

FINAL RESUME ON THE RESEARCH UNIT
ARNA - Acides nucléiques : régulations naturelles et
artificielles

UNDER THE SUPERVISION OF THE
FOLLOWING INSTITUTIONS AND RESEARCH
BODIES:

Université de Bordeaux

Centre national de la recherche scientifique - CNRS,
Institut national de la santé et de la recherche
médicale - INSERM

EVALUATION CAMPAIGN 2020-2021
GROUP B



In the name of Hcéres¹:

Mr Thierry Coulhon, President

In the name of the experts committee²:

Mr Eugen Stulz, Chairman of the committee

Under the decree No.2014-1365 dated 14 November 2014,

¹ The president of Hcéres "countersigns the evaluation reports set up by the experts committees and signed by their chairman." (Article 8, paragraph 5);

² The evaluation reports "are signed by the chairman of the experts committee". (Article 11, paragraph 2).

Tables in this document were filled with certified data submitted by the supervising body on behalf of the unit.

UNIT PRESENTATION

Unit name:

ARNA - Acides nucléiques : régulations naturelles et artificielles

Unit acronym:

ARNA

Current label and N°:

num

ID RNSR:

201622171J

Application type:

U1212

Head of the unit (2020-2021):

Mr Philippe Barthélémy

Project leader (2021-2025):

Mr Philippe Barthélémy

Number of teams and/or themes:

5

EXPERTS COMMITTEE MEMBERS

Chair:

Mr. Eugen Stulz, University of Southampton, UK

Experts:

Ms Claire Beauvineau, Curie Institute, Paris

Ms Laurence Charles, Aix Marseille University

Mr Cyril Dominguez, University of Leicester, UK

Ms Emmanuelle Fabre, Institut Jean Bernard, Hôpital Saint-Louis, Paris

Ms Ines Gallay, i2BC Paris-Saclay

Ms Zoya Ignatova, University of Hamburg, Germany

Mr Frank Sobott, University of Leeds, UK

Mr Pierre Strazewski, University Claude Bernard Lyon 1

Ms Carine Tisne, IBPC University of Paris

HCÉRES REPRESENTATIVE

Mr Hinrich Gronemeyer

REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Ms Carine Giovannangeli, INSERM

Mr Gilles Giuchard, University of Bordeaux

Mr Stéphane Ménage, CNRS

Mr Philippe Moretto, University of Bordeaux

Ms Sandrine Sagan, CNRS

Mr Richard Salive, INSERM

INTRODUCTION

HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

The ARNA unit was created in 2007 as an INSERM Unit (U869) associated with the Université de Bordeaux (UB), and today comprises INSERM U1212, CNRS UMR 5320 and University of Bordeaux (UB). Originally created by Mr J.J. Toulmé, leadership was transferred to Mr J.L. Mergny (2011), and most recently to Mr P. Barthélémy (2019). With the new leadership, a deputy director of the unit position (Mr F. Darfeuille) was created.

ARNA is divided between the Carreire campus (two sites) and the IECB (Institut Européen de Chimie et Biologie) and is the largest multidisciplinary unit hosted on the UB campus.

A major strength of the unit is that it merges the excellent infrastructure of two institutions of highest ranking: the Institut Européen de Chimie et Biologie (IECB) and the University of Bordeaux (UB). The IECB is providing high-end instrumentation, laboratory space and staff, while the UB is providing further staff, students, teaching opportunities, instrumentation and state-of-the-art laboratory space, in particular within a brand-new research building expected to be occupied in 2022.

Through a combined support from both IECB and UB, together with strongest support from INSERM and CNRS, the ARNA unit has the best opportunity to explore its world-leading capabilities to address both essential basic research and at the same time tackle the needs of high societal importance, providing the Bordeaux area with an unprecedented platform. It is clear that the unit is recognized by the stake holders as a unique entity which receives very good support.

RESEARCH ECOSYSTEM

The ARNA unit's research field covers nucleic acids in its broadest sense. It is a synergistic combination of different expertise in structural biology, molecular biophysics, molecular cell biology, molecular and supramolecular chemistry, and pharmaco-technology, aiming to understand structure and activity of a range of nucleic acid systems. It is a unit at the interface of biology and chemistry.

At INSERM, ARNA belongs to the ITMO "Technologies pour la santé" and "Bases moléculaires et structurales du vivant", as well as the commissions CSS1 (biology focused) and CSS6 (public health).

Locally at the University of Bordeaux, ARNA is one of the five academic component structures (CRCTB, CBMN, BIOTIS, CRMSB, ARNA) of the department "Health sciences and technologies" to which is also affiliated the Clinical Investigation Center (CIC Bordeaux). For teaching, ARNA is affiliated with "UFR Pharmacie" and "UFR Biologie", and with the Graduate Schools of Chemistry and of Health. ARNA is strongly involved in the proposals of the future "Grands Programmes de Recherche" (IdEx), in particular "Frontiers of Life" (FOI) and "IMaging for Precision medicine within A Collaborative Translational program" (IMPACT).

ARNA is also a CNRS laboratory (UMR CNRS 5320) affiliated to the "Institut National de Chimie" (INC). Affiliated sections cover mainly chemical, biological and biochemical aspects of nucleic acid chemistry.

HCÉRES NOMENCLATURE AND THEMATICS OF THE UNIT

SVE2, ST4-4

MANAGEMENT TEAM

Mr. Philippe Barthélémy, Head

Mr. Fabien Darfeuille, Deputy Head

UNIT WORKFORCE

Acides Nucléiques : régulations naturelle et artificielle

Active staff	Number 06/01/2020	Number 01/01/2022
Full professors and similar positions	4	3
Assistant professors and similar positions	17	17
Full time research directors (Directeurs de recherche) and similar positions	7	7
Full time research associates (Chargés de recherche) and similar positions	10	10
Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")	0	
High school teachers	0	
Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	20	19
Permanent staff	58	56
Non-permanent professors and associate professors, including emeritus	1	
Non-permanent full time scientists, including emeritus, post-docs (except PhD students)	13	
PhD Students	15	
Non-permanent supporting personnel	6	
Non-permanent staff	35	
Total	93	56

GLOBAL ASSESSMENT OF THE UNIT

The ARNA unit is an interdisciplinary unit dedicated to the exploration of nucleic acids chemistry (DNA, RNA) in its widest sense. The unit combines world-class expertise in chemical synthesis, structural analysis of biological systems, and applications in both cell biology and medicinal therapy. ARNA is unique in its competence at a European level, and globally there are few units that could match ARNA's excellence in expertise.

The ARNA unit has a solid international reputation for nucleic acid-based science; the teams work mostly in a synergistic way and provide interdisciplinary research across biology and chemistry. The unit is consistently publishing a high number of papers (~330 during the assessment period) in both medium and high-ranking peer-reviewed journals, and presentations are given on a number of important conferences and high-quality departments internationally (265). ARNA is making very important contributions to different areas of nucleic acid research, including characterization of 3D DNA/RNA structures (particularly using cryoEM and NMR) and mechanisms of action. The unit profits from a dedicated oligonucleotide synthesis platform (two synthesizers), as well as good access to excellent mass spectrometry and NMR facilities. The unit is also highly active in training of both undergraduate and postgraduate students, postdoctoral fellows and visiting researchers, though the overall number of PhD (46 current and finished) students could be higher. Public engagement is also well documented, but industrial contacts are not yet very well explored. The five interdisciplinary teams within ARNA complement each other very well, and interactions are well documented through publications and inter-group discussions and collaborations. However, there is room for exploration of the synergies between the teams. *In vivo* and preclinical studies are available through local (e.g., BioTis Bordeaux Inserm U 1026) and national (e.g., University of Tours) collaborations.

During the current evaluation period, ARNA received funding from INSERM (3.373 M€), University of Bordeaux (1.540 M€) and CNRS (898 k€). External funding from national (FEDER, ANR, LabEx AMADEUS and TRAIL), European (ERC, H2020), international and industrial sources reached a total of 8.234 M€. Overall, this is excellent financial support for a unit of this size.

The performance of the individual Teams varies with respect to the evaluation criteria. Outstanding contributions are made by the Teams mRNA (articles, reviewing, recognition) and OLIFANS (conferences, recognition, publications per student) who make a major contribution to ARNA. TMS has excellent contributions for articles, reviewing and patents, while ChemBioPharm is excellent in dissemination. The teams Strames and TMS are weak in terms of output and recognition. The small Teams mRNA and OLIFANS deliver exceptionally, while the other teams overall contribute well in one form or another.

The unit is overall highly active in research, publishing results, dissemination through international conferences and seminars, and well engaged in teaching. Taken together, the unit has an excellent to outstanding reputation, which is clearly seen in the high number of top-quality research outputs, recognition and engagement. A weak point of the unit is overall integration, inter-team collaboration and unequal contribution to the various assessment criteria from the individual teams.

The future scientific directions of the unit evolve around the use of an interdisciplinary approach to understand and target DNA or RNA mediated processes at a molecular level, related to health and disease. ARNA will pursue four main objectives: i) understand and decipher several key processes involved in gene expression at the molecular level; ii) interfere with these processes by the design, the synthesis and the delivery of oligonucleotides and its derivatives; iii) invent and develop cutting-edge methodologies in structural and molecular biology to study and characterize nucleic acid polymers; and iv) develop novel synthetic nucleic acid based bioconjugates for applications in medicinal chemistry. The reorganization of the unit as a whole will help to reach the research ambitions, and by making excellent use of all research facilities and support available will be able to produce novel targets for medicinal applications.

The evaluation reports of Hceres
are available online: www.hceres.com

Evaluation of clusters of higher education and research institutions
Evaluation of higher education and research institutions
Evaluation of research
Evaluation of doctoral schools
Evaluation of programmes
International evaluation and accreditation



2 rue Albert Einstein
75013 Paris, France
T. 33 (0)1 55 55 60 10

hceres.com

[@Hceres_](https://twitter.com/Hceres_)

[Hcéres](https://www.youtube.com/Hceres)