aviesan
alliance nationale
pour les sciences de la vie et de la santé

ITMO Cancer

Ex Post Analysis of the *PMSI* Programme (2011-2017)

The *Physics, Mathematics and Engineering Sciences Applied to Cancer* (PMSI) programme was implemented by ITMO Cancer-Aviesan, in collaboration with ITMO Health Technologies-Aviesan, in the frame of the last two French Cancer Plans (2009-13 and 2014-19). It aimed at attracting physicists, mathematicians and engineers in cancer research, in order to foster a French interdisciplinary cancer community and improve both tools development and disease understanding. This document presents key learnings coming from the ex post analysis of the PMSI programme realised in May 2018.

Key Figures

- 450 submitted projects
- 108 projects funded
- Selection rate : median 24%
- 95 PI
- 247 partners (median 2,8 per project)
- €29.84M (median €281k per project)
- PI age: median 43 y.o.

A Major Structural Significance for Multidisciplinarity in Cancer Research

Outcomes
(51 projects achieved in 2018)*

- 102 personnel hired
- 23 international collaborations
- 3 interdisciplinary laboratories
- > 60 tools and models
- 9 patents
- 2 start-ups
- 150 publications, including 121 original articles (50% in open access)

**as mentioned in the final reports*

The structuring impact of the programme was shown by several ways. It was attractive for PI without previous experience in cancer, especially physicists who submitted 46% of the projects. Collaborations at the interface of physics, mathematics and oncology were promoted by the programme, with 44% of the projects led by consortia gathering 3 or more disciplines. Projects aiming at developing innovative therapies based on physical approaches (e.g., electroporation, optics, acoustics or plasma) emerged during the assessed period, reflecting the incentive effect of the programme. The programme had a leverage effect on laureates, 40% of them having secured another grant to continue their project beyond the PMSI programme.

More than 60 Tools and Models

Tools and Knowledge
(51 projects achieved in 2018)*

- Experimental setups to study irradiation effects or cancer cell properties
- Mathematical models of tumour (growth, response to radiations or nanoparticles)
- Dose calculation modules (for diagnosis and treatment)
- Image processing and imaging devices
- Cancer cells physical characteristics
- Radiation/nanoparticles effects on cells and molecules

**as mentioned in the final reports*

Many tools and models were developed thanks to the programme, a part of them beeing in open access (e.g., simulation modules for imaging and dosimetry). Therapeutic or diagnostic perspectives of several projects led to an economical valorisation of the findings through patents, start-ups and ongoing discussions with industrial partners for technological transfer. Some other tools were used to improve the knowledge of biological processes in oncology, and more broadly in fundamental biology. The multidisciplinary nature of the programme was reflected by the great diversity of journals domains publishing the results, headed by *Physics* (26% of the publications) and *Biomedical Sciences* (20%).

In 7 editions, a genuine interdisciplinary research ecosystem at the interface between physics, mathematics, engineering sciences and oncology has been fostered. Knowledge on the oncogenetic processes was improved, and new tools were generated and disseminated. The evaluation committees have noticed an increase of high-quality project submissions over the years, indicating that the scientific community in France related to the programme's topics got stronger.