2018-00790 - PhD position: Mathematical modeling of anti-cancer immunotherapies

Level of qualifications required: Graduate degree or equivalent
Fonction: PhD Position

About the research centre or Inria department

The MONC project-team aims at developing new mathematical models involving partial differential equations and statistical methods based on a precise biological and medical knowledge in order to build numerical tools based on available quantitative data about cancer. The goal is finally to be able to help clinicians and/or biologists to better understand, predict or control tumor growth and possibly evaluate the therapeutic response, in a clinical context or for pre-clinical studies. We plan to develop patient-specific approaches (mainly based on medical imaging) as well as population-type approaches in order to take advantage of available large data bases. We claim that our work may have a clinical impact that can change the way of handling certain pathologies.

Context

The recruited person will work within the Inria team MONC (Modeling in ONCology) in close collaboration with biological partners at the Roswell Park Cancer Institute (RPCI, Buffalo, NY, USA) in the context of the Inria associated team METAMATS and clinical partners in the anti-cancer center "Antoine Lacassagne" in Nice.

Travel expenses are covered within the limits of the scale in force.

Assignment

Assignments:
The PhD candidate will develop a novel model for systemic interactions between a population of tumors and immune players. This will be based on the current state of biological knowledge validated by confrontation with experimental data generated in cutting-edge animal models allowing the simultaneous tracking of tumor growth and lymphocytes recruitment. Clinical translation of the mathematical model will be pursued once the structural models will have been validated experimentally.

For a better knowledge of the proposed research subject:


Collaboration:
The recruited person will be in connection with the experimental teams of J. Ebos and S. Battaglia at the Roswell Park Cancer Institute (Buffalo, USA) for the biological data and the team of G. Milano in the "Antoine Lacassagne" center (Nice, FR) for clinical data.

Main activities

Main activities:
- Modeling and simulation of the tumor-immune interactions and effect of checkpoint blockade
• Data analysis
• Review of the biological and clinical literature
• Statistics (nonlinear mixed-effects, survival analysis, data science)

Additional activities:
• Write reports
• Contribute to code development and interface

Skills
Technical skills and level required:
• Ordinary and partial differential equations
• Numerical analysis
• Excellent level in programming (Python/Matlab)
• Basic statistical data analysis a plus
• Basic knowledge in cell/cancer biology or medicine will be appreciated

Languages:
• Good level of English in both oral and writing

Relational skills:
• Sociability and ability to interact with people from different scientific communities

Benefits package
• Subsidised catering service
• Partially-reimbursed public transport

Remuneration
Thesis funded by the university (doctoral school)

General Information
• Theme/Domain: Modeling and Control for Life Sciences
  Scientific computing (BAP E)
• Town/city: Talence
• Inria Center: CRI Bordeaux - Sud-Ouest
• Starting date: 2018-05-01
• Duration of contract: 3 years, 5 months
• Deadline to apply: 2018-07-31

Contacts
• Inria Team: MONC
• Recruiter: Benzekry Sebastien / sebastien.benzekry@inria.fr

About Inria
Inria, the French National Institute for computer science and applied mathematics, promotes "scientific excellence for technology transfer and society". Graduates from the world's top universities, Inria's 2,700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in
industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

**Conditions for application**

Thank you to send CV + cover letter

**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.

**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.