements throughout 2022. I am most grateful to my colleagues from the BPH steering committee, Dr. Carole Dufouil, Dr. Hélène Jacqmin-Gadda, Dr. Olivier Marcy, Prof. Antoine Pariente, and Dr. David-Alexandre Tregouët, for their very helpful and constructive advice and support. Many thanks also to all team directors and deputy directors (presented in this document) for their dedication and much appreciated investment for the BPH community.

While gradually resuming "pre-pandemic" on site working habit, we have also been confronted with new challenges and opportunities related to hybrid set ups and working jointly on optimizing these. This year has also been marked by major investments of the BPH community in applying to large scale funding opportunities, which, if selected, could have a long-lasting transformative impact on public health research at the university of Bordeaux. These programs, referred to in the yearbook, also involve tight partnerships across disciplines

within the university of Bordeaux, Bordeaux University Hospital, and at the regional, national international, and intersectoral level. Results are awaited.

Last but not least, I would also like to thank the BPH administrative team, directed by Isabelle Bely, whose daily support and efficient work are much appreciated. The increasing success in large scale funding (annual income from grant applications of 17 M euros in 2022 vs 10 M on average over the past 5 years) also leads to rapidly increasing needs in financial and human resources management, and we are extremely grateful to Christine Lopes-Monteiro and Ludivine Christophe for their continued support.

Special thanks to Valérie Garcia for her help in preparing this second edition of the BPH yearbook and to Nicolas Koskas who has supported Valérie Garcia and the BPH in revamping its website, please learn more about us at https://www.bordeaux-population-health.center/!


General Meeting - December 2022

# ORGANIZATION

Director: Prof. Stéphanie Debette
Secretary General: Isabelle Bely

**The BPH brings together over 482 staff members with a common goal: to explore and address major public health challenges and priorities with a multidisciplinary perspective and robust methodological approaches. As one of the largest public health research centers in France, the BPH is internationally recognized for its cutting-edge research, the unique, deeply phenotyped cohorts it has created and followed for up to 30 years, the seamless collaboration between data scientists, epidemiologists and clinicians, its leadership role in international consortia, and strong partnerships with the Global South.**

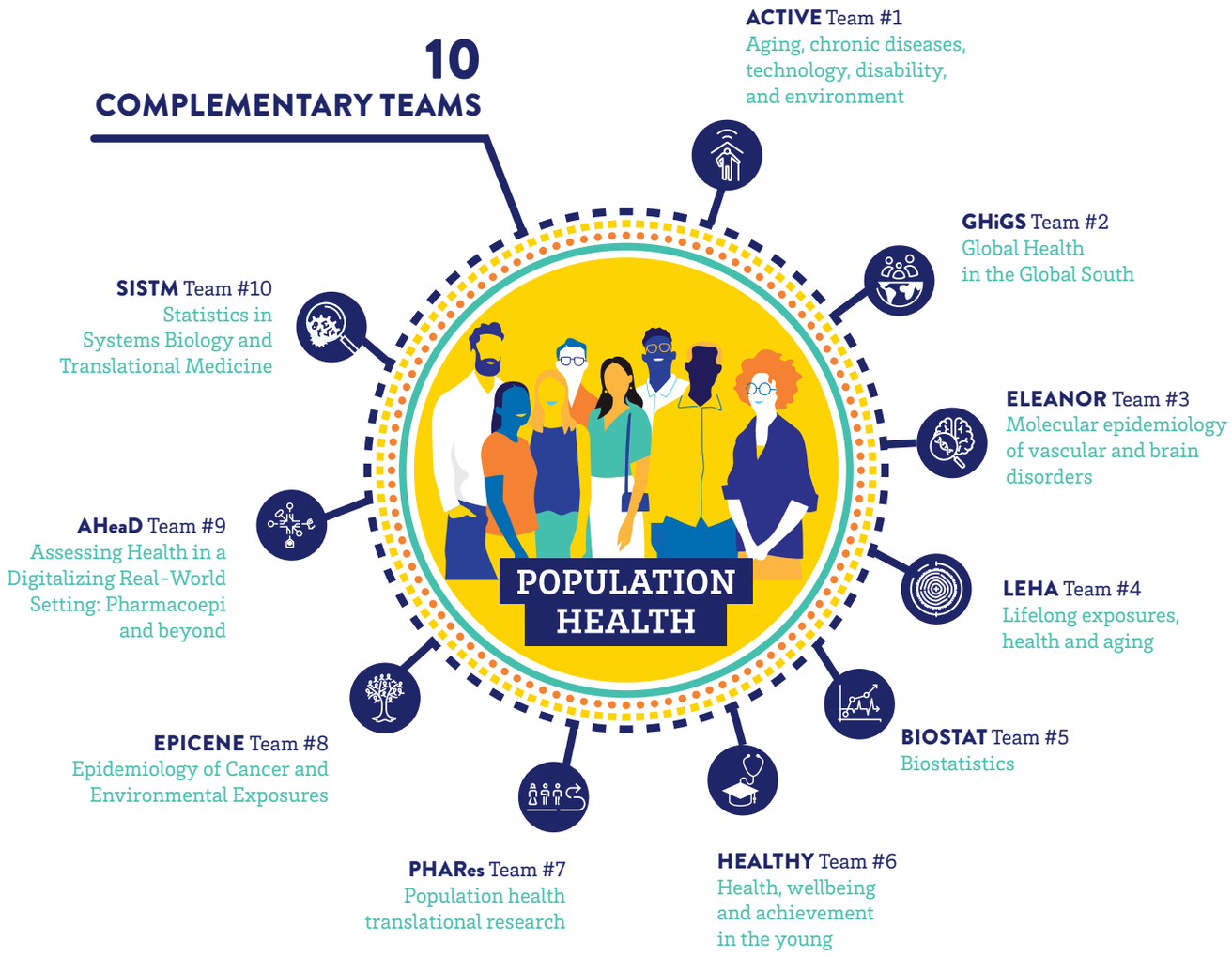
## Mission and research organization

The BPH is devoted to producing innovative research based on robust methodology to address a wide range of public health challenges. The Center is composed of 10 complementary research teams gathering basic and clinician scientists, healthcare professionals, technicians and engineers, post-doctoral fellows, PhD and undergraduate students who work together towards a common goal.

## DOMAINS OF RESEARCH

### Areas of research and teams

The 10 BPH research teams cover a wide array of research domains. "Historical" topics covered since inception include biostatistics, neuroepidemiology, epidemiology of infectious diseases, cancer, aging, nutrition, and trauma prevention. Subsequently this focus was broadened to encompass public health data science with artificial intelligence dimensions, real world data in pharmacoepidemiology and beyond, genetic and molecular epidemiology, global health including for non-communicable diseases, social determinants of health, health economics, and methodological research in prevention.



## Scientific coordination across research teams

BPH research organization is also based on major cross-sectional research themes with the aim of :

- Increase international visibility of the center's areas of excellence
- Create opportunities for collaboration across its 10 teams
- Prioritize themes linked with Horizon Europe topics
- Organize weekly seminars around these cross-sectional themes
- Support early career researchers

This scientific coordination across research teams is under the overall coordination of Dr. Hélène Jacqmin-Gadda, scientific director of Biostatistics team. She oversees the organization of cross-disciplinary scientific seminars around the 5 strategic themes representing the major focus of BPH research. These themes are also aligned with Horizon Europe's strategic themes and aim to contribute to the United Nations' sustainable


### 5 Major cross-sectional research themes

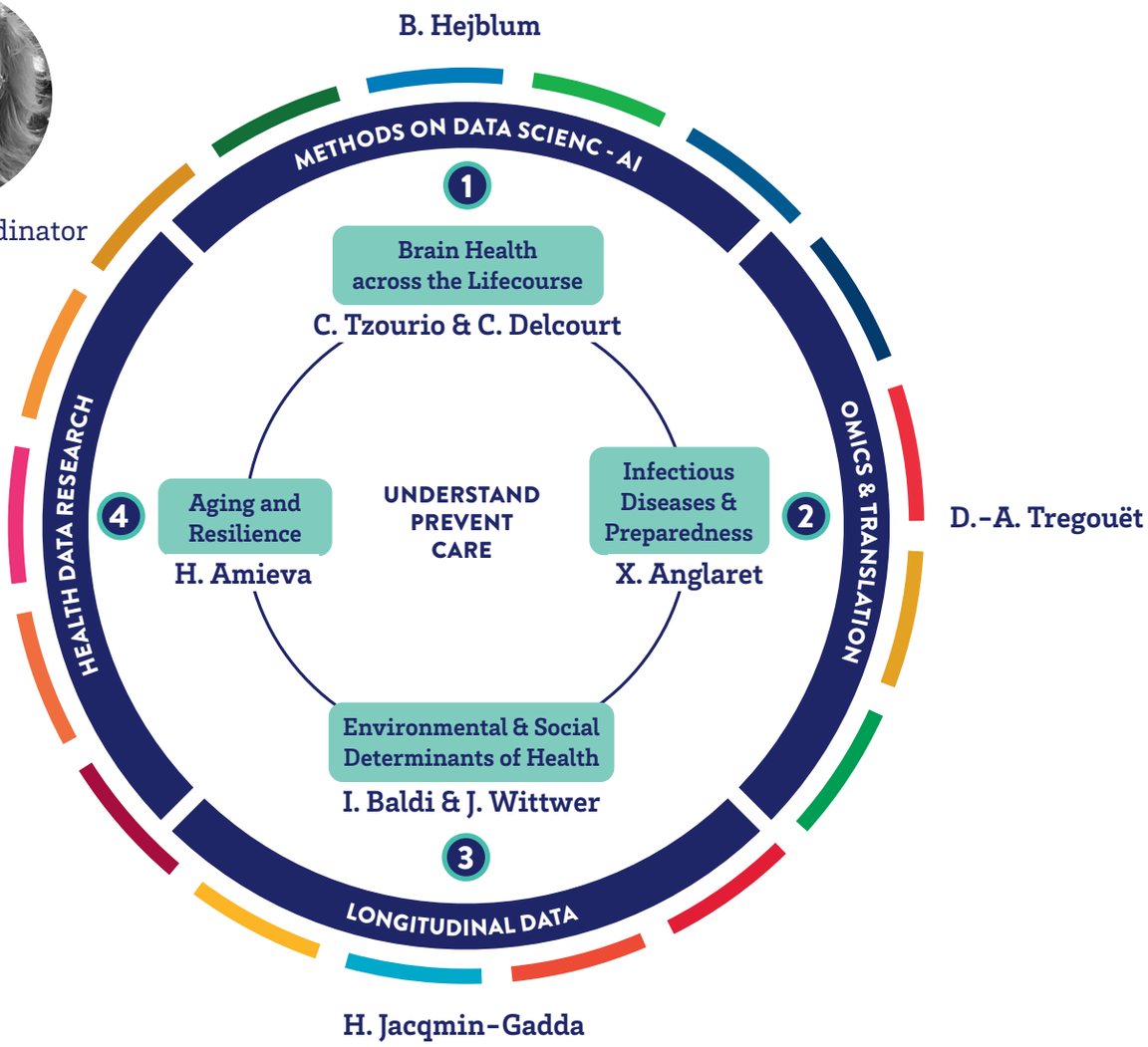
1. Brain Health across the Lifecourse, co-led by Christophe Tzourio & Cécile Delcourt
2. Infectious Diseases and Preparedness, led by Xavier Anglaret
3. Environmental & Ssocial Determinants of Health, co-led by Isabelle Baldi & Jérôme Wittwer
4. Ageing and Resilience, led by Hélène Amieva

### 5 1 data science cross-cutting theme with 4 sub-themes:

- Methods on data science - AI, led by **Boris Hejblum**
- Omics & translation, led by **David-Alexandre Tregouët**
- Longitudinal data, led by **Hélène Jacqmin-Gadda**
- Health data research, led by **Antoine Pariente**

**H. Jacqmin-Gadda**

Overall coordinator



# 2022 KEY FIGURES

## GRANTS AND FUNDINGS

**140**
Contracts including...

**123**
National public grants

**7**
European grants

**3**
International grants (outside Europe)

**7**
Grants from foundations and charities or private entities (ARC, FRM, etc...)

## STAFF MEMBERS

**482**
staff including...

**102**
Researcher or teacher clinician researchers

**32**
Hospital practitioners

**35**
Permanent supporting staff (study & research engineers, technicians & administrative staff)

**182**
Non-permanent supporting staff

**111**
PhD students

**20**
Post-docs

## BIBLIOMETRIC INDICATORS


**641**
scientific papers

**10,03 %**
publications

**50,75 %**
publications in Q1 journals

**9** BPH teams in the TOP 11 of the most cited papers in the 1st quartile journals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# KEY FIGURE for past period (2016-2021)


**2958**
scientific papers

**21 %**
publications

**3,04 %**
normalised citation index for the 2013-19 period

**300**
others outcomes

**>120**
scientific books or monographs

**42**
software contributions

**13**
patents

**3**
start-ups

**>120**
general public communications

**24**
covid projects

**> 25**
Prizes and/or distinctions

**157**
National public grants which 102 in coordination

**9**
National invesment for the future initiative grants (PIA), among which 3 in coordination

**42**
Local grants (regional governement, among which 30 in coordination

**28**
European grants among which 7 in coordination

**36**
International grants (outside Europe), among which 15 in coordination

**68**
Grants from foundations and charities or private entities (ARC, FRM, etc...) among which 56 in coordination

Hdb DANSKA

# THE BPH WITHIN THE COMMUNITY

**The BPH is co-hosted by Inserm and the University of Bordeaux. Two BPH research teams have a third host institution, INRIA (SISTM team) and IRD (GHiGS team). The center is located within the University of Bordeaux campus, one of the largest university campuses in Europe, and specifically on the Carreire biomedical campus. The BPH is situated within walking distance from Bordeaux University Hospital, with which it entertains strong connections.**

## RESEARCH-BASED TEACHING

The University of Bordeaux was one of the first four universities in France to receive the Initiative of Excellence label from the Investments for the Future scheme (PIA). It is identified as a world-class cluster of excellence in higher education and scientific research.

### Public health teaching

We are located next to the teaching premises of the ISPED Bordeaux School of Public Health, directed by Prof. Simone-Mathoulin-Pelissier, also a researcher at the BPH. All ISPED teachers conduct their research in a BPH team and 51 researchers from the BPH teach at the ISPED on a regular basis. ISPED delivers training courses in areas such as epidemiology, biostatistics, health promotion, occupational and environmental health, global health, management of medical and medico-social organisations, public health data science, and medical informatics.

### Graduate programs and summer schools

BPH researchers developed an international research-based teaching offer supported by PIA3 funding (EUR), including the Digital Public Health Graduate Program (DPH) and an interdisciplinary graduate program to address current and future public health challenges in Africa (EUR@ AFRICA). Moreover, BPH researchers co-lead several international summer school programs (e.g. Neurepiomics) and methodological seminars (e.g. Melodem), and contribute to the ISPED summer school programs.

### Health sciences and medical curriculum

BPH researchers also make significant contributions to university curricula by teaching (research-based) courses in various disciplines: Health Sciences (Medical Science Faculty, Pharmaceutical Science Faculty) and Social Sciences (Psychology Faculty, Social sciences, Anthropology and Ethnology Faculty).


### UB2030-CAP Santé Numérique

In 2022, the new France 2030 project UB 2030 CAP Digital Health has been established with a large consortium including the University of Bordeaux, the CHU Bordeaux, private companies and national institutions specialized in digital and e-health. The ambition of this project coordinated by the BPH's SISTM team director is to offer innovative training courses in the field of digital health : "From research to teaching for the next generation of healthcare professionals

Bordeaux Universiy Hospital (CHUB) is one of the largest French University Hospitals in terms of activity, with a total capacity of 3,000 beds.

# CLINICAL RESEARCH

The link with the clinical sector of the University Hospital of Bordeaux (CHUB) is reinforced by the strong involvement of many BPH researchers as leaders in the main methodological and operational structures for clinical and epidemiological research.
Many clinicians (neurologists, psychiatrists, infectious disease specialists, oncologists, emergency medicine specialists, etc.) are also involved in BPH research projects, some of them as directors or deputy directors of the research teams.

## Hospital units led by BPH researchers

- Departments of Medical Informatics
- Occupational health unit for research organisations
- Hospital Unit for Innovation in Prevention (UHIP) at CHU Saint-André.

## Methodological structures

- CIC-EC (Centre for Clinical Investigations – Clinical Epidemiology)
- Population-based cancer registries
- Clinical trial units in various domains:
  - **EUCLID** (EUropean CLInical Trials Platform & Development) F-CRIN (French Clinical Research Infrastructure Network) platform for international trials
  - **USMR** (Methodological support unit for clinical and epidemiological research) for clinical research at Bordeaux University Hospital.
  - The **UMS 54 MART** Joint Service Unit (Inserm/University of Bordeaux) has taken over from the former CMG-EC (Centre de Méthodologie et de Gestion des Essais Cliniques Inserm/ANRS) for research into HIV and hepatitis.
  - **MEREVA** (Methodology and monitoring of clinical research on HIV and other infectious diseases in developing countries) for clinical research in low-income countries.

## Health Data Warehouse EDS@NOVA

Since 2020, a number of academic and medical researchers from the BPH's SISTM team have been involved in the creation of a Health Data Warehouse 'Entrepôt de Données de Santé EDS' at Bordeaux University Hospital, open to clinical epidemiology research. In 2022, the EDS@NOVA, which brings together partner establishments in the Nouvelle-Aquitaine region, has been submitted to the national call "Support for the creation of hospital health data warehouses" as part of France's strategy to accelerate digital health. This programme aims to strengthen regional cooperation and encourage the development of projects between partners.

# LARGE-SCALE RESEARCH PROJECTS AND PARTNERSHIPS

BPH researchers are leading several 2022 still active ambitious research projects funded by :

- the **French government's "Investissements d'avenir" program (PIA3)**, including BCube (Bordeaux Biobank Cohort for brain health) and RHU SHIVA ("Recherche Hospitalo-Universitaire en santé" on small cerebral vessel diseases)
- the **University of Bordeaux "initiative of Excellence' including the Large competitive Research Programs GPR** "Grands Programmes de Recherche", including IPORA (coordinator): Interdisciplinary Policy-Oriented Research on Africa, HOPE (WP lead): Understanding Human Well-being and Behavior for better Policies & Societies, Impulse program PHDS (coordinator): Public Health Data Science Bordeaux Network
- **European programs with a coordinationg role**, including Drug-Safe 2 (ANSM), risks of medical drugs-administrative databases, TB-speed (UNITAID), to increase TB diagnosis in children, NIH, International epidemiology Databases to Evaluate AIDS (IeDEA) in Western Africa

In 2022, BPH researchers have developed new ambitious research projects with a coordinating role.

## VBHI IHU Vascular Brain Health project

In 2022, the VBHI IHU project has emerged to set up a global vascular brain health coalition of excellence based on BPH research and teaching actors, large, deeply characterized and uniquely complementary cohorts, established national and international networks, strong implication in medical research, translational and clinical research, but also public-private partnerships enhancing innovation and transfer. The VBHI project based on this nexus of academic excellence and public-private partnership aims to develop a novel paradigm for precision prevention and therapeutic innovation to improve vascular brain health through prevention (research & translation) and maximize innovation and impact of our research and transposition to all levels of the healthcare system at national and international level.

Département de recherche Santé publique / université de BORDEAUX

Research at the University of Bordeaux is divided into 11 departments, each bringing together different research structures (joint research units, university teams, platforms, etc.). The department of Public Health, directed by Prof. Antoine Pariente, comprises the Bordeaux Population Health Research Centre with its 10 research teams, the Clinical Investigation Centre (CIC 14.01), and, since September 2022, the service unit MART (Methods and Applied Research for Trial).

## Launch of the B CUBE (Biobank and Brain health in Bordeaux)

B Cube is a new population-based study among young seniors for deep phenotyping of cerebral aging
https://cohorte-b-cube.fr/

© photo Claude Petit pour *Sud Ouest*

### IHU Vascular brain health institute project (VBHI) • Time line 2022 (next steps for 2023)

**2022 MAR**
building the project with partner organizations or establishments

**2022 NOV**
Letter of intent with scientific project associated to the organization and administrative/ budgetary modal

**2023 FEV**
Preselection and presentation of the project to the Ministerial Steering Committee (MSC) • France 2030

**2023 MAY**
Evaluation of the selected project by the General Secretariat for Investment (SGPI)

**2023**
Final decision of the Prime Minister

# RESEARCH

## RESEARCH TEAMS
## RESEARCH HIGHLIGHTS
## IN 2022

# BIOSTATISTICS

## Team

**BIOSTAT**

**MIXED RESEARCH TEAM**

Inserm université de BORDEAUX

### Dr. Hélène Jacqmin-Gadda

PhD, BIOSTAT Director

Hélène Jacqmin-Gadda obtained the "Habilitation à Diriger des Recherches" (HDR) in Biostatistics in 2002 at Bordeaux University (France). She is Director of Research at the French National Institute of Health and Medical Research (Inserm) and head of the Biostatistics team at the BPH since 2014. Her research focuses on statistical methods for the analysis of longitudinal data with complex observation schemes and especially, models for multivariate longitudinal data and joint models for longitudinal data and time-to-event, as well as evaluation of predictive abilities of these models. Her main motivation is the study of cognitive aging and dementia. Other fields of application are HIV and cancer. She has advised 23 master students and 10 PhD students. She has co-authored about 130 publications in peer-review journals and two books about biostatistical models in epidemiology published in 2015. She is currently associate editor of *Statistics in Medicine and the International Journal of Biostatistics* and she was associate editor of Biometrics from 2003 to 2014.

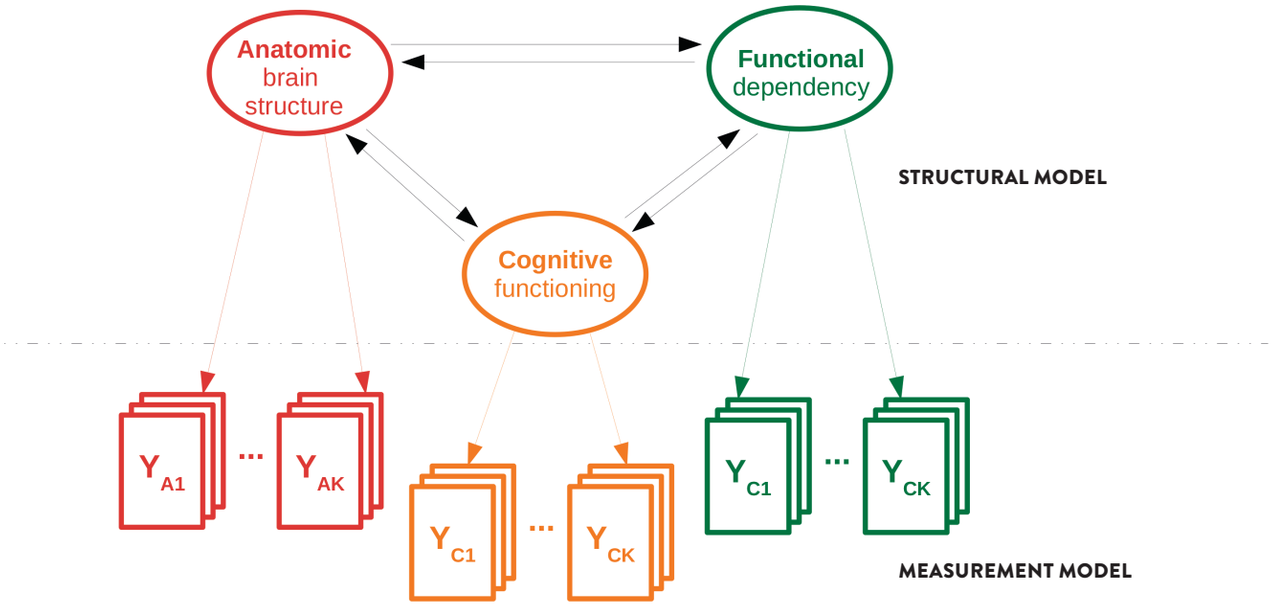
### Dr. Cécile Proust-Lima

PhD, BIOSTAT Deputy Director

Cécile Proust-Lima is a Director of Research in Biostatistics at the French National Institute of Health and Medical Research (Inserm).
Her research mainly focuses on the development of longitudinal statistical methodologies to describe, explain and predict chronic disease progression. She has specialized over the years in latent class and latent process models for the joint analysis of correlated longitudinal markers and event time history with applications notably in cerebral aging and neurodegenerative diseases (Alzheimer's Disease and related dementias, Multiple System Atrophy). The works of her group, made available through open-source software (e.g., R packages lcmm, DynForest), are intended to address Public Health research questions through close collaborations with epidemiologists and clinicians and the analysis of large epidemiological cohort studies.

**The main objective of the team is the development of statistical methods for time-dependent data coming from either observational cohort studies, clinical trials or casecontrol studies, with the aim of answering clinical and public health questions regarding chronic diseases: future burden, risk factors, individual prediction, underlying pathological mechanisms, and treatment effects.**

Over recent years the team has worked on two main topics: multivariate models for time-dependent data and model-based estimation of public health indicators. Our main domain of research focuses on the development of multivariate dynamic models for the analysis of censored time-to-events and/or repeated measures of longitudinal data accounting for complex observation schemes. These works are motivated by the study of the natural history of chronic diseases such as Alzheimer's disease or Multi-System Atrophy, the investigation of the impact of time-dependent exposures, or the validation of surrogate markers for clinical trials in cancer research. Parametric and semiparametric estimation procedures for frailty models for correlated time-to-events, clustered data and/or recurrent events as well as joint models for event times and longitudinal markers were implemented in the R-package Frailtypack. Another field of research is the extension of mixed models using latent classes and/ or latent processes for the analysis of multiple longitudinal outcomes with non-standard distributions in heterogeneous populations. We proposed the R-package LCMM, which enables the estimation of latent class mixed models, joint latent class mixed models and mixed models for curvilinear univariate or multivariate longitudinal outcomes. These models were motivated by the analysis of cognitive decline in cohort studies. They account for population heterogeneity and issues raised by the metrologic properties of measurement tools of cognition and autonomy (high correlation between markers measuring one or several underlying processes, ordinal data, non-standard asymmetric distributions with floor and/or ceiling effects and unequal sensitivity to changes). We also designed methods for the estimation of Illness-Death model accounting for interval-censoring (Package SmoothHazard). Tools for computing individual prediction and evaluating predictive abilities of these models were also developed. Relying on multi-state methodology, we propose several approaches to forecast the future burden of neurologic and cardio-vascular diseases and




assess the expected impact of intervention scenarios, targeting their modifiable risk factors. Depending on the complexity of the investigated scenarios, the indicators for the future burden of the disease are computed analytically or using micro-simulations.

Our current projects particularly focus on causal questions and big-data issues in the framework of dynamic models. On the one hand, causal questions are related to our research about the mechanism underlying pathological processes in chronic diseases, the evaluation of surrogate markers, the role of long-term exposure and the impact of social inequalities in health. We investigate the causal interpretation of the multivariate models we developed and we propose new methods for studying causality for censored time-to-events, repeated measures of time-dependent outcome and/or time-dependent risk factors. On the other hand, as technological progress helps collect large amounts of data (genetics, biology, imaging, IoT data), we develop new approaches that tackle high-dimensionality issues with respect to the number of time-dependent predictors, markers and outcomes.

## 2022 Key publications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# MOLECULAR EPIDEMIOLOGY OF VASCULAR AND BRAIN DISORDERS

## Team

ELEANOR

MIXED RESEARCH TEAM

Inserm université de BORDEAUX

### Dr. David-Alexandre Trégouët

PhD, ELEANOR director

Holder of a PhD in Public Health (1999), with strong emphasis on genetic epidemiology, his research career started with the development of statistical methods to analyze family data as well as genetic polymorphisms in the context of candidate association studies. He then turned to the development and application of statistical/bioinformatics tools for the analysis of high-throughput microarray and next generation sequencing data. In parallel to these methodological developments, he is participating in the design and the analysis of several epidemiological studies aiming at identifying molecular determinants of cardiovascular diseases, his specialty being venous thrombosis (VT). He is joint coordinator of the French EOVT, FARIVE, MARTHA, MARFAST and PILGRIM studies, and joint convener of the International Network of Venous Thrombosis (INVENT) consortium, aimed at identifying genetic factors for VT. Within the F-CRIN supported INNVOTE network that brings together all French clinicians working in the field of VTE, he supervises the re search programs on VT genomics. Over recent years, his interests have extended to molecular epidemiology integrating epigenetics marks, microRNA and proteomic profiling in order to develop a research program on precision medicine in thrombotic disorders.

### Pr. Stéphanie Debette

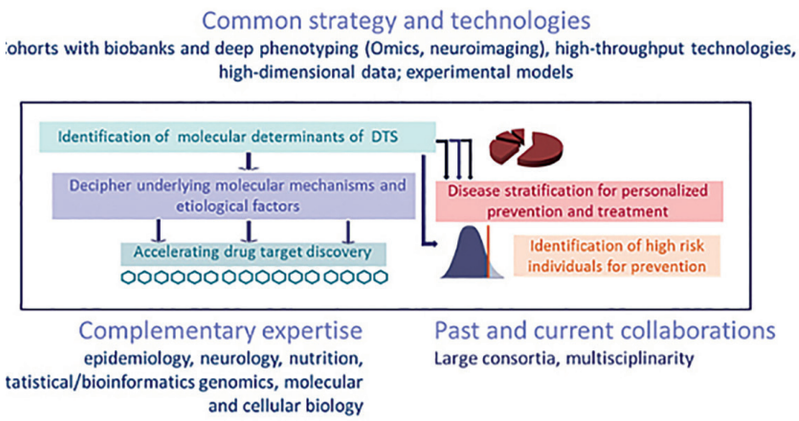
MD, PhD, BPH Director,
ELEANOR Deputy Director

**The purpose of our research is to identify groups of individuals who are at high risk of developing three common and tightly linked neurological and vascular conditions: (dementia, stroke and venous thrombosis), to discover novel etiological factors and therapeutic targets, and to propose more personalized preventive strategies through improved risk stratification.**

Our research program relies on major components:
1/ large-scale epidemiological and clinical cohorts coupled with biosamples;
2/ the deployment of cutting-edge high-throughput technologies for deep molecular phenotyping;
3/ the application of advanced statistical methodologies;
4/ a group of experts in molecular-clinical epidemiology and
5/ a widespread network of collaborators that enables us to contribute to the functional characterization of the identified biomarkers.
Our project is focusing on three inter-related clinical outcomes, cognitive impairment / dementia, stroke, and thrombosis and is organized around 4 themes:

**Molecular epidemiology of vascular brain aging, (PI: Stéphanie Debette)**
Using collaborative genome-wide association study meta-analyses and next generation sequencing data we are studying the genetic underpinnings of stroke and MRI-markers of covert cerebral small vessel disease (SVD). We have a growing interest in cross-ancestry studies, as these are crucial to enhance genomic discovery and make results more representative. Through the ERC SEGWAY we are taking a lifespan approach to explore early determinants of brain aging and the impact of genes predisposing to stroke, dementia and SVD on brain microstructure in young adults (i-Share cohort). In the RHU SHIVA project (national investment for the future funding), following up on efforts that we initiated in the EU-JPND BRIDGET program, we are now expanding our explorations to other omics approaches (epigenomics, transcriptomics, proteomics and metabolomics), focusing in particular on deciphering the molecular underpinnings of covert SVD and its contribution to stroke and dementia. Finally, we are engaged in leveraging these molecular epidemiology studies to accelerate drug discovery and improve risk prediction/stratification for targeted prevention. Our group is also involved in European therapeutic guideline coordination.

**INTEGRATIVE RESEARCH:**
**MOLECULAR EPIDEMIOLOGY OF DEMENTIA, STROKE AND VENOUS THROMBOSIS**




**Exposome of brain aging and dementia (PI: Cécilia Samieri)**
The network and dynamics of environmental factors leading to age-related brain diseases has yet to be elucidated, in order to identify the most impactful targets for prevention. This exposome research axis leverages molecular epidemiology, brain imaging and advanced statistical approaches deployed to population-based cohorts with biobanks in order to investigate: (1) the exposome of brain health at key ages, and (2) the underlying pathways and life-course dynamics. The general aims are to: refine assessment of already-known exposures (eg, diet biomarkers); explore novel exposures (eg, chemical mixtures); investigate beyond individual exposures (eg, microbiome interactions); and eventually model the global exposome network, to improve etiological modeling of age-related brain diseases. We will capitalize on existing data (e.g. the 3C cohort) and target younger populations, building a new population-based cohort of 2000 participants aged 55-80 years from the community living in Bordeaux metropole, the B cube (Biobank and Brain Health in Bordeaux) study.

**Precision Medicine for better prophylaxis & better knowledge on venous thrombosis (PI:David-Alexandre Trégouët)**
After spending several years to identify common genetic factors for venous thrombosis (VT) in the general population, we are now embarking into a more integrative analysis of various molecular determinants (genes; epigenetic marks, proteins,...) on specific subgroups of individuals at higher risk of VT including women under oral contraceptives, patients with a previous history of VT and patients with viral infections.
In parallel, building on our recent successes, we will continue our genetic investigations of rare forms of unexplained inherited VT through the application of whole exome/genome sequencing in familial cases.

**Integrative approach for vascular and brain disorders (all PIs)**
The deep characterization and understanding of the biology of a complex disease requires to integrate results/data from others diseases as they very often share common risk factors and pathophysiological mechanisms. By capitalizing on the existence of complementary and synergistic expertise and bioresources brought by ELEANOR's PIs in different but interrelated diseases, we are implementing an integrative research strategy to optimize the identification and the characterization of molecular determinants associated with some of the most common age-related diseases.

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# HEALTH, WELLBEING AND ACHIEVEMENT IN THE YOUNG

## HEALTHY

**MIXED RESEARCH TEAM**

Inserm université de BORDEAUX

### Pr. Cédric Galera

MD, PhD, HEALTHY Director

Cédric Galera is a pediatric psychiatrist and epidemiologist. He was resident in child psychiatry at the University of Bordeaux between 2000 and 2004. He did a research fellowship in Montreal (Canada) in 2003 and a clinical fellowship in Montevideo (Uruguay) in 2005. He is professor of Child and Adolescent Psychiatry at the University of Bordeaux and hospital practitioner at Charles Perrens hospital and at Bordeaux University Hospital. He has been a researcher at the BPH since 2008 and an associate researcher at the Research Unit on Children's Psychosocial Maladjustment (Cana da) since 2017.

### Pr. Christophe Tzourio

MD, PhD, HEALTHY Deputy Director

Christophe Tzourio is a neurologist and epidemiologist. He is the immediate past director of the BPH. Prof. Tzourio trained as a resident at the Paris Hospitals and Chief of Clinic in Neurology at the Lariboisière Hospital. He joined INSERM in 1994 as a Research Associate and was promoted to Research Director in 2000. In 2005, he became Director of a new INSERM U708 research unit at the Pitié-Salpêtrière Hospital in Paris. In 2013, he was appointed Professor of Epidemiology at the University of Bordeaux and hospital practitioner at the Bordeaux University Hospital. From 2013 until 2021 he was director of the Bordeaux Population Health research center, Inserm U1219, at the University of Bordeaux.

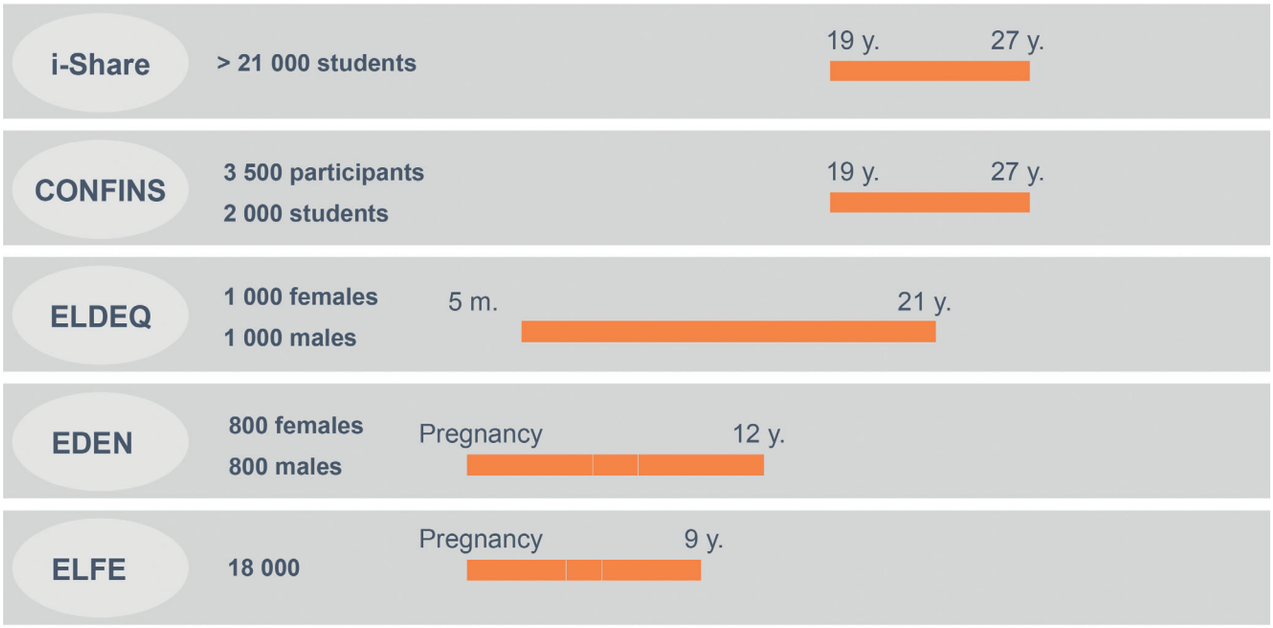
**The research focus of our team is to understand and prevent mental health problems in youths.**
**We aim to:**

1. **Investigate the risk and protective factors of Mental, Neurological and Substance use (MNS) problems in young people using a lifespan perspective**
2. **Test the efficacy of strategies to prevent Mental, Neurological and Substance use problems and build resilience to stressors in youths / parents**

Over the past five years, our team has provided relevant evidence on the early contribution of social environment and biological factors on youth mental health (cognition, externalizing behaviors, internalizing problems, ADHD and risk for suicide). Team members have studied the modulation of biological factors by the social environment in relation to externalizing problems and ADHD and the relative contributions of genes and environment on the developmental course of the ADHD phenotype and suicide risk, from the peri-conceptional period to adolescence. Team members have also found that cytokine patterns in the cord blood are associated with childhood anxiety/depression symptoms. Regarding interventions aiming at improving mental health, cognitive development and social outcomes, the team has shown the benefits of early non-parental care and evidenced the moderate efficacy of a multicomponent early intervention program on behavior, cognition and health, in an Irish sample. Team members have developed eHealth tools to be used for MNS in youths, particularly in students. These findings provide key elements to inform public policies and tailor our experimental interventions. Research of our team members takes advantages of various cohorts, including birth cohorts (ex: ELFE and ELDEQ) and young adult cohorts (iShare and CONFINS).

Our future research will rely on 3 axes:
**Axis 1** Mental health epidemiology in the youths: understanding the risk and protective factors underlying MNS problems (Cédric Galera)
The HEALTHY team is particularly interested in quantifying (1) the putatively protective role that psychosocial services play on the prevention of MNS problems; (2) the impact of MNS problems on individual functioning, including educational and professional achievement; and (3) the biological and social

**COHORTS USED TO INVESTIGATE MECHANISMS UNDERLYING MNS AND THEIR SEQUELAE**




mechanisms underlying specific mental health disorders and problems like ADHD, depression, suicidality, pathological low levels of self-esteem, etc.

**Axis 2** Exploring social and behavioral features of mental health in the youths (Ilaria Montagni, Christophe Tzourio)
This axis will aim at describing and analyzing health behaviors/lifestyle, health representations, and health literacy of young people, relying on sociological and communication approaches (Humanities and Social Sciences) and mixed-methods studies.

**Axis 3** Designing, testing and evaluating interventions preventing MNS problems and promoting mental health in the youths (Cédric Galera, Ilaria Montagni, Christophe Tzourio)
We will conduct (1) specific interventions focusing on a defined mental health problem or disorder (selective and indicated interventions); and (2) general-population interventions targeting health behaviours, e.g., health literacy, healthy lifestyles, life-skills training, psycho-education (universal interventions).

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# LIFELONG EXPOSURES, HEALTH AND AGING

## Team

**LEHA**

**MIXED RESEARCH TEAM**

Inserm université de BORDEAUX

### Dr Cécile Delcourt

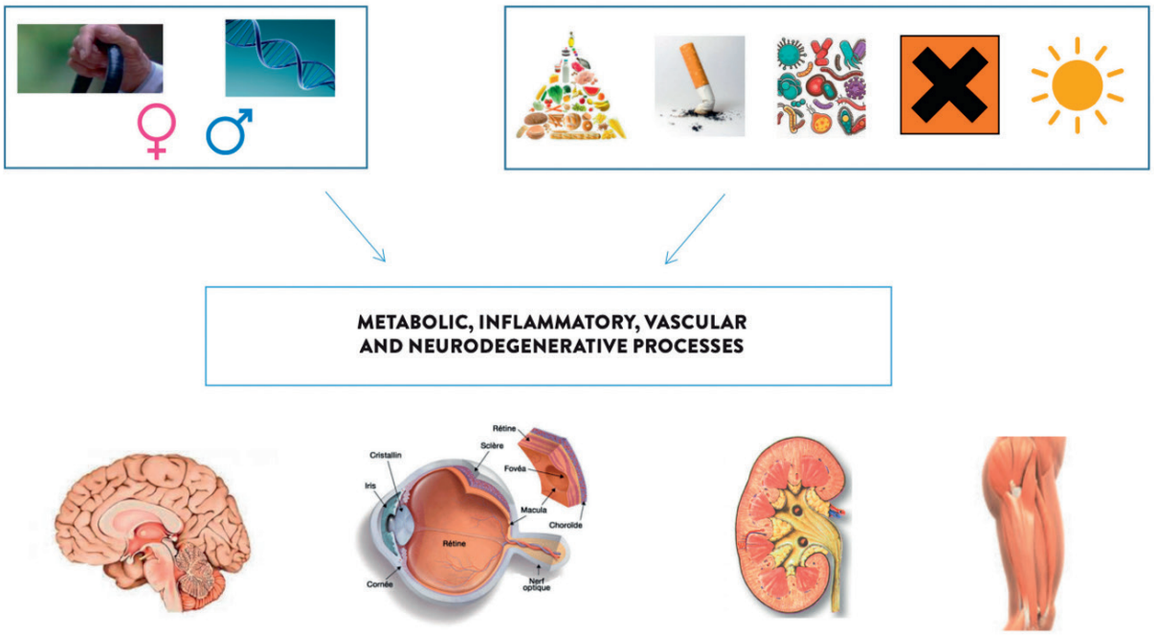
PhD, LEHA Director

Cécile Delcourt has a PhD in statistics and public health and is a senior researcher at Inserm U1219-Bordeaux Population Health Research Centre, where she leads the LEHA (Lifelong Exposures, Health and Aging) research group. She has a strong expertise in the epidemiology of eye diseases (in particular AMD, cataract and glaucoma). She is internationally renowned in the identification of risk factors for major eye diseases (in particular smoking, light exposure and nutrition). She has led two major population-based epidemiological studies in the field, since 1995 (POLA and Alienor studies). She has founded and led from 2011 to 2018 the "European Eye Epidemiology" consortium, gathering 32 teams from 12 European countries, and has been workpackage leader in two European projects (Eye-Risk and Sense-Cog), granted in the Horizon 2020 framework. She has published more than 200 scientific articles, with a Factor H of 41. She received the Achievement Award of the American Academy of Ophthalmology in 2019.

**The objective of team LEHA is to study age-related diseases, in particular those of the brain (dementia, Alzheimer's disease) and of the eye (age-related macular degeneration, glaucoma), using a lifelong approach and focusing on shared mechanisms and exposures, in order to define strategies for the prevention of age-related functional loss and the promotion of healthy aging**

We study populations of different ages (elderly, middle-aged, young) in prospective designs allowing for the study of slow long-term processes, using early biomarkers (in particular eye and brain imaging) allowing for the early detection of health related effects of exposures. As age-related diseases share common mechanisms and consequences and interact with each other, aging is considered as a global state promoting the occurrence of diseases. Models of aging are mainly neurological diseases (cognitive decline and dementia/ Alzheimer's) and eye diseases (mainly age-related macular degeneration (AMD) and glaucoma), but also extend to other health endpoints, such as diabetes, kidney disease or physical performance.
Our research is based on population-based cohorts that we have been conducting in elderly populations for more than 30 years: the PAQUID cohort (n=3777, followed since 1988) and the 3C Study (n=9294 including 2104 in Bordeaux, followed since 1999), and its ancillary ophthalmological study in Bordeaux Alienor (n=963, followed since 2006). We also participate in population-based cohort studies (i-Share, 20,000 students, PI C. Tzourio), Constances (220,000 adults aged 18-69 years, followed since 2012, PI M. Zins, Inserm U1018, Villejuif) and B cube (planned 2000 aged 55-80 years in Bordeaux, PI C Samieri), in particular by generating cutting edge ophthalmological phenotypic information and several ranges of biomarkers. Finally, we collaborate with European and American cohorts, individually or within collaborative projects. Overall, these studies collect information on many aspects of aging (functions, chronic and degenerative diseases, disability) and their determinants (clinical factors, nutrition, environmental exposures, genetics), which allow a very comprehensive study of the epidemiology of health and aging in older adults, but also offer a scope for a broader lifelong approach, thanks to the epidemiological and clinical studies conducted in younger individuals.

**EXPOSOME AND AGE-RELATED DISEASES**




Our research activity is divided in 3 axes:

- Burden of age-related and chronic disorders, which aims at documenting the frequency of age-related and chronic diseases and characterize their burden, in terms of loss of autonomy, impaired quality of life, as well as medical and non-medical costs.
- Mechanisms and processes of age-related diseases, which aims at finely characterizing aging processes, by collecting detailed clinical, imaging and functional data over long periods of time, with major interest in degenerative and vascular processes as well as inflammatory mechanisms.
- Determinants of healthy aging, which focuses mainly on the role of nutrition and lifestyle, as well as environmental exposures (sunlight exposure, air pollution...). With regard to nutrition, our approach combines interest in specific dietary intakes and patterns with the use of innovative measurements (lipidomics, metabolomics, gut microbiota...).

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# STATISTICS IN SYSTEMS BIOLOGY AND TRANSLATIONAL MEDICINE

## Team

**SISTM**

**MIXED RESEARCH TEAM**

Inserm Inria université de BORDEAUX

### Pr. Rodolphe Thiebaut

MD, PhD, SISTM Director

Rodolphe Thiebaut is a medical doctor specialised in Public Health. He holds a PhD in Biostatistics from Bordeaux University. He started his research career at the Institut National de Santé et de la Recherche Médicale (INSERM) as a research scientist between 2002 and 2009 and as research director between 2010 and 2013. He was a research fellow in the Immunobiology Division of the Institute of Child Health (London, UK) in 2007. He is now Professor in Public Health / Biostatistics at the University of Bordeaux. He leads a research group (SISTM-Statistics in Systems Biology and Translational Medicine) devoted to the modelling and analysis of high-dimensional data mainly applied to immunology through the French Vaccine Research Institute (https://vaccine-research-institute.fr/en/). This group, which is embedded in the INSERM U1219 Research Centre (https://www.bordeaux-population-health.center/), has been recognised as an INRIA project team since January 2015 (https://www.inria.fr/fr/sistm). He is in charge of the medical information department of the Bordeaux University Hospital. He is also the Director of the Graduate School of Digital Public Health, coordinator of the Master of Public Health Data Science at ISPED (Institut de Santé Publique d'Epidémiologie et de Dévelopement).

**The two main objectives of the SISTM team are: 1) to accelerate the development of vaccines by analyzing all the information available in early clinical trials and optimizing new trials 2) to develop new data science approaches to analyze and model big/ omics data.**

The team is organized around three axes sharing a common objective. It is embarked in a double challenge of developing methods to deal with high dimensional data with low sample size and a main application for accelerating vaccine development.

Hence in Axis 1, the relevant information is extracted from big data. This information is used to estimate mechanistic model parameters in Axis 2. Mechanistic models can then be used for simulating the optimal vaccine strategies to be evaluated in the next clinical trials. All this work is done in collaboration with our partners from the Vaccine Research Institute, EUCLID/ ANRS-MIE CMG platform and the Bordeaux Hospital.

**Axis 1 High Dimensional Statistical Learning**

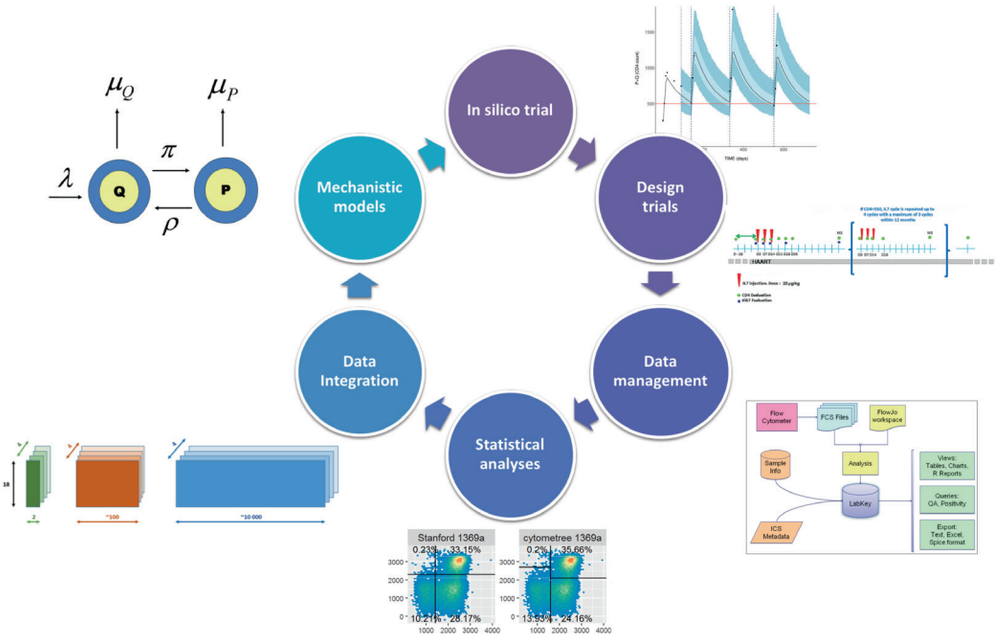
- To develop and apply methods for discovering complex relationships between high dimensional data (multiblock analysis for data integration)
- To reduce data redundancy by i) high dimensional reduction ii) deconvolution
- To visualize high dimensional data through statistically sound approaches
- To infer cell populations abundance through gene expression data by deconvolution approach

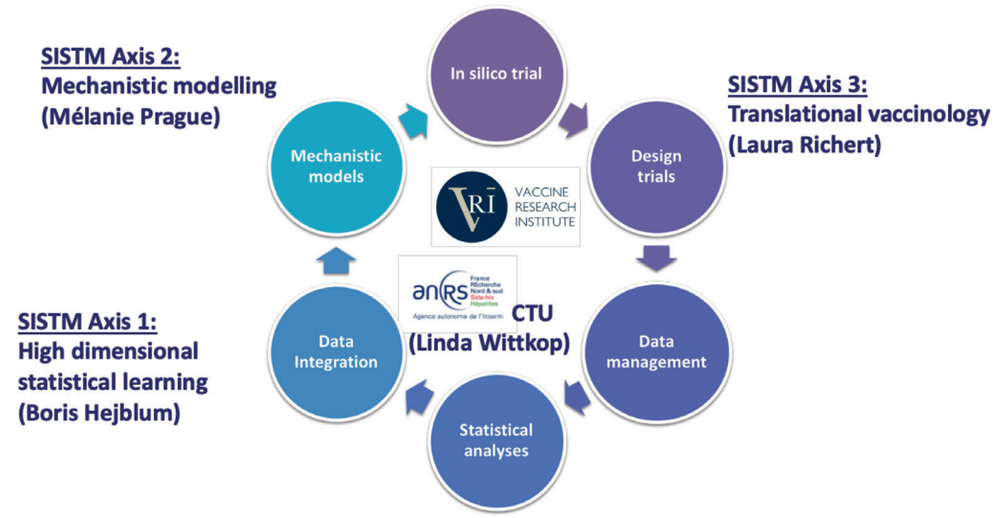
**Axis 2 Mechanistic learning**

- To infer ordinary differential equations (ODE) systems parameters by using high dimensional data
- To compare and implement control strategies through various approaches belonging to statistical control, stochastic control, reinforcement learning

**Axis 3 Translational vaccinology**

- To accelerate vaccine development by in silico trials
- To accelerate vaccine development by new adaptive designs
- To accelerate vaccine development by in depth analysis of data generated in early clinical trials

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# AGING, CHRONIC DISEASES, TECHNOLOGY, DISABILITY, AND ENVIRONMENT

## Team

**ACTIVE**

**MIXED RESEARCH TEAM**

Inserm université de BORDEAUX

### Pr. Hélène Amieva

PhD, ACTIVE Director

Hélène Amieva has a PhD in neurosciences. After one year of post-doctoral fellowship at the Psychology Department of Aberdeen University (UK), she has been working at the CNRS as a permanent researcher for nine years. She is currently Professor of psychogerontology at Bordeaux University.
Her main expertise is in the field of epidemiology and neuropsychology of aging, dementia and Alzheimer's disease, in particular psychosocial factors modulating clinical trajectories and cognitive decline in aging. She has also been involved in clinical studies assessing non-drug treatments. She has conducted the ETNA3 study, a national trial assessing the efficacy of non-pharmacological therapies in Alzheimer's disease, involving 653 patients followed up for three years in 40 French hospital centers. Currently, she is the principal investigator of the study assessing the impact of the French Alzheimer Village in South-western France, an innovative experiment for people suffering from Alzheimer's disease.
She is the author or co-author of about 190 articles published in international journals.
She is co-director of the Master of "Psychogerontology and Public Health" at Bordeaux University. Since 2021, she is the general secretary of the French speaking society of Neuropsychology relying on a community of physicians, psychologists, speech therapists and researchers working in French-speaking countries and actively involved in the field of neuropsychology.

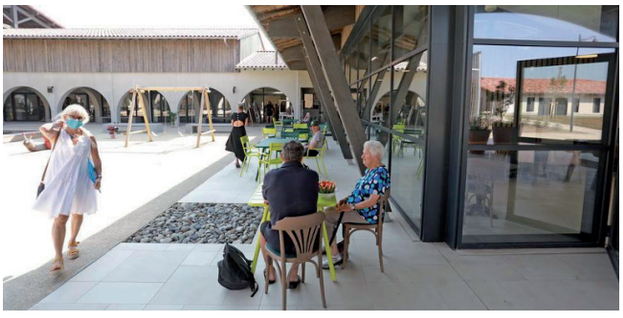
**Most of the researches conducted within the ACTIVE team aim at studying: (1) intrinsic capacities of individuals and environmental factors contributing to develop / maintain/ reduce functional capacity in the context of acute/chronic disease, disability, and/or old age; and (2) innovative strategies based on the optimization of such factors. The team is composed of epidemiologists, psychologists, cognitive scientists, geriatricians, physical therapists, neurologists and a psychiatrist.**

The first research axis is coordinated by Karine Pérès. It investigates to what extent intrinsic capacity and environments contribute to develop / maintain / reduce functional ability. Functional trajectories associated with aging process are studied through a continuum distinguishing robustness, pre-frailty, frailty, and activity limitation. We examine their determinants through a multidimensional approach considering intrinsic capacities (cognition, depression, sensory impairments, personality traits…) and environmental factors (family support, social network, (un) adapted home, professional assistance, digital technologies) that may influence the sequence and speed of functional deterioration. The heterogeneity of these trajectories is explored in several prospective population-based and clinical studies (PAQUID, AMI, 3C, CONSTANCES, COGLOC…). More recently, taking advantage of the ongoing cohort studies, the PA-COVID survey, set up very shortly after the first COVID-19 lockdown in France, aims at providing valuable knowledge on older adults' social and psychological experiences of the COVID-19 crisis and its impact on cognitive, mental and functional health.

The second research axis coordinated by Hélène Sauzéon focuses on innovative strategies based on the optimization of individuals' intrinsic capacity and/or environments. As an example of strategies based on optimized environments, the French Alzheimer village is an experimental accommodation facility for older adults with Alzheimer's disease built like a traditional village. The team is currently conducting an ambitious multidimensional research program evaluating whether this innovative model is relevant compared to traditional nursing homes (see below). Other researches involve interventions relying on digital technologies. They generally address two main health issues: rehabilitation access and patient agentivity (i.e., active role of the patient). A research

Le village Alzheimer de Dax

project is being conducted on patients with vascular aphasia to evaluate the benefits of tele-rehabilitation compared to a conventional face-to-face rehabilitation. Another research stresses the role of self-determination in cognitive rehabilitation by leveraging recent technological advances. The program includes a large panel of individuals of various ages and with various disability conditions. The goal is to study the impact of the technology properties of adaptability (self-configuration of objectives/ contents of the intervention by the care recipient) and/or adaptivity (self-configuration of intervention by machine learning algorithms) on rehabilitation results.



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# ASSESSING HEALTH IN A DIGITALIZING REAL-WORLD SETTING PHARMACOEPI & BEYOND

AHeaD

MIXED RESEARCH TEAM

Inserm université de BORDEAUX

## Pr. Antoine Pariente

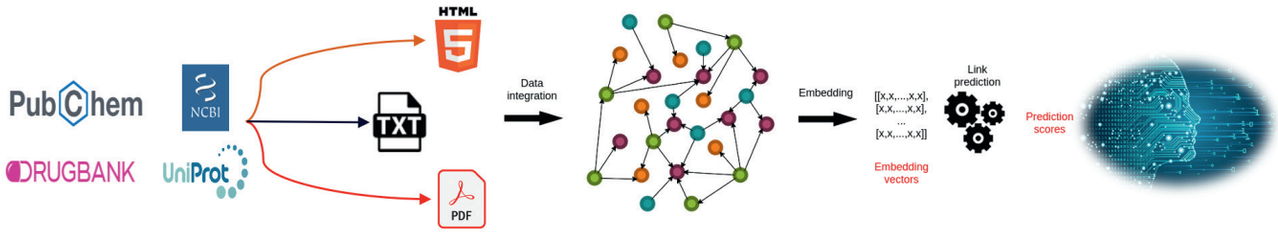
MD, PhD, AHEAD Director

Dr. Antoine Pariente did his MD in Pharmacology and Public Health and completed his training with a PhD in Pharmacoepidemiology focusing on population impact of drugs in dementia.
From 2016 to 2021, he headed the Bordeaux Pharmacovigilance Centre; from 2018 to 2021, he was appointed as a scientific independent expert towards the European Medicines Agency Pharmacovigilance Risk Assessment Committee (PRAC), where he was selected to chair the Interest Group for Impact of Pharmacovigilance regulatory Actions Assessment.
During the 2015-2019 period, he coordinated the French national academic platform for pharmacoepidemiology DRUGS-SAFE (Drugs Systematized Assessment in real-life environment). After being selected through a national call emitted by the French Drug Agency, this was transformed into the DRUGS-SAFER Centre. Antoine Pariente also coordinates this academic centre, which has been appointed by the authorities to provide real-world evidence supporting decision-making regarding the use and safety of drugs.
From 2016 to 2020, he chaired the Bordeaux Population Health research team "Pharmacoepidemioloy-Drugs and Population Health".
He is now the director of the BPH AHeaD team, created from the merging of the Pharmaco, ERIAS (headed by Gayo Diallo), and IETO (headed by Emmanuel Lagarde) teams.

## Pr. Gayo Diallo

PhD, AHeadD Deputy Director

Gayo Diallo is a full professor in computer science at Bordeaux University (France) since 2022 and is deputy director of the AHeaD research group of the Bordeaux Population Health (BPH) research center (BPH) Inserm-1219. Previously, he was the group leader of the Computer Sciences Applied to Health research group (ERIAS) of BPH.
He joined the University of Bordeaux, Bordeaux School of Public Health (ISPED), in 2009 after being a research assistant at City University of London (UK) and PostDoc researcher at the Laboratory of Applied Computer Sciences (LISI/ENSMA) Futuroscope Poitiers (France). He graduated from University of Grenoble Joseph Fourier in 2006 and holds a degree in Business Creation obtained in 2003.
His research interests include AI based approaches for healthcare data and knowledge management and ICT for Societal Development (ICT4D). He coordinated several international and regional R&D projects and has been involved or coordinated various EU or other international funded projects. Gayo was awarded a IDEX Talent mobility grant, and he has been Visiting Professor at University of Minnesota/ the Institute of Health Informatics (US) during the period January-August 2022 and held for two years a part-time Inria delegation position.
He is the winner of the practical application prize of the 2015 edition of the Orange Data for Development Big Data Challenge (D4D) and he authored or co-authored more than 100 peer-reviewed papers on symbolic AI and digital health.




**We are interested in better understanding healthcare real-world setting and better assessing medicines in this observational environment. In particular, we aim to investigate trajectories of care and their determinants, with a specific interest into emergency care use from one side, and trajectories of care for patients with chronic diseases relating to cardiovascular health or mental health from the other.**

AHeaD results from the merging of three different teams ("Pharmacoepidemiology-Pharmacoepi"; "Injuries-IETO"; "Informatics in Health-ERIAS"). The collaborations we developed over the years ultimately concentrated most of our teams' research efforts around the secondary use of electronic databases for the study of health and medicines in a real-world setting. In anticipation of the research challenges that will emerge from the multiplication, diversification, and complexification of digital health data, we decided to join forces with the AHeaD team project. This will combine our originating teams' expertise in electronic health records databases (HERs), hospital data warehouses, ontologies, data visualization, knowledge representation, machine learning and natural language processing for health research, thus constituting a tremendous research opportunity. The way to answer the questions regarding health assessment in real-world settings is likely to change dramatically. In the coming years, the use of electronic health databases, that developed tremendously over the past 30 years, will need to be complemented using information from other sources that will help strengthen and substantiate the real-world evidence provided. Building bridges between applied health research, already widely using EHRs, and informatics appears as a necessity when envisioning the future development of health assessment in real-world settings.

The research will divide into three axes corresponding to different objectives and methods. The research will divide into three axes corresponding to different objectives and methods:

1. Data & Signals: Structuring and bridging data for hypothesis generating in real-world assessment

Safety signal or repurposing hypotheses are mostly presented or generated from the results obtained from one data source/type of information analysis. We intend to go further by developing approaches that will combine various types/sources of information for hypothesis-generating research from realworld data.

2. Use & Effectiveness: Stay focused, remain global Medicine & health determinants assessment is better performed when closely focusing on one type of medicine or care.

The downside is to risk losing sight of the overall care environment (therapeutic alternatives; healthcare trajectories). We intend to develop research that will contextualize and characterize overall healthcare surrounding targeted research regarding the use or effectiveness of a given type of medicine or care.

3. Policies & Impact: Assessing the public health impact of regulatory actions

The hypotheses generated/confirmed within the two first research axes can result in official recommendations or regulatory actions aiming to optimize healthcare strategies. Here, our research will assess to what extent these strategies are successfully adopted and beneficial to health, thereby completing our research path from generating a hypothesis to applying it in society

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# EPIDEMIOLOGY OF CANCERS AND ENVIRONMENTAL EXPOSURES

## EPICENE

**MIXED RESEARCH TEAM**

Inserm université de BORDEAUX

### Pr. Isabelle Baldi

MD, PhD, EPICENE Director

Isabelle Baldi is a Professor in Occupational Health at Bordeaux University, and a member of the Environmental and Occupational Health department at Bordeaux University Hospital. Her research aims at assessing long-term effects of occupational & environmental pesticide exposure through epidemiological studies (especially on cancer and neurological outcomes). She has developed new tools for pesticide exposure assessment, such as crop exposure matrices (PESTIMAT, PESTIPOP) and algorithms (PESTEX-PO, CANEPA) based on field observations, using several epidemiological projects. She is co-leader of the AGRICAN cohort (https://www.agrican.fr/ ) and responsible for the neurological subgroup of the AGRICOH international consortium (https:// agricoh.iarc.fr/ ). She is involved in the European SPRINT program (https://sprint-h2020.eu/). She also heads the Registry of Central nervous system tumors, implemented in Gironde in 1999.

### Dr. Fleur Delva

MD, PhD, EPICENE Deputy Director

Fleur Delva is a medical doctor specialized in public health and hospital practitioner at the Bordeaux University Hospital and co-director of the INSERM EPICENE "Cancer environment" team. She obtained a PhD in epidemiology in 2014 and obtained an accreditation to supervise PhD research in 2019. Today, her activity is divided between hospital activity where she coordinates the ARTEMIS Centre, an environmental health prevention platform for patients with reproductive disorders, and a research activity on the environment and reproduction themes, with significant research and leadership experiences within global organizations in cancer surveillance, epidemiology and public health.

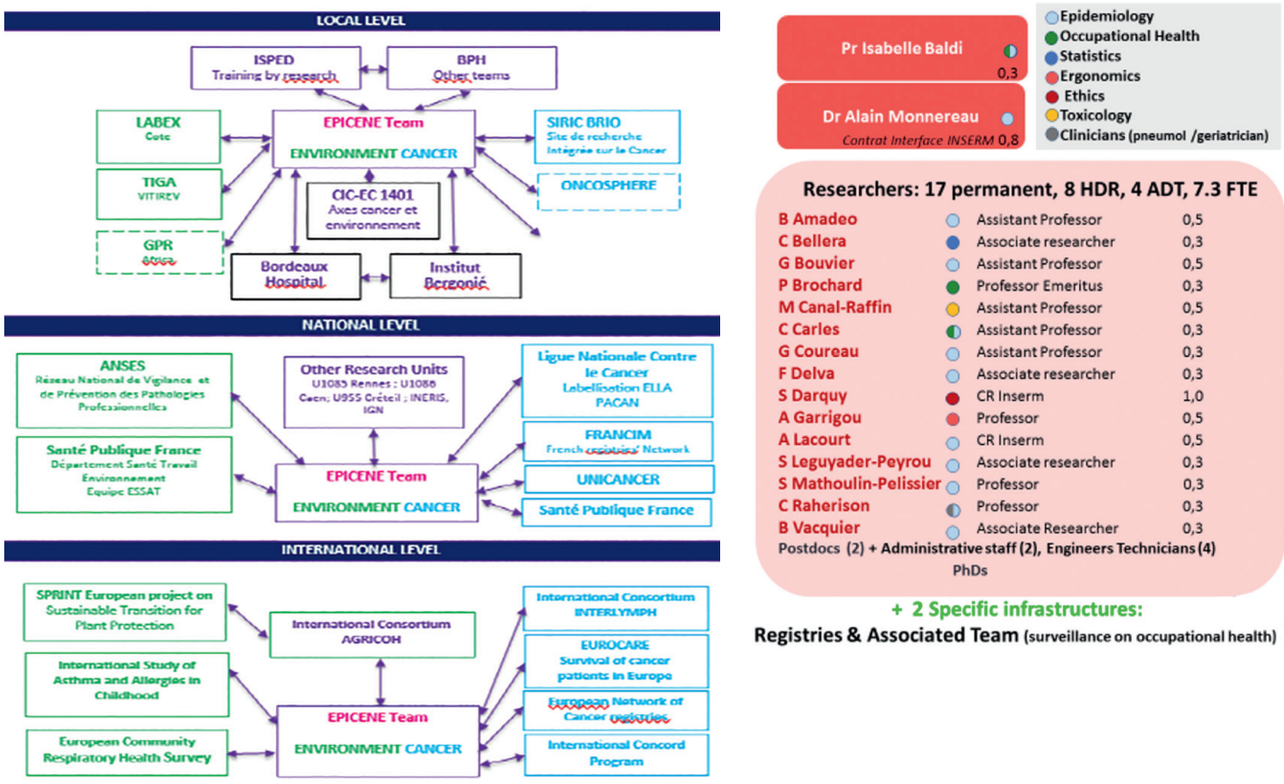
**EPICENE's research is focused on cancers and environmental and occupational determinants of health. Our projects address methodological challenges in a multidisciplinary approach with the aim of expanding knowledge on cancer survival and its determinants, developing new approaches to estimate life-long environmental exposures (Exposome concept), understanding the role of the environment and the occurrence of certain cancers.**

**Theme 1: Cancer survival: improving knowledge, detecting frail individuals, identifying surrogate endpoints**

Although survival rates have improved for the main cancers over the past decades, they remain highly variable depending on the cancer site and on many more individual parameters. We strive to further understand the factors associated with better survival for cancer patients. Thanks to our involvement in population based cancer registries, we generate new data on cancer survival and its determinants (treatments, comorbidities, care practices, palliative care) for several cancer types (hematological cancers, breast cancer…). We pay particular attention to frail people, for whom efforts of detection and prevention are strongly needed, including elderly people whose number will rapidly increase in the coming decades. We develop new tools for detection programs and we investigate cancer literacy in elderly cancer patients.
Our efforts also focus on improving cancer screening strategies (including organized mass screening). We also develop new biostatistical approaches to assess treatment efficacy and patient survival in randomized controlled trials and in real-life settings

**Theme 2: Methods in environmental and occupational exposures: the exposome knowledge**

Our research aims to improve the knowledge of levels and determinants of exposure to major contaminants with field measurements in order to identify the main determinants of exposure (usable in retrospective questionnaires and in large population cohorts). Our research on pesticide exposures started 25 years ago and continues to provide many original data through the PESTEXPO program. We now aim to document baseline levels for "everyday" contamination on a farm and explore pesticide exposures in non-farming jobs (i.e., gardening, wood industry…). We also explore the exposures of the general population living near treated fields. We combine field measurements and ergonomic observations. Levels and







EPICENE's collaborations

determinants of exposures to other pollutants are also studied, such as nanoparticles in the occupational and environmental settings, antineoplastic drugs in healthcare workers, electromagnetic fields... We also develop indirect exposure assessment tools, such as Job Exposure Matrices (PESTIMAT, MATPUF) and spatial modeling. Usable retrospectively in large populations with minimal collection of data (job or residential calendars), they are very useful to our epidemiological studies.

**Theme 3: Environmental Etiology of Cancer**

For more than 20 years, we have studied the etiology of CNS tumors, hematological malignancies and mesothelioma thanks to registries that we set up in this domain and our collaborations at both national and international levels. Recently, we also developed studies on sarcomas. As etiological research, including the role of the environment, remains scarce for most rare cancers, we intend to analyze the role of environmental determinants in the occurrence of these cancers, for which the role of environmental factors is suspected. Our efforts rely on cohorts (AGRICAN, LUCSO, REALYSA), case-control studies (CERENAT, ETIOSARC), and data from international consortia (AGRICOH, INTERLYMPH). We attempt to better understand cancer risks in specific populations, suspected to be more vulnerable because of individual conditions or comorbidities (e.g., allergies, immunological disorders), genetic characteristics (polymorphisms of detoxification genes,...) or specific exposures (women, smokers...)

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# GLOBAL HEALTH IN THE GLOBAL SOUTH

**GHiGS**
**MIXED RESEARCH TEAM**

Inserm IRD Institut de Recherche pour le Développement FRANCE université de BORDEAUX

## Dr Olivier Marcy

MD, PhD, GHiGS Director

Olivier Marcy is a clinical epidemiologist and researcher at the University of Bordeaux and research director at the IRD (French Institute for Research and Sustainable Development). He worked for more than 10 years as a clinician and public health program manager in sub-Saharan Africa (Republic of Congo) and South East-Asia (Cambodia). His research focuses on diagnosis of tuberculosis (TB) in children and TB-HIV co-infection in adults and children. He is the project leader of the Unitaid-funded TB-Speed project on childhood TB diagnosis with research ranging from decentra lisation and implementation challenges to accuracy of diagnostic algorithms for vulnerable children. He is the current chair of the NIAID-funded TB-SRN international cohort on pulmonary TB in adults. He is also involved in the IPORA interdisciplinary and policy-oriented research platform where he is developing research on impact of air-pollution on respiratory health in urban settings in Africa.

## Dr Renaud Becquet

PHD, GhiGS Deputy director

Renaud Becquet, senior scientist at Inserm, has a PhD and a HDR in epidemiology (University of Bordeaux). After his PhD in Abidjan, Côte d'Ivoire, and a two-year post-doctoral fellowship at the University of KwaZulu Natal, South Africa, he was recruited in 2008 as senior scientist at the Bordeaux Population Health Research Centre. His early research focused on the prevention of mother-to-child transmission of HIV in Africa. He later created a research platform with humanitarian organisation ALIMA to develop innovative and transformative research in sub-Saharan Africa, focusing on improving maternal and child health outcomes in complex situations. He authored and co-authored about 100 articles published in internatio nal journals. He has served as an expert in various committees and guideline development groups (WHO, UNICEF, UNAIDS). He is currently the coordinator of the Master Global Health in the Global South at the Bordeaux School of Public Health.

**The objectives of the GHiGS team are:**

- **to produce data on diseases affecting the Global South, their epidemiology, risk factors and consequences;**
- **to use these findings to design and evaluate innovative interventions at both individual and population levels, which are effective, equitable and sustainable, and contribute to the advancement of global health.**

**Per the definition of Koplan et al. (The Lancet 2009; 373(9679): 1993-5), global health is an area for study, research, and practice that places a priority on improving health and achieving equity in health for all people worldwide. Global health emphasizes transnational health issues, determinants, and solutions; it involves many disciplines within and beyond health sciences and promotes interdisciplinary collaboration; and it is a synthesis of population-based prevention with individual-level clinical care.**

**Per the definition of the World Bank, the Global South is made up of Africa, Latin America and the Caribbean, Pacific Islands, and the developing countries in Asia, including the Middle East.**

**Scientific orientations of the research team**

The GHiGS team aims to contribute to improving health at both individual and population levels in countries from the Global South and to contribute to reducing health inequities between and within countries. Low-and middle-income countries, particularly in Sub-Saharan Africa, are going through major changes including epidemiologic, sociodemographic, economic, agronomic, technological and climatic transitions. At the same time, they are carrying the triple burden of:
1/ infectious disease (including HIV), tuberculosis, malaria, hepatitis and a number of other emerging infectious disease threats (including hemorrhagic fevers and other epidemics);
2/ growingly prevalent non-communicable diseases (NCDs; diabetes, cancers, hypertension, obesity),
and 3/ unprecedented outdoor pollutions and environmental threats. The GHiGS team aims to respond to these major transitions and new challenges through integrated, multi-level and inter-disciplinary research approaches in the context of the Global South.
Among the key highlights of the past five years, the GHiGS team contributed to a major revision in the international HIV treatment guidelines issued by the World Health Organisation and was among the rare research teams worldwide to have conducted a treatment trial to reduce mortality during the Ebola epidemic in West Africa.
In the coming years, the GHiGS team will strengthen and expand two key research themes, i.e., infectious diseases and mother and child health issues, to address new challenges in the field of diagnosis, care, and treatment. NCD research, previously addressed by the team in relation with infectious diseases (HPV-and HBV-related cancers, cardiovascular and metabolic HIV-comorbidities), will become a standalone research theme. Major challenges in implementing evidence-based interventions will be addressed within a cross-sectional and structural research axis on "Models of care, implementation and health systems". Finally, beyond the

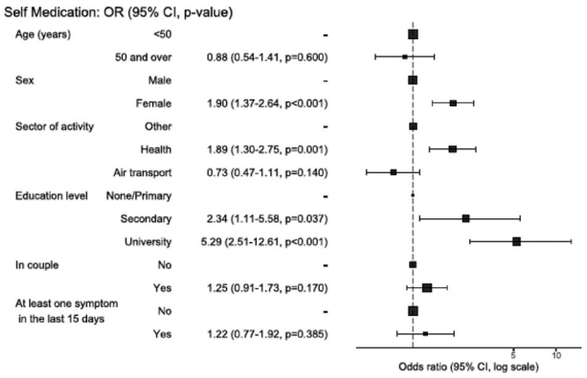


**FIGURE 1** shows factors associated with self-medication to prevent the infection to SARS-CoV-2 in high-risk populations, Lomé, Togo in a binary logistic multivariable model. These associations were expressed as adjusted odds ratios.
Self-medication was coded as a binary variable ( =1 if intake of at least one product and = 0 if not)

Source: Sadio AJ et al. BMC Public Health (2021) 21:58.
A study including around 1,000 participants from five sectors (healthcare, air transport, police, road transport and informal sectors) who were invited to provide information about their self-medication practices to prevent COVID-19. Health professionals, women and people with a high level of education were the most likely to practice self-medication.

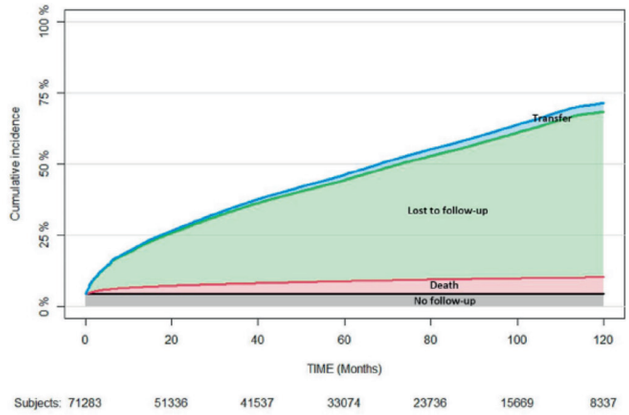


**FIGURE 2**. Ten-year stacked plot of cumulative incidence function of attrition by attrition types. IeDEA West Africa Collaboration, 2002to.

Source: Tiendrebeogo T et al. J Int AIDS Soc. 2021;24(5):e25723.
A cohort analysis of more than 70,000 patients initiated on Antiretroviral Treatment (ART) followed for 10 years in 8 West-African countries showed that overall attrition was as high as 21%, 45% and 71% at 12, 60 and 120 months following ART initiation, respectively. Overall, patients lost to follow-up accounted for 85% of patients lost to care.

individual and health system levels, the GHiGS team will explore the impact on health (NCDs, emerging epidemics,...) of global forces and environmental changes (climate change, bacterial ecosystem, resistance to antimicrobials, pollution...), as part of the "People in their environment" axis. Research by the GHiGS team will be built on equal partnership and co-construction with scientific partners, clinicians, policy-makers from the Global South countries. Through its expanded research program and strengthened collaborations and partnerships, the ambition of the GHiGS team is to contribute to the achievement of the Sustainable Development Goal #3 on Health and Well-Being.
Structuration of the research team The GHiGS activities will be organised around 3 research themes (infectious diseases; maternal and child health; non-communicable diseases) which correspond to major global health challenges; and 3 cross-sectional axes (Prevention, diagnosis and treatment; models of care, implementation, and health systems; people in their environment) that will structure research efforts, collaborations, and development of methods and scientific engineering capacities.

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# POPULATION HEALTH TRANSLATIONAL RESEARCH

**PHARes**

**MIXED RESEARCH TEAM**

Inserm université de BORDEAUX

## Dr. Carole Dufouil

PhD, PHARes director

Carole Dufouil is a research director at Inserm Centre UMR1219 (Bordeaux Population Health) in Bordeaux, and director of the PHARes team (Population Health trAnslational Research). She is also deputy director for international and overseas relations at Bordeaux School of Public Health (ISPED). She has received training in biostatistics and public health. Her early publications were on methods to handle missing data in longitudinal studies. More recently, her research has focused on the determinants of neurological diseases, including Alzheimer's disease. She is particularly interested in the role of vascular risk factor exposure and cognitive stimulating activities, and imaging markers (PET, MRI) of brain aging and disease. She is co-PI of the 3C-Dijon study and co-PI of the MEMENTO study, a national clinical cohort, which was set up in the context of the French Alzheimer Plan 2008-2013, and aims to improve the understanding of the natural course of Alzheimer's disease and related disorders. She is also strongly involved in international scientific programs, through, among others, collaborations in the Framingham Heart study, or co-leading of the Melodem initiative which aims at harmonizing analytical approaches in longitudinal studies on dementia (www. melodem.org).

**The PHARes Team aims to improve our understanding of and act upon the greatest risks and threats to population health, representing a large share of morbidity and mortality as well as social determinants of health and healthcare expenditure. Through this translational approach, We seek to reduce, the impact of these risks and treats (taking into account social and environmental inequalities, including inequalities in access to healthcare) by**

- **improving risks factors and inequalities measurement with real-world data and methods developed for and applied to observational studies and thus providing the evidence based for a critical building block for action,**
- **developing innovative methods (observational and experimental) for the development and evaluation of complex population health interventions,**
- **analysing of social and political processes underlying the unequal distribution of risks and health inequities in order to influence decision-making.**

The team works on five principal research axes:

**1. Methods for population health intervention research.**

This axis involves conducting research on research (meta-research), on concepts and methods for the evaluation of prevention and health promotion interventions. The questions cover all stages of the approach, from the development to the scaling-up of interventions

**2. Social determinants, migration dynamics, environment & health.**

This research axis relies on a strong interdisciplinary convergence on the cross-cutting themes of social inequalities, deprived populations, environmental risks and their relation to population health and health inequalities. Our research addresses the following issues:

- Social determinants of maternal, child, sexual & reproductive health among vulnerable populations
- Health status and healthcare access of vulnerable populations.
- Innovative approaches to improve health and health equity in decision-making processes at the territorial level.

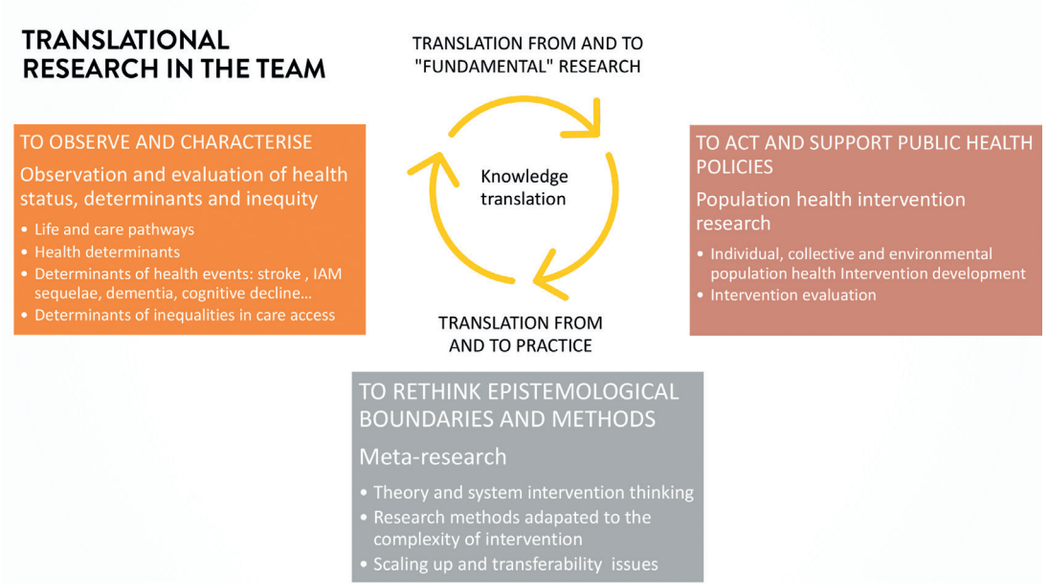
**3. Pathways and determinants of health.**

The concept of pathway has been developed to respond to the need to make our health system and society evolve in the face of increased life expectancy, chronic illnesses and the complexity of managements. The identification of interventions to improve pathways and reduce inequalities in access to care is another major issue, leading to significant improvements in population health and focusing on three main goals :

- Characterization of pathways
- Identification of determinants of health
- Optimisation of care pathways and reduction of health inequalities,

**4. Innovations for prevention in the healthcare system.**

The growing prevalence of chronic diseases is a major challenge for the sustainability of health systems. There is a need to transform health systems by increasing prevention and by implementing innovative organisations in the management of these diseases. This transformation will require the




development and the analysis of research-and field-based interventions. Transforming the health system also requires transferring innovative models into public decisions and practice. The objective of this theme is to identify, develop and/or evaluate technological (such as mobile health in prevention strategies) and organisational innovations (such as interprofessional collaboration to improve professional practice and health-care outcomes) in terms of prevention (or "preventive clinical practices "), at the hospital or in outpatient healthcare. Research covers all stages of innovation, from development to scale-up.

5. Economics and management of healthcare organizations. The aim of this axis is to conduct research projects that evaluate health policies and interventions using an applied and multidisciplinary approach, involving economists, management researchers, health professionals (doctors and nurses and other social science researchers with expertise in health services. This research relies on a variety of perspectives, depending on the object studied (healthcare utilisation, healthcare pathways, technological or organisational innovations ...), the relevant evaluation outcome (take-up of public programs, efficiency, healthcare access inequalities, staff turnover, rehospitalisation...), the available data and the appropriate methods (econometrics using administrative data, experimental studies, medico-economic modelling of clinical data and registry data, qualitative interviews...).

Our team conducts research that takes into account:

• the characteristics of surveillance of health determinants (including social, environmental and cultural factors),

• the system in which the interventions are implemented, whether they are in or out of the health care environment (public domain: media, opinions, policies, professional practices, etc.),

• the complex nature of population health interventions (individual, ecological, collective, regulatory). Within this framework, our team focuses on 3 research objects that we believe to be at the heart of translational population health research:

1. Health status, health determinants and social inequalities (Research object "TO OBSERVE AND CHARACTERISE")
2. Population health interventions, whether they be policy, outreach, or organisations within and outside the healthcare setting (Research object "TO ACT ON AND SUPPORT PUBLIC HEALTH POLICIES")
3. Methodological research to better apprehend the complexity of the two first objects (Research object "TO RETHINK EPISTEMOLOGICAL BOUNDARIES AND METHODS") The association of these three research objects (observational, interventional and meta-research) is fundamental to the development of translational research and mobilizes the principles of knowledge transfer between disciplines and between researchers and decision-makers to make it work.

## 2022 Key publications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# 2022 RESEARCH HIGHLIGHTS

# 2022 RESEARCH HIGHLIGHTS

## BIOSTAT

### The Bordeaux Public Health Data Science (PHDS) impulse research network

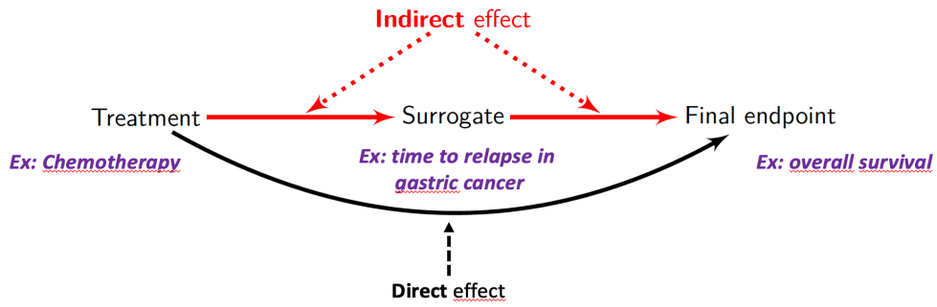
Project launch

Participants in the first RRI PHDS datathon (Oct 5, 2022)

The 'Public Health Data Science' (PHDS) Bordeaux research network, led by Cécile Proust-Lima of the BPH Biostatistics team, is one of the eight Impulse Research Networks accredited by the University of Bordeaux for the 2022-2025 period. The project aims to boost collaborative research in Bordeaux between teams in data science (statistics, mathematics, computer science) and teams specialized in public health and epidemiology, to tackle the methodological challenges encountered in public health. With its dual expertise, the BPH research center is a major force in the network, along with teams from the Inria Sud-Ouest center, the IMB and the LABRI. The research teams in the network are collaborating more and more thanks to its vibrancy. For example, the network's first 'datathon' was held at the Inria center in mid-October of 2022. Multi-disciplinary teams had 1.5 days to predict the probability of severe dependency in the Memento cohort. The network also launches annual calls for funding for masters, doctorates and post-doctorates in co-supervision between Bordeaux teams.

## When surrogacy meets causal mediation analysis

Major publication and partnership




In clinical research, the use of surrogate endpoints speeds up the process of evaluating a treatment compared to the use of a traditional endpoint. Surrogate endpoints must first be validated statistically before being used in a new clinical trial. In this research, we propose to validate a surrogate endpoint based on a causal approach using mediation analysis, which aims at decomposing the effect of the treatment on the final endpoint into an indirect effect via the surrogate endpoint and a direct effect independent of the latter. We are particularly interested in the case where the endpoint is time-to-event data such as time to death, and in a surrogate endpoint which is either also time-to-event or a longitudinal biomarker.
This work has been published in the international journal Biostatistics in 2022 and the proposed approaches have been implemented in frailtypack, an R library, to disseminate and facilitate their use.

This research project has been conducted with international collaborators: Catherine Legrand of the Catholic University of Louvain (Belgium) and James Dignam of the University of Chicago (USA).
Funding related to this research project was obtained from the Ligue Contre le Cancer, the EDSP2 doctoral school, as well as a state grant supervised by the National Research Agency (ANR), under the program for investment in the future (PIA3,) bearing the reference 17-EURE-0019. Quentin Le Coënt was a member of the Ecole Universitaire de Recherche (EUR) Digital Public Health PhD.
Le Coënt Q, Legrand C, Rondeau V. Time-to-event surrogate endpoint validation using mediation analysis and meta-analytic data. Biostatistics. 2022. https ://doi.org/10.1093/biostatistics/kxac044

## Recruitment of Anais Rouanet as Senior Lecturer at the University of Bordeaux.

New member

Anaïs Rouanet joined the BPH Biostatistics team in September 2022 as an Associate Professor at the University of Bordeaux. After a PhD in biostatistics defended in 2016 on the selection by death in the study of dementia and cognitive decline, Anaïs Rouanet completed a 2-year post-doc in the Biostatistics department of the MRC Public Health Institute in Cambridge, UK. Since 2019, she was a post-doc in the Biostatistics team at BPH. Anaïs is developing a research program on the identification and discrimination of dementia phenotypes from longitudinal markers as well as on selection issues in cohort studies.

# LEHA

## API-DMLA Project

Project launch

Age-related macular degeneration (ARMD) is the main cause of visual loss in France among people aged 55 and over. The neovascular form of this disease is now treated with anti-VEGF (vascular endothelial growth factor) injections. These treatments make it easy to identify this pathology in the SNDS databases. To date, few cohorts present validated ophthalmological data. Thanks to the SNDS data and the large French national cohorts (CONSTANCES, E3N and 3 Cités), we have all the data to establish and validate an algorithm for the detection of ARMD cases. Their identification would allow the study of many determinants of ARMD in the existing large French cohorts, which would allow a change of scale for the epidemiology of ARMD. The algorithms will be made available to the scientific community and may be used by all French cohorts linked to the SNDS.

This project was implemented in collaboration with the CONSTANCES, E3N and 3 Cités cohorts and was a winner of the 2022 BOAS (Bibliothèque Ouverte d'Algorithmes de Santé) call for interest by the Health Data Hub (HDH).

## Macu-Life : Lifestyle exposure and risk of age-related macular degeneration in the E3 cohort

Project launch

With the support of the Fondation Bordeaux Université, we have launched the Macu-Life project (Project leader: B. Merle).
Age-related macular degeneration (AMD) is the leading cause of vision loss in industrialised countries. Treatment options remain limited, and do not always prevent visual loss. The risk of developing AMD is determined jointly by age, genetics and lifestyle: smoking, nutrition, physical activity and metabolic factors.
These exposures, occurring earlier in life, could affect the long-term onset of chronic diseases. To date, the time window for the mechanisms of action to prevent AMD has yet to be determined. Childhood could be important, as could mid-life.
We hypothesise that exposures throughout life, particularly at mid-life, will influence the development of AMD in later life.
The aims of Macu-Life are
1/ to identify and validate cases of AMD in the E3N cohort and
2/ to assess the associations between lifetime exposures and AMD, with a particular focus on smoking, physical activity and nutritional and metabolic exposures.
This project is based on the unique data from the E3N cohort: 100,000 women followed since 1990, 2,000 expected cases of AMD. Macu-Life will represent one of the largest studies of AMD and represents a change of scale in the epidemiology of AMD.
Our project is supported by our sponsors: Mutuelles AXA and Thea Pharma.

## REIN project (M. Reydit)

Project launch

Improving drug prescribing is a clearly identified public health objective.
The prevalence of potentially inappropriate prescriptions (PIP) in the general population of elderly people is 30 to 50%, and these PIP are associated with an increase in healthcare consumption and in the instantaneous risk of hospitalisation and death. The prevalence of these PIPs and their impact on hospitalisations and death have been little studied in the specific population of elderly dialysis patients, a population at particular risk of polymedication due to their numerous comorbidities. We propose to describe to the prevalence of these PIPs at the start of dialysis in patients aged over 65 who started their first dialysis replacement therapy in France between 2012 and 2019, to analyse the association between PIPs and the instantaneous risk of hospitalisation and death in this population, and to describe, among this population, changes in the proportion of patients presenting at least one PIP between 2012 and 2019. We hope that this work will make it possible to highlight the most frequent and riskiest PIPs, and to better alert nephrologists to potentially inappropriate prescriptions in elderly dialysis patients.
This project has been made possible thanks to funding obtained under the REIN 2020 and EPI-PHARE 2022 calls

# SISTM

## New results on Ebola vaccine strategies

Major publication

© Inserm/Patrick Delapierre, 2018

These are the results of a large international trial evaluating three Ebola vaccine strategies (PREVAC trial) which all showed a good immunological response associated with good tolerance.
DOI > https://doi: 10.1056/NEJMoa2200072

## A new mechanistic model quantifying the effect of COVID19 vaccines in preclinical studies

Major publication

A mathematical model has been developed in collaboration with IDMIT at CEA to quantify the in vivo effect of SARS-Cov2 vaccines in macaques. The infection of target endothelial cells was thus blocked, and an effect on the destruction of infected cells was evidenced. The team used publicly available data on the mRNA vaccine and a new vaccine based on dendritic cell targeting developed by the Vaccine Research Institute.
Alexandre, M., Marlin, R., Prague, M., Coleon, S., Kahlaoui, N., Cardinaud, S., ... & Thiébaut, R. (2022). Modelling the response to vaccine in non-human primates to define SARS-CoV-2 mechanistic correlates of protection. Elife, 11, e75427.
DOI > https://doi: 10.7554/eLife.75427

## Launch of a multi-cohort study: COVPOPART

Project launch


The COVPOPART cohort, which evaluates the response to COVID19 vaccines in 11 specific populations (HIV-infected patients, patients with cancer or diabetes...), has just published its first results in 4091 participants.
DOI > https://doi: 10.7554/eLife.75427

# AHeaD

## Pharmacoepidemiological study shows increased risk of ischemic stroke in users of antiemetic drugs

Major publication

The AHeaD team of the Bordeaux Population Health Research Center has conducted a study evaluating the risk of ischemic stroke associated with the use of anti-emetic drugs with antidopaminergic properties, as part of the activity of the DRUGS-SAFER Center financed by the GIS EPI-PHARE.
These drugs belong to the neuroleptic family and are the most used in the treatment of nausea and vomiting. Such a risk had already been demonstrated in neuroleptics with psychiatric indications.
The results suggest a threefold increase in the risk of ischemic stroke within 15 days of initiation.
The study was published in the British Medical Journal (Bénard-Laribière A et al. Risk of first ischaemic stroke and use of antidopaminergic antiemetics: nationwide case-time-control study. BMJ. 2022 Mar 23;376:e066192.), to which an editorial was associated. A report was submitted to the EPI-PHARE SIG.
DOI >10.1136/bmj-2021-066192

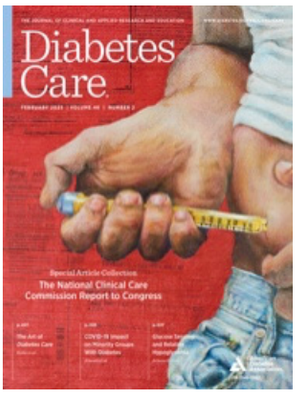
## Preparation and presentation to the National Road Safety Council of a report on the "Système Sûr Soutenable" (sustainable safety system) approach

Expert report on the road safety policy to be implemented in the coming years

Emmanuel Lagarde, a researcher on the team, coordinated the drafting of an expert report on the "Système Sûr Soutenable" as part of his chairmanship of the expert committee of the National Road Safety Council. The report was presented during a plenary session on December 28th, 2022

## Pharmacoepidemiologic study shows thyroid cancer risk signal with GLP-1 agonist use in diabetes

Major publication and contribution to public health




The AHeaD team of the Bordeaux Population Health Research Center has conducted a study evaluating the risk of thyroid cancer associated with the use of certain antidiabetic drugs, as part of the activity of the DRUGS-SAFER Center financed by the GIS EPI-PHARE.
This pharmacoepidemiological study conducted using national health data (SNDS) suggests that the use of GLP-1 receptor agonists is associated with an increased risk of thyroid cancer. It was published in Diabetes Care (Bezin J et al. GLP-1 Receptor Agonists and the Risk of Thyroid Cancer. Diabetes Care 2022; dc221148. https://doi.org/10.2337/dc22-1148) with an associated commentary. A report was submitted to the EPI-PHARE SIG.
The identified signal is currently being evaluated by the European Medicines Agency's Pharmacovigilance Risk Assessment Committee (PRAC).
DOI >https://doi.org/10.2337/dc22-1148

## A study of cardiometabolic disease trajectories in the context of the implementation of the European Health Data Space

Project launch

The use case of the AHeaD team of the Bordeaux Population Health Research Center was selected among five European use cases within the framework of the European EHDS 2 Pilot project coordinated by the Health Data Hub. This study aims to conduct a systematic comparison of health trajectories – defined as the longitudinal sequence of health-related events that precede a main event of interest – and their predictive impact on cardiometabolic diseases in France, Finland, and Denmark, which are among the few European countries for which nationwide health claims data are available. By understanding how different patterns of health events lead to major adverse health outcomes, it may be possible to identify subgroups of patients who would benefit from targeted public health interventions. The study involves a total population of nearly 92 million Europeans. The AHeaD team is in partnership with FIMM – Institute for Molecular Medicine Finland, the Department of Public Health of Copenhagen University, the Norwegian Institute of Public Health and the Faculty of Health Sciences, Semmelweis University, Hungary.

# ELEANOR

## Identification of new genes involved in stroke genesis thanks to the largest international genomic study to date

Major publication and new perspectives for therapeutic innovation and risk prediction

nature

This large international genomic study on stroke was co-led by Stéphanie Debette, director of the Bordeaux Population Health - University of Bordeaux research center, and Martin Dichgans, from the LMU University of Munich (Germany). It revealed new genes involved in the genesis of strokes. The study was performed on DNA samples from nearly 200,000 stroke patients and about 2 million control individuals from a wide range of geographical backgrounds, considering that 70% of all stroke deaths occur in low- and middle-income countries. Participants were of diverse European, East- and South-Asian, African, and Latin American ancestry and were drawn from numerous hospital and population-based cohorts and biobanks, as well as from five clinical trials.

These results provide information to predict genetic stroke risks for the first time in populations of non-European ancestry and will allow the development of personalized approaches for prevention and therapeutic purposes.

This collaborative project included members of the GIGASTROKE consortium, involving international networks and researchers from over 20 countries.

DOI > https://doi.org/10.1038/s41586-022-05165-3

## Launch of the B cube study (Biobank and Brain health in Bordeaux)

Project launch

B CUBE
Biobank and Brain health in Bordeaux

Age-related brain diseases such as Alzheimer's disease evolve silently for 15 to 20 years in the brain before the first symptoms appear and the diagnosis is made. To this day, little is known about the factors that contribute to the onset of the disease. Some of these factors are linked to one's genetic background and cannot be modified; others are linked to one's exposome (i.e. the exposures to which each person is subjected and which may influence our health) and can be modified. This includes external exposures (food, pollutants, etc.) but also the social context and the regulation of one's internal environment (biological). To decipher the role of this environmental component in the early stages of brain aging, the ELEANOR team launched in March 2022 a new population-based study, the B cube cohort, with the support of the PIA3 and in collaboration with the LEHA team. The objective is to include 2,000 young senior volunteers (55 years and older) from the Bordeaux metropolitan area to analyze their behaviors, biological parameters, microbiota, etc., in a multidisciplinary manner, and to link them with their brain function. The aim is to identify the factors and mechanisms which, early in life, allow the brain to adapt to aging or, on the contrary, lead to the development of brain aging pathologies. The team hopes to establish early prevention strategies that could delay or avoid these diseases and, ultimately, reduce the burden of brain aging on society.

# ACTIVE

## First publication from the research program evaluating the Village Landais Alzheimer, the first "Village" type model to be evaluated scientifically

Major publication


The Village Landais Alzheimer is an experimental model that offers an alternative to the 'retirement home' type of accommodation for people with neurodegenerative diseases, which suffers from numerous limitations as shown in the literature and by recurring controversies. Although very innovative, these 'Village' type facilities offering an 'ordinary' living environment and promoting the maintenance of activities and social ties are still scarce worldwide. To date, none of them have been the subject of a scientific evaluation. Since 2020 (the year the Village Landais opened its doors), the ACTIVE team has been conducting a multidimensional prospective research project to estimate the impact of such a system on the people who are cared for, their families, professionals, the general public, in both medical and economic terms. In August 2022, the first study from this research program was published. Over 800 individuals selected from the general population were questioned about their perceptions of Alzheimer's disease. Results showed that the very negative perceptions of Alzheimer's disease changed positively among the people living in the surrounding towns after the opening of the Village. However, no change was observed among the people living in unexposed towns in another French department.

Pech M, Meillon C, Marquet M, Dartigues JF, Amieva H. The "Alzheimer Village": Assessment of Alzheimer's disease representations in the general population: A cross sectional phone survey. Alzheimers Dement (N Y). 2022 Aug 2;8(1):e12328.

DOI > https://doi: 10.1002/trc2.12328

## Continuation of the study of the COVID-19 health crisis consequences with the start of a follow-up at participants' homes

Project launch

msa santé famille retraite services

Shortly after the onset of the Covid-19 pandemic in March 2020, the ACTIVE team undertook a telephone survey (PA-COVID survey) among 500 people aged 85 years and older to assess the psychosocial experience of the health crisis and of the restrictions implemented by very old ('oldest old') people. To date, five publications from this survey have shown contrasting results in terms of cognitive and mental health. The team is continuing to study the consequences in the longer term by means of an in-depth clinical examination allowing a better understanding of the consequences of the pandemic in cognitive, psychological, social, physical and functional terms. In June 2022, with the support of the MSA, a follow-up began that was no longer based on a telephone call but on an interview carried out at the participants' homes by psychologists and physicians.

## Launch of the ES-Park multicenter trial: evaluation of the intervention of ES-Park teams, multidisciplinary teams specialized in Parkinson's disease intervening in the homes of people suffering from Parkinson's disease to provide rehabilitation and support

Project launch

RÉPUBLIQUE FRANÇAISE
*Liberté Égalité Fraternité*

ars Agence Régionale de Santé Nouvelle-Aquitaine

Within the framework of the 2008-2012 National Alzheimer's Plan, teams called ESAs were set up to intervene in Alzheimer's patients' homes to rehabilitate and support them in their daily lives. Following the example of these teams in Alzheimer's disease and in view of the data in the literature on Parkinson's disease, the ES-Park trial was launched in September 2022 for a period of 3 years to evaluate the same type of care with teams specialized in the issues involved in Parkinson's disease. These teams are composed of occupational therapists, nurses and psychologists, and work at the patients' homes to maintain their autonomy and social life and improve their quality of life as well as that of their primary caregivers. Three Parkinson's Expert Centers are participating in this trial (Bordeaux, Limoges and Poitiers) and are responsible for recruiting and monitoring patients. This pilot project evaluating the effectiveness of these specialized teams working at the patients' homes is supported by the ARS Nouvelle-Aquitaine.

# EPICENE

## Recourse to hospital palliative care for patients with poor prognosis cancer in France: national ReSPPAC study – '2022SHS-RISP call for projects – Component 3: Thematic Projects'. National Cancer Institute

New study for cancer monitoring

The aim of the study is to identify the sociodemographic, socioeconomic and clinical determinants of the frequency and earliness of first recourse to hospital palliative care (HPC) in patients with poor prognosis cancer in France, considering different types of HPC establishments and the competing risk of death. The data will come from the cancer cohort of the French National Cancer Institute (INCa) extracted from the National Health Data System (SNDS).

## Finalization of the international datecan-elderly initiative: assessing patient-reported outcomes (pros) and patient-related outcomes in randomized cancer clinical trials for older adults: results of datecan-elderly initiative

Others contributions to public health

The DATECAN project (Definition for the Assessment of Time-to-event Endpoint in Cancer Randomized Trials) aims to define new therapeutic efficacy criteria in cancer clinical trials not based solely on overall survival, to allow elderly patients to be included in these trials in which they have been underrepresented to date. In the long term, this standardization of therapeutic efficacy criteria should improve the recruitment of elderly subjects in clinical trials and provide this population with better access to innovative treatments.

## Angeline Galvin received the Reiffers Prize

Awards and nominations

The Reiffers Prize recognized her work on the determinants of access to care and prognosis in elderly cancer patients. Through its multidimensional approach, which takes account of a large number of factors, including those specific to elderly subjects, this study will make it possible to identify the most vulnerable groups within the elderly cancer population, with a view to proposing preventive or management actions and int

## Launch of the application PESTIMAT

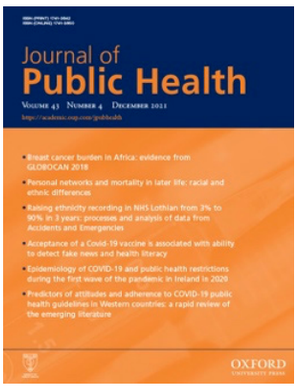
Patents / software

The aim of Pestimat is to record the history of pesticide use in agriculture in mainland France since 1950. Based on knowledge of the crops (vines, maize, wheat, arboriculture, etc.) on which people have worked and the periods during which they have worked, PESTIMAT makes it possible to identify the active ingredients and families of pesticides to which they may have been exposed. This data is essential for understanding long-term health effects. The matrix is used in a number of epidemiological studies, including the AGRICAN cohort. The new online tool makes it possible to 1) better estimate exposure and therefore health risks associated with pesticides in epidemiological research, 2) provide information to all those who need to know about exposure to specific pesticides (occupational health physicians, particularly in occupational pathology consultation centres, MSA health departments, health insurance fund physicians), 3) support preventionists in understanding exposure so that they can monitor and reduce it for exposed professionals

# HEALTHY

## A "hot" and "highly cited" paper on health literacy in the Covid-19 era

Major publication




During the first lockdown, the HEALTHY team set up the CONFINS cohort on the impact of Covid-19 on the well-being of the French population. From the data collected and in collaboration with CRO Kappa Santé and the start-up Kap Code, our researchers demonstrated that the ability to detect fake news was strongly associated with the decision to get vaccinated against Covid-19. More generally, vaccination intention was dependent on health literacy - accessing, understanding, evaluating, and using information. The scientific publication on this topic has been cited over 40 times in Web of Science since its publication in December 2021. This article is in the "Highly cited paper" category (the top 1% of the most cited scientific publications in the world in the Social Sciences category) and is also recognized as a "Hot paper" (top 0.1%), which is a very rare marker and signals a major impact in an emerging field of knowledge such as health communication.

DOI >https://doi.org/10.1093/pubmed/fdab028

# GHiGS

## Launch of 2 interdisciplinary doctorates as part of the IPORA
Major research program

The aim of the IPORA international interdisciplinary research program is: a) designing and carrying out research on the changes taking place on the African continent; and b) carrying out, within this network under construction, research useful to decision-makers faced with the challenges posed by these changes. Coordinated by the GHiGS team, this network is based on a partnership with Université Félix Houphouët Boigny (UFHB, Abidjan, Côte d'Ivoire), Université Internationale de Rabat (Morocco), and Addis Ababa University (UAA, Ethiopia). This first year of the IPORA program saw the emergence of the first two interdisciplinary thesis projects on key IPORA themes and challenges for the African continent, namely urbanization and nutrition:
- Interdisciplinary approaches to children's respiratory health and air pollution in African cities (Disciplines: Environmental Physics and Epidemiology, UB degree, co-direction GHiGS-UFHB).
- Food prices, consumption choices and nutrition. Theory and evidence from Ethiopia 2010-2020 (Disciplines: epidemiology, economics and nutrition, co-diploma UB- AAU).

Photos Auriane Pajot 2022

## Child malnutrition in Africa: success of a new strategy to treat more children at lower cost
Major publication

The GHiGS team, in close collaboration with the humanitarian NGO ALIMA, designed and implemented a randomized clinical trial to evaluate a new strategy called «OptiMA», in which acutely malnourished children, whatever their stage of illness, received a single nutritional treatment, ready-to-use therapeutic food, in a progressively decreasing dosage as nutritional recovery progressed.
The study, carried out in the Democratic Republic of Congo, involved almost a thousand malnourished children aged between 6 months and 5 years, recruited from four health areas in Kasai province, covering some sixty villages and four health centers. The methodology involved following each child for six months, in order to monitor his or her clinical evaluation after the end of treatment and assess the risk of relapse.
The main results of this clinical trial demonstrated that the effectiveness of the OptiMA strategy was not only not inferior to that of conventional programs, but even superior. Acute malnutrition management based on a single program, using a single therapeutic product in progressively reduced doses, led to better nutritional status in children and fewer relapses over a 6-month period.

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The OptiMA protocol for children suffering from acute malnutrition and stunted growth

## Restitution of TB-Speed results to public health actors and decision-makers. June 2022 in Maputo (Mozambique)

Conference organization and others contributions to public health


The TB-Speed project, coordinated by the GHiGS team and funded by Unitaid and Initiative/Expertise France, aimed to develop and evaluate innovative diagnostic approaches for childhood tuberculosis in order to reduce its mortality, through decentralization and better screening of vulnerable children (https://www.tb-speed.com/fr/). On June 9 and 10, 2022 in Maputo, Mozambique, the results of the 5 studies conducted in the project were presented during an international symposium. More than 110 people from the research teams, national programs of the 7 participating countries (Cambodia, Cameroon, Côte d'Ivoire, Mozambique, Uganda, Sierra Leone, Zambia), and the World Health Organization team in charge of pediatric TB attended the symposium. The results of the various research components on the effectiveness of the tested interventions, their cost and cost-effectiveness, their feasibility and acceptability, and the challenges of implementation were discussed as well as their implications for public health and for changing health practices and policies. The symposium was followed by a scientific writing workshop with about 15 young researchers from different countries.

# PHARes

## François Alla elected as member of the Clinical Science section of Academia Europea

Awards and nominations


François Alla Professor at University of Bordeaux and practitioner, University hospital (CHU) of Bordeaux, was elected a member of the Academia Europaea, in recognition of his excellence in the field of population health intervention research, in particular on preventive interventions in health care settings (tobacco, alcohol, vaccination, screening, etc.). He also acts as an expert for a dozen national and international public health and research bodies. Finally, he holds or has held regional and national positions in the governance of research or health policy. He is the current president of the regional conference of health and autonomy (CRSA) of Nouvelle-Aquitaine.

## Carole Dufouil appointed to the Strategic comittee of National Health Data System

Nominations

Carole Dufouil head of the PHAres team was appointed to the "Financing of public health databases" working group by the Strategic Committee of the National Health Data System. This group composed of representatives from the Ministry of Health and Prevention, the Ministry of Higher Education and Research and the Ministry of the Economy, Finance and Industrial and Digital Sovereignty, as well as representatives from hospital health establishments, the conference of CHRU general directors and the Health Data Hub, is responsible for studying the modalities of a sustainable financing of large health databases.

# PHD THESES DEFENDED

# PHD THESES DEFENDED ON 2022

**ALBERT MARION**
**Understanding the situations of pesticide exposure during the use of sprayers.** Design and regulation as a chain of determinants
Cognitive sciences
Ergonomics option
supervised by GARRIGOU Alain et CHARBONNEAU Alexandre

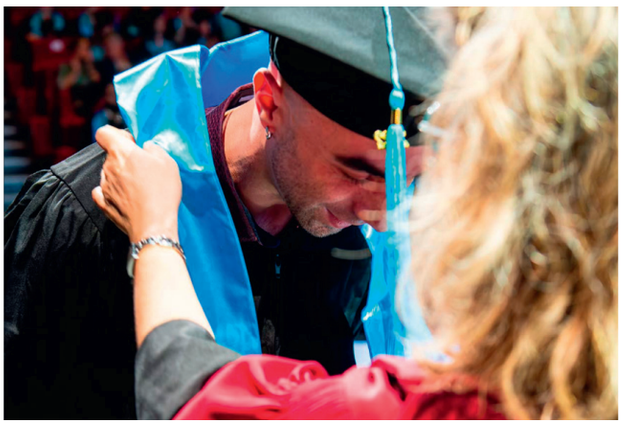
**ALEXANDRE MARIE**
**Mechanistic modeling and optimization of vaccine response in infectious diseases: application to HIV, Ebola and SARS-CoV-2**
Public Health Biostatistics option supervised by THIEBAUT Rodolphe et PRAGUE Mélanie

**ANDERSON ALEXANDRA**
**Epidemiology of sexually transmitted infections among female sex workers in Togo**
Public Health
Epidemiology option
supervised by EKOUEVI Didier et COFFIE Patrick

**CAZES CÉCILE**
**Simplified management of acute malnutrition in children aged 6 to 59 months: the OPTIMA-2 community-based clinical randomized trial in the Democratic Republic of Congo**
Public Health
Epidemiology option
supervised by BECQUET Renaud

**CHERADAME JÉRÉMY**
**Study of injury risk factors in senior elite rugby**
Public Health Biostatistics option supervised by JACQMIN-GADDA Hélène and DECQ Philippe

**COSSIN SÉBASTIEN**
**Contributions to information extraction in a hospital data warehouse : an aid for clinical research**
Public Health Information Technology and Health option supervised by JOUHET Vianney and DIALLO Gayo



**DAOUD FRÉDÉRIC**
**Assessment of the efficacy of sutures with triclosan on microorganisms associated with surgical site infections**
Pharmacology, option Pharmacoepidemiology, Pharmacovigilance
supervised by MOORE Nicholas and ROGUES Anne-Marie

**DE CASTRO NATHALIE**
**Efficacy of raltegravir-based regimens for antiretroviral treatment of people with HIV and tuberculosis in low -and middle- income countries: insight from clinical trials**
Public Health
Epidemiology option
supervised by MARCY Olivier

**DE COURSON HUGUES**
**Blood pressure variability and cerebrovascular risk: confirmation and new methods**
Public Health
Epidemiology option
supervised by TZOURIO Christophe et LEFFONDRE

**KAREN DE GRAAF LUCIE**
**Occupational exposure to pesticides and health outcomes among greenspace workers in France.**
Public Health
Epidemiology option
supervised by BALDI Isabelle

**DEVAUX ANTHONY**
**Dynamic modelling and prediction of health events from multivariate longitudinal data**
Public Health Biostatistics option supervised by PROUST-LIMA Cecile and GENUER Robin

**DINART DEREK**
**Methods for estimating randomized cancer trial sizes in the presence of survival data and heterogeneous populations**
Public Health Biostatistics option supervised by BELLERA Carine et RONDEAU Virginie

**FRANCIS FLORENCE**
**Proportionate universalism: towards an application to populationhealth interventions for a reduction of health inequalities**
Public Health
Epidemiology option
supervised by ALLA François

**GONCALVES RUBEN**
**Analytical contribution of high-resolution mass spectrometry by QTOF for the identification and management of psychoactive substances exposure**
Pharmacology, option Pharmacoepidemiology, Pharmacovigilance
supervised by MOLIMARD Mathieu

**GOUTILLE FABIENNE**
**No longer ignoring farmers : a contribution of ergonomics to the prevention of pesticide risk in wine-growing areas** Cognitive sciences
Ergonomics option
supervised by GARRIGOU Alain et GRUENAIS Marc-Eric

**JASPARD MARIE**
**Operational research on emerging infectious diseases in Sub-saharan Africa**
Public Health
Epidemiology option
supervised by MALVY Denis

**KHAN SADIA**
**Early life respiratory and allergic profiles and their associated factors in French general population : findings from the ELFE (Etude Longitudinale Française depuis l'Enfance) cohort**
Public Health
Epidemiology option
supervised by RAHERISON Chantal

**LE COENT QUENTIN**
**Early life respiratory and allergic profiles and their associated factors in French general population : findings from the ELFE (Etude Longitudinale Française depuis l'Enfance) cohort**
Public Health Biostatistics option supervised by RONDEAU VIRGINIE and LEGRAND Catherine

**GRAND QUENTIN**
**Genetic determinants of structural and vascular brain phenotypes in young adults and across the lifespan**
Public Health
Epidemiology option
supervised by DEBETTE Stéphanie

**LETINIER LOUIS**
**Drug-drug interactions: prevalence, risks and prevention tools**
Pharmacology, option Pharmacoepidemiology, Pharmacovigilance
supervised by PARIENTE Antoine

**MAKAREMI MASROUR**
**Practitioner-new technology interface in dentofacial orthopedics : contribution of cognitive sciences**
Sciences cognitives et Ergonomie - Option Sciences Cognitives
supervised by N'KAOUA Bernard

**NAVARRO MARIE**
**Machine learning for prediction of suicidal behaviors in adolescents and young adults**
Public Health Biostatistics option supervised by COTE Sylvana

**PELLAY HERMINE**
**Associations between dairy products, cerebral volume and cognitive functions in the elderly**
Public Health
Epidemiology option
supervised by FEART-COURET Catherine

**POISEUIL MARIE**
**Participation in breast cancer screenings in women and survival after breast cancer by screening and socio-demographic inequalities**
Public Health
Epidemiology option
supervised by COUREAU Gaëlle et AMADEO Brice

**SINGIER ALLISON**
**Medicines misuse : characterization and assessment. Cases of benzodiazepines and weak opioids.**
Pharmacology, option Pharmacoepidemiology, Pharmacovigilance
supervised by SALVO Francesco

# EVENTS 2022

# JOINT PUBLIC HEALTH SEMINARS 2022

Grand rounds jointly organized with Bordeaux School of Public Health ISPED and Public Health Department of university of Bordeaux

## FEBRUARY

**• 35 years post-Ottawa Charter: what lessons learned and what remaining challenges for well-being friendly public health policies?**

**Linda CAMBON**, Chaire Prévention ISPED, Équipe PHARes BPH, Université de Bordeaux, CHU Bordeaux
**Dr Stéphanie VANDENTORREN**, Direction scientifique et International, Santé Publique France / Équipe PHARes BPH
**Dr Laurent EL GHOZI**, Président d'honneur de l'association Élus, santé publique et Territoires.

**• Let's talk less, let's talk about xxxx**

**Nathalie BONVALLOT, Claire MORISSON, Nadine RIVET, Annie BURBAUD, Elodie GRIMAL**

## MARCH

**• Ethics in health decision-making in times of crisis: feedback from the national PENTERE project (analysis of the impact of the Covid crisis xxxx)**

**Pr Grégoire MOUTEL,** Chef de service de médecine légale et droit de la santé au CHU de Caen (Université de Normandie) et Directeur de l'Espace de Réflexion Éthique de Normandie.

**• Management of severe acute malnutrition in infants in Africa: successes and challenges**

**Dr André BRIEND**, Center for Child Health Research, Faculty of Medicine and Medical Technology, Tampere University, Tampere, Finland

Grand Programme de Recherche IPORA | Interdisciplinary Policy-Oriented Research on Africa / université de BORDEAUX

## MAY

**• " Maternal employment and children's outcomes – Evidence from Indonesia "**

**Maria C. Lo Bue** Department of Economics and Finance, University of Bari, Bari, Italy

## JUNE

**• "Genomics and drug discovery – past, present, future",**

**Professeur Vincent Mooser**, titulaire de la Chaire d'excellence en recherche du Canada en médecine génomique de l'Université McGill.

## SEPTEMBER

**• Brain plasticity and resilience,**

**Nora Abrous** Equipe Neurogenèse et physiopathologie, Neurocentre Magendie, Bordeaux

**Maël Lemoine** Laboratoire ImmunoConcept, Bordeaux

## OCTOBER

**• Vitamin B12 deficiency among the elderly: using the NuAge research bank to designa urine screening programme**

**Nancy Presse, Dt.P., Ph.D,** Professeure adjointe, Faculté de médecine et des sciences de la santé, Université de Sherbrooke, Centre de recherche sur le vieillissement du CIUSSS de l'Estrie-CHUS et Centre de recherche de l'Institut universitaire de gériatrie de Montréal, Directrice du Laboratoire sur l'alimentation des aînés et la nutrition gériatrique, Directrice des Banques NuAge

# BPH THEMATIC RESEARCH SEMINARS 2022

The BPH organizes 4 seminars per month to give the opportunity to understand the issues in our on the major strategic research themes, to take stock of the progress of projects in the teams and to identify new synergies at the Centre level.

## THEME "ENVIRONMENTAL & SOCIAL DETERMINANTS OF HEALTH"

### MARCH

• **Perspectives in the projects ETIOSARC et CERENAT**
**Brice Amadeo / Sarah Rousseau**, EPICENE Team, BPH

• **Interactions between genetic, optimal cardiovascular health and dementia**
**Jeanne Neuffer**, ELEANOR Team, BPH

### APRIL

• **Assessment of environmental and occupational exposures in cohorts on ageing and/or cancer**

• **Pesticide exposure of green-space workers in the AGRICAN cohort**
**Lucie de Graaf,** EPICENE Team, BPH

• **Assessement of air pollution exposure in the cohorts Constances/3C/Gazel**
**Laure Gayraud**, LEHA Team, BPH

• **Analysis of Public Policies with Impact on Children : APPIE Project**
**Louise Wallerich**, PHARes team, BPH

• **Social determinants of infant malnutrition in Kasaï, Democratic Republic of Congo: case control study nested in a clinical randomized trial**
**Renaud Becquet**, GHiGS Team, BPH

# THEME " METHODS IN DATA SCIENCE "

## APRIL

### ANALYSIS OF DNA METHYLATION DATA

- **Differential analysis of DNA methylation data: a review of the state-of-the-art**
  **Boris Hejblum**, SISTM team, BPH

- **DNA methylation for the study of age-related diseases**
  **Cécile Delcourt**, LEHA team director, BPH

- **DNA methylation in small vessel disease**
  **Aniket Mishra**, ELEANOR team, BPH

## MAY

### METHODS FOR CAUSALITY STUDIES

- **Introduction to directed acyclic graphs (DAG)**
  **Karen Leffondré**, BIOSTAT team, BPH

- **Mediation analysis and joint models for surrogate validation using meta-analyses**
  **Quentin Le Coënt**, BIOSTAT team, BPH

### ELECTRONIC HEALTH DATA: WHAT CAN WE DO/ WHAT CAN THEY DO

- **SNDS & HDH: we can't tell you when, but we can tell you how**
  **Antoine Pariente** AHEAD team director, BPH

- **Towards a European Health Data Space: a Use Case proposal on Cardiometabolic Diseases between 5 European countries**
  **Gayo Diallo** : AHEAD team co-director, BPH

- **TARPON Project: Automatic Processing of Emergency Department Visits Summaries for an Injury National Observatory**
  **Emmanuel Lagarde**, AHEAD team, BPH

- **European initiatives to improve knowledge about Medication Safety in Pregnancy**
  **Hedvig Nordeng,**
  Professor PharmacoEpidemiology and Drug Safety, Department of Pharmacy, University of Oslo, Norway

# THEME "AGEING AND RESILIENCE"

## SEPTEMBER

### POSITIVE AGEING MODELS

- **Epidemiology of healthy aging: concept and application to AMI cohort data,**
  **Antoine Gbessemehlan**, ACTIVE team, BPH

- **Evaluation of dementia-friendly initiatives**
  **Damien Krier**, PHARes, ACTIVE teams, BPH, small-scale homelike residential care and dementia village models: a scoping review

### DIGITAL DEVICES AS FACILITATORS AND PROMOTERS OF ACTIVE AGEING ?

- **Fall detection and prevention systems of homecare for the elderly: myth or reality ?,**
  **Marion Pech**, ACTIVE team, BPH

- **Soci'Alz, an adapted technology to support social participation of residents suffering from dementia,**
  **Lucile Dupuy**, ACTIVE team, BPH

### FAMILY AND PSYCHOLOGICAL FACTORS OF RESILIENCE

- **Resilience in older couples**
  **Valérie Bergua**, ACTIVE team, BPH

- **Optimism: a possible path to resilience**
  **Louis Hébrard**, ACTIVE team, BPH

# THEME "BRAIN HEALTH ACROSS THE LIFECOURSE"

## OCTOBER

- **Strengthening causal inference in Parkinson's disease: triangulation of proof.**
  **Alexis Elbaz**, MD, PhD, Director of research, INSERM U1018 Centre for Epidemiology and Population Health Villejuif, team" Exposome and Heredity " https://cesp.inserm.fr/en/equipe/exposome-and-heredity).

- **"Nutrition and brain health"**
  **Catherine Féart**, LEHA team, BPH

- **"Use of machine learning to predict suicidal behavior "**
  **Marie Navarro**, HEALTHY team, BPH

- **"Infectious diseases in older adults : what about cognition? "**
  **Virgilio Hernandez-Ruiz**, ACTIVE team, BPH

- **"Stroke genetics informs drug discovery and risk prediction across ancestries"**
  **Aniket Mishra**, ELEANOR team, BPH

# THEME "INFECTIOUS DISEASES & PREPAREDNESS"

- **"Vaccines for Ebola virus disease: results of the PREVAC randomized trial"**
  **Edouard Lhomme**, SISTM team, BPH

- **"In-utero exposure to HIV/ART and 12-month survival in HIV-exposed uninfected children in the pre- and post-ART era: a causal mediation analysis"**
  **Renaud Becquet**, GHiGs team co director, BPH

- **"COVID-19 vaccination in specific populations: results from the ANRS0001S COV POPART cohort study"**
  **Linda Wittkop**, SISTM team, BPH

- **"Control of Malaria in Pregnancy: from clinical trials to implementation science"**
  **Raquel González**, ISGlobal, Barcelona

- **"WHO REACT prospective meta-analyses of COVID treatment"**
  **Pr Jonathan Sterne**, Univ. Bristol

- **Financial conflicts of interest: danger for scientific integrity**
  **Pr Didier Dreyfuss**, AP-HP, member of CCNE

# BIOSTATISTICS SEMINARS 2022

These events are intended for researchers in statistics interested in recent developments and their methodological aspects as well as for practitioners using statistical methods in the health field.

## JANUARY

• **"Dynamic event prediction from multiple longitudinal markers by 'model averaging' "**
Hélène Jacqmin-Gadda
BIOSTA Team BPH

• **"Prediction of the COVID-19 pandemic"**
Long Ma (TU Delft, NL)
https://www.nas.ewi.tudelft.nl/index.php/long-ma

## MARCH

• **"Evaluation of the impact of a change in tobacco consumption on the prevalence of myocardial infarction in France"**
Pierre Joly (BPH)

## APRIL

• **"Sample size estimation for recurrent event data using multifrailty and multilevel survival models"**
Derek Dinart (BPH)

## MAY

• **"End of propensity score for emulating clinical trials?"**

• **"Impact of blood pressure variability on the risk of stroke"**
Léonie Courcoul (BPH)

## JUNE

• **"On the choice of longitudinal models for the analysis of anti-tumor efficacy in mouse clinical trials of patient-derived xenograft models"**
Hélène Savel (BPH)

## JULY

• **"Modeling long term biomarker paths"**
Terry Therneau (Mayo Clinic)

## SEPTEMBER

• **" Flexible extensions of AFT model: new methods & applications"**
Michal Brahamowicz
https://www.mcgill.ca/epi-biostat-occh/michal-abrahamowicz

## NOVEMBER

• **"Profiles of hemoglobin trajectories in Non-Dialysis Chronic Kidney Disease and associated risk of Major Cardiac Events"**
Lisa Le Gall (BPH)
Michal Abrahamowicz
https://www.mcgill.ca/epi-biostat-occh/michal-abrahamowicz

• **"Viral and immune kinetics of HPV genital infections in young adult women"**
24 November 2022
Baptiste Elie
https://alizon.ouvaton.org/people_fr.html

## DECEMBER

• **"Bayesian networks: prediction and decision support"**
Pierre Catoire (BPH)

# SUMMER SCHOOLS AND OTHER EVENTS 2022

## FEBRUARY

**• Parlons peu, parlons Perturbateurs Endocriniens, Department of Public Health webinar, University of Bordeaux/Isped /BPH**

## JUNE

**• Bordeaux Summer School Africa 2022, Sustainable African cities: multidisciplinary research to meet health, demographic, economic and political challenges online summer school organized within the framework of the IPORA Major Research Program – Interdisciplinary Policy – Oriented Research on Africa**

## OCTOBER

**• First BPH Junior Researchers'day**


## NOVEMBER

**• Public health issues Alumni guest speakers**

Alumnis invités

**M2 SITIS Kevin Ouazzani, Clinityx**

https://www.clinityx.com/

**Tatiana Andriamiarana, IzyCardio**

https://www.izycardio.com/

**M2 BIOSTAT et deux alumnis biostat**

## DECEMBER

**• "Economics for the evaluation of health policies?"**

**Lise Rochaix**, Professor of Economics at the University of Paris 1 Panthéon-Sorbonne, Director of the Research Chair in Health Economics (Hospinnomics), a partnership between the Paris School of Economics and the Assistance Publique - Hôpitaux de Paris, President of the Board of Directors of the ATIH (Technical Agency for Hospital Information)

# CONFERENCES AND CONGRESSES 2022

## MAY

**• Bordeaux PharmacoEpi Festival, 10th edition**

## SEPTEMBER

**• 27th Workshop of the International Stroke Genetics Consortium,** Bordeaux, co organized with the University of Ibadan (Nigeria)

**Stéphanie Debette** Professor of Epidemiology at Bordeaux University and director of INSERM Center U1219 and **Aniket Mishra**, postdoctoral researcher in the field of quantitative genetics BPH, University of Bordeaux with **Rufus Akinyemi** Deputy Director of the Centre for Genomics and Precision Medicine, College of Medicine, University of Ibadan, Nigeria and **Mayowa Owolabi** Professor of Neurology and pioneer Director, Center for Genomic and Precision Medicine Dean, Faculty of Clinical Sciences, University of Ibadan

## OCTOBER

**• Exchange and debate "Public health": what now?** Mutualité Française Nouvelle-Aquitaine

**Pr François Alla,** Professor of Public Health at University of Bordeaux, Hospital Practitioner at CHU of Bordeaux, BPH researcher
**Pr François Dabis**, President of l'IREPS Nouvelle-Aquitaine, BPH researcher

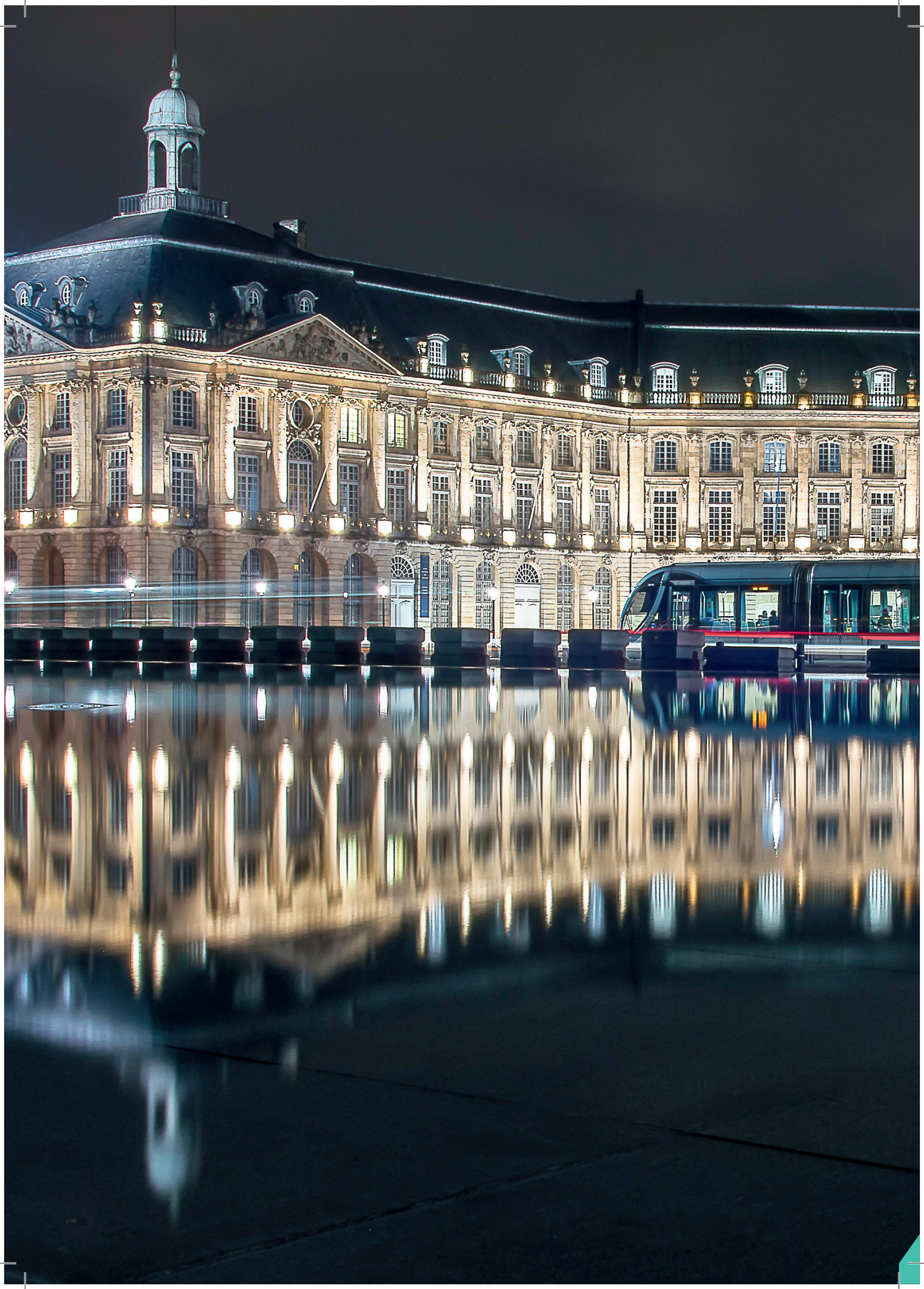
**• Launch of the first Datathon of the Public Health Data Science Implusion Research Network**

First 'datathon' of the 'Public Health Data Science' (PHDS) Bordeaux research network Inria center
CPL Dynamic prediction from multiple markers - Hélène Jacqmin-Gadda (BPH Inserm),
Modelling the response to vaccine to define mechanistic correlate of protection - Marie Alexandre (Inria, Inserm, BPH),
Methods for post-clustering inference applied to gene expression data analysis - Benjamin Hivert (Inria, Inserm, BPH),
A population-based Kalman filter - Annabelle Collin (CNRS, Inria, Bordeaux INP, IMP),
Keynote speaker: Xavier Hinaut (Inria Bordeaux Sud-Ouest)
Le Reservoir Computing pour le traitement de séquence efficace : de la théorie à la pratique avec ReservoirPy
Reservoir computing for efficient treatment of sequences: from theory to practice with ReservoirPy

## NOVEMBER

**• Care symposium, real life data and territories. Contribution of strategic decision-making for health**

**Fleur Mougin**, Professeure d'informatique, Responsable du M2 SITIS - ISPED, Membre du conseil d'administration de l'Association Française d'Informatique Médicale, BPH
**Vianney Jouhet**, Hospital Practitioner at CHU of Bordeaux - Public Health Physician specialized in medical informatics, BPH reseracher
**Rodolphe Thiebaut**, Head of the Medical Information Service at CHU of Bordeaux, Professor in Biostatistics at the University of Bordeaux and Director of the SISTM team BPH



# SOCIETAL IMPACTS

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The BPH is strongly committed to contributing to the **United Nations' Sustainable Development Goals** and to improving population health both locally and globally, embracing a comprehensive precision and global health approach targeting major health challenges, with a special focus on brain, vascular and infectious diseases, as well as cancer.
All the research conducted at the BPH contributes to addressing sustainable development goals, mostly **SDG3** (good health) and **SDG4** (quality education), but also **SDG10** (reduced inequalities), and **SDG11** (sustainable cities & communities). The BPH is also involved in the partnership recently established between UBx and **the Ban Ki-Moon centre for global citizens**, a quasi-international organization chaired by former UN SG Ban Ki-Moon to support the implementation of SDGs, with the participation of scholars in the online **Bordeaux Summer School** 'Sustainable African cities multidisciplinary research to meet health, demograpic, economic and political challenges' organized on May 2022 by the GHiGS team and the Interdisciplinary Policy-Oriented Research on Africa Program. 6 BKM scholars in the recent summer.


BPH researchers are also acutely aware of sustainable development goals at large, including the **climate emergency and environmental impacts**. In fact, many members and researchers within the BPH are engaged in climate action (SDG13) and implicated in an active network of students and **staff ambassadors of the environmental and societal transition** ("Référents Transitions") **of the University of Bordeaux**, in order to contribute to the integration actions; (3) initiate concrete actions to save energy and water and optimize waste recycling).

The BPH representative appointed as university's transitions referent is involved in working groups on the societal and environmental transitions program, and contributed to discussions with the **Minister of Higher Education and Research during her visit to Bordeaux in October 2022** the BPH is member of an active network of student and staff ambassadors implicated in working groups on societal and environmental transitions program **"Action Climat Environnement"** (ACE) and group launched at UBx (www.aceub.fr) and meeting on a monthly basis to coordinate the actions implemented in the different research units and to develop common concerted actions. The objective is to: (1 perform an inventory of the impact of research activities on climate change (business travel, use of digital technologies, waste management); (2) carry out awareness-raising actions; (3) initiate concrete actions to save energy.

Minister of Higher Education and Research during her visit to Bordeaux in October 2022.

Since 2018 a **quality and integrity (Q&I) management process** has been established in the Centre to increase awareness of and promote scientific integrity in research. A Q&I committee was set up including team directors, researchers, and engineers. In 2022 several seminars surveys has been organized on "Files and databases organization" and "Training for bibliographic search, reference management and Regulatory aspects".
The committee is coordinating by Catherine Fagard-Sultan who participates in several working groups of the "Réseau Inserm Quality" and the "Délégation à l'intégrité Scientifique de l'Inserm", creating a link with national activities of Inserm involving Quality and Integrity.


Finally, despite a less prominent tradition in public health compared to other disciplines, BPH researchers are increasingly involved in innovation and technological transfer activities. Over the past 5 years, BPH researchers have produced >**15 patents invention disclosures**. They obtained **15 Cifre fellowships** (joint academic-industry fellowships) and have established **25 industrial and R&D contracts**, both with SMEs and large multinational pharmaceutical companies, particularly in the context of vaccine trials.
Since 2016, **4 start-ups** have emerged from BPH teams including Synapse, UT4H, Tricky and in 2022 RetiNet which offers a personalised medicine service for the prevention of AMD via a digital platform. This new spin-off from the Population Health
Research Centre in Bordeaux has been selected by Microsoft to join the Microsoft for Startups Founders Hub programme to accelerate the development and growth of startups.

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