



**Offer #2024-07886**

## **Mechanistic learning of the natural history of lung cancer**

**Level of qualifications required** : Graduate degree or equivalent

**Fonction** : Internship Engineering

**Level of experience** : Recently graduated

### **About the research centre or Inria department**

The Inria centre at Université Côte d'Azur includes 42 research teams and 9 support services. The center's staff (about 500 people) is made up of scientists of different nationalities, engineers, technicians and administrative staff. The teams are mainly located on the university campuses of Sophia Antipolis and Nice as well as Montpellier, in close collaboration with research and higher education laboratories and establishments (Université Côte d'Azur, CNRS, INRAE, INSERM ...), but also with the regional economic players.

With a presence in the fields of computational neuroscience and biology, data science and modeling, software engineering and certification, as well as collaborative robotics, the Inria Centre at Université Côte d'Azur is a major player in terms of scientific excellence through its results and collaborations at both European and international levels.

### **Context**

This PhD position will take place in the environment of the Inria-Inserm team COMPO (COMputational Pharmacology in Oncology), located in the La Timone health campus. The team is composed of mathematicians, data scientists, pharmacists and clinicians and is a unique multidisciplinary environment focused on developing novel computational tools for decision-making in clinical oncology.

The PhD student will join a national consortium in the context of the LUCA-pi (lung cancer prevention and intervention) national RHU project (30M€ with 10M€ from the French national research agency) consisting of:

- AP-HM (university hospitals of Marseille, Pr D. Boulate)
- Gustave Roussy Institute (Pr L. Zitvogel and Pr G. Kroemer)
- Center for Immunology of Marseille (P. Milpied)
- Inria – Inserm COMPO

The objective is to develop a mechanistic mathematical model of the lung cancer natural history and combine it with machine learning algorithms to predict a localized, early-stage lung cancer or the post-surgery metastatic relapse.

The PhD will be supervised by a mathematician/data scientist (Dr S. Benzekry, head of COMPO) and a thoracic surgeon (Pr D. Boulate, PI of the LUCA-pi project).

### **Assignment**

#### **Data**

The project builds on already existing databases and ongoing prospective projects integrating high dimension clinical, imaging and biological longitudinal phenotyping. The PREVALUNG, PREVALUNG ETOILE and PREVALUNG BIOCEPTION are 3 intertwined projects respectively funded by the National Institute against cancer (INCa), Aix-Marseille University Foundation for Excellence (A\*midex) and the European commission (PREVALUNG EU, Horizon Europe Program). The PREVALUNG studies are recruiting 2750 participants with 3 rounds of lung cancer screening including baseline and longitudinal multimodal phenotyping.

### **Main activities**

**Main activities:**

- Review of the literature
- Benchmark of existing methods
- Development of novel "mechanistic learning" algorithms
- Interactions with the biological and clinical partners
- Writing scientific publications

#### Additional activities:

- Continuous integration / continuous deployment of the code
- Data visualization
- Statistical reporting to the partners

## Skills

#### Technical skills and level required :

- Excellent programming skills in a scripting language (R and/or Python)
- Strong background in statistics and machine learning
- Hands-on experience with real-world data analysis
- Ideally, experience in mixed-effects modeling
- Experience in computer vision is a plus
- Strong motivation for medical and societal applications of computational methods
- Knowledge of biology and/or medicine is a plus
- Ability to work both independently and as a team, good relational skills

#### Additional:

- English speaking
- Intermediate academic writing skills
- Intermediate oral presentation skills

## Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Contribution to mutual insurance (subject to conditions)

## Remuneration

Gross Salary per month: 2100€ brut per month (year 1 & 2) and 2190€ brut per month (year 3)

## General Information

- **Theme/Domain** : Computational Neuroscience and Medicine  
Biologie et santé, Sciences de la vie et de la terre (BAP A)
- **Town/city** : Marseille
- **Inria Center** : [Centre Inria d'Université Côte d'Azur](#)
- **Starting date** : 2024-02-01
- **Duration of contract** : 6 months
- **Deadline to apply** : 2024-07-23

## Contacts

- **Inria Team** : [COMPO](#)
- **Recruiter** :  
Benzekry Sebastien / [Sebastien.Benzekry@inria.fr](mailto:Sebastien.Benzekry@inria.fr)

## About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

## The keys to success

You don't just apply the reference method to a given problem; instead, you are eager to thoroughly understand the information contained in the data.

**Warning** : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

## Instruction to apply

Applications must be submitted online on the Inria website. Collecting applications by other channels is not guaranteed.

The position is open to:

- Inria internal mobility, remuneration according to statutory conditions
- mobility from other public body, by posting for a period of three years, renewable, remuneration according to statutory conditions
- in short term contract from service fixed-term

### **Defence Security :**

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

### **Recruitment Policy :**

As part of its diversity policy, all Inria positions are accessible to people with disabilities.