

## CALL FOR APPLICATION

### INSERM CHAIR Recruitment

#### Development of new statistical methods to study the genetic component of complex diseases beyond association studies

The Inserm chair recruitments opened to Inserm are intended for researchers with strong potential to manage and lead research teams and participate in national, European or international projects.

This recruitment, based on research and teaching projects, is aimed at researchers with a doctorate or equivalent and a first post-doctoral experience. The position is offered on a fixed-term contract (CDD) with a view to tenure in the Inserm Research Directors personnel at the end of the contract.

Application on EVA: <https://eva3-accueil.inserm.fr/sites/eva/chaieres/2023/session2/Pages/default.aspx>



<b>Supporting institution:</b>	Inserm : Institut national de la Santé et de la recherche médicale
<b>Name of the head of the institution:</b>	Pr. Didier Samuel
<b>Academic region:</b>	Paris
<b>Location/ Site concerned:</b>	Genetic Epidemiology of Cancers Team - Inserm Unit 900 - Institut Curie - Paris - France
<b>Partner institution:</b>	Institut Curie
<b>Research contact</b>	Nadine Andrieu ( <a href="mailto:nadine.andrieu@curie.fr">nadine.andrieu@curie.fr</a> ) and Fabienne Lesueur ( <a href="mailto:fabienne.lesueur@curie.fr">fabienne.lesueur@curie.fr</a> )
<b>Administrative contact</b>	<a href="mailto:chaieres-professeur-junior@inserm.fr">chaieres-professeur-junior@inserm.fr</a>
<b>Research fields EURAXESS :</b>	Cancer research, Health sciences
<b>Keywords:</b>	maladie complexe, facteur génétique, facteur environnemental, style de vie, prédisposition génétique

<b>Job title to be filled:</b>	Chaire sur le développement de nouvelles méthodes statistiques pour étudier la composante génétique des maladies complexes au-delà des études d'association
<b>Body after tenure:</b>	Research Director
<b>Anticipated duration of the contract:</b>	5 years

<b>Scientific domains/fields:</b>	Genetic statistics - genetic epidemiology
<b>Corresponding specialized scientific commissions (CSS):</b>	CSS2 : Cancérologie, maladies génétiques CSS6 : Santé publique, santé des populations
<b>Project name:</b>	Development of new statistical methods to study the genetic component of complex diseases beyond association studies

<b>Funding :</b>	
<b>ANR package :</b>	200k€
<b>Total project</b>	200k€

<b>Remuneration package</b>	3 500€ - 5 000€ according to research experience
<b>Quota</b>	Full Time

### Strategy of the host institution:

The Genetic Epidemiology of Cancers team (GEC) is located at the Institut Curie (<http://www.curie.fr>), which is a world-class Comprehensive Cancer Center with a hospital group treating more than 13,000 patients per year, and a multidisciplinary research center combining research in biology, genetics, computational biology, soft matter physics, organic and medicinal chemistry. It is part of the Inserm Unit "Cancer and Genome: Bioinformatics, Biostatistics and Epidemiology of Complex Systems" (U900). U900 staff is studying several aspects of cancer pathology and treatments and focusing on the underlying molecular and cellular mechanisms: initiation (estimation of cancer risks, including genetic and non-genetic factors, optimization of patient follow-up strategies), tumor development and progression, and improvement of therapeutic strategies. The research projects are carried out by interdisciplinary teams comprised of biologists and clinicians, epidemiologists, mathematicians, statisticians, physicists and computer scientists. U900 staff scientists are experts in high-dimensional data analysis and modeling. Their activity combines experimental and theoretical approaches, cycling in iterative manner from experimental biology and clinics to mathematical models and back. The final results are validated explicative and predictive models.

### Strategy of the host laboratory:

Projects developed by GEC aim at characterizing genetic variants involved in predisposition to cancers by considering effects of other genetic or non-genetic factors. In addition to variants involved in monogenic transmission, common variants are also studied, as well as their interactions with lifestyle and environmental exposures.

Studied populations are populations at high risk of cancer, such as Hereditary Breast and Ovary Cancer families, or populations having a cancer risk a priori similar to that of the general population. Within the team, the Platform of Investigation in Genetics and Epidemiology was established to support epidemiology- and genomics-related activities. This platform is involved in the setting up, collection and centralization of epidemiological, familial and clinical data of the national studies that the team coordinates. The team also aims to adapt laboratory, pathology and bioinformatics-related genomic techniques to suit the projects' particular needs and is endowed with a wet lab activity.

Results from this research will in fine allow to improve risk prediction models and therefore to more precisely estimate tumor risks, which in turn will help elaborating personalized screening, follow up and new prevention strategies.

### Summary of the scientific theme:

Classical methodologies and analytical strategies used to study the genetic component of complex diseases as cancer have reached their limit to discover new susceptibility variants. So far, methods such as the genotype-restricted likelihood method, maximum likelihood parametric methods or other modified segregation-analysis approaches allow estimation of penetrance of variants (or cumulative risks of developing the disease) in a high risk family context under simplistic transmission models. For more common variants, conferring either a moderate- or low-risk of diseases, strategies such as genome-wide association studies (GWAS) have also reached their limit.

The recruited researcher is expected to propose new analytical methods and strategies to consider the complexity of multifactorial diseases. As example, adequate consideration of environmental and lifestyle factors, such as their variation over time, should make it possible to highlight genetic factors acting differently throughout life and influencing the onset of the disease. This work should not only be based on simulated data but above all on real-life data. Data from studies coordinated by GEC and international data of the consortia to which GEC belongs will be available to develop and validate the methods.

### Summary of the teaching project:

The teaching will consist in presenting the methods in genetic epidemiology for complex diseases both for family data and for so-called general population data. This teaching should be generously illustrated with examples of real-life data to raise awareness of the advantages and limitations of these methods.

Reminders of the fundamentals of genetics (transmission models, classification of variants....) and epidemiology (concept of risk: relative, cumulative, absolute...; choice of control populations: unaffected relatives, population-based controls; biases related to ascertainment, anamneses, genetic testing ...) should be considered according to the background of the students.

### Scientific dissemination/ Open Science :

The policy of the U900 lab is to publish in the best journals and conferences in our discipline. The recruited researcher is expected to publish regularly as principal author but also as co-author.

Several presentations at national and international conferences, national and international consortia will be part of the expected contributions.

#### **Open Science :**

All the published articles will be on HAL in their integral version. As for the data collected and prepared for research, they will be made available to the community as soon as possible, after a possible embargo period. Participation in the creation of challenges in the field will allow further enhancing the value of the proposed developments and their recognition in the wider international community.

### Science and society:

The U900 lab participates every year in the Fête de la Science and the Nuit des Chercheurs. The recruited researcher will be expected to actively participate in these events and communicate with the general public.

Depending on his or her current situation, he or she may also be interviewed by journalists from the general or popular science press.

### Selection of candidates:

It is carried out by a selection commission, composed of six to ten members, the majority of whom are specialists in the fields of research concerned.

The selection commission carries out an initial examination of the application files, particularly in the light of the research and teaching project presented. At the end of this examination, it draws up a list of candidates selected for a hearing.

Only candidates previously selected on the basis of their applications by the selection committee will be invited to the audition.

At the end of the hearings, the selection committee will deliberate and decide on the merits of the candidates, taking into account: the quality, originality and, where appropriate, the interdisciplinarity of the research and teaching projects presented, the motivation of the candidates and their scientific and teaching supervision capacity.

The candidates selected at the end of the selection process will be offered a junior professorship contract, after receiving the opinion of the President and CEO of Inserm.

### Required profile:

**Education Level : Phd**

Researcher Profile : R3/R4

*R3 Established researcher A stage in a researcher's career describing those who have developed a level of independence and can be described as an established researcher*

*R4 Leading Research A stage in a researcher's career where they can be termed a 'leading researcher'. This would include the team leader of a research group or head of an industry R&D laboratory.*

Your application will be evaluated according to the following criteria :

- Relevance and originality of the project related to the research field
- International exposure in research projects
- Your ability to raise funds
- Participation in editorial and reviewing activities
- Your teaching experience
- Your ability to lead a team...

### Application instruction :

Applications can be submitted online at [EVA](#).

Deadline application: 11<sup>th</sup> September 2023

*Please complete the scientific file in English.*

*It is imperative to contact the laboratory corresponding to the Chair you have applied for in order to build the project with them.*

Position also open to 'Bénéficiaires de l'Obligation d'Emploi' (disabled persons), as defined in article 27 of law no. 84-16 of January 11, 1984 on statutory provisions for the civil service.