HORIZON-MSCA-2021-DN-01

**Project No. 101072632**

**Breaking the barrier**

**An integrated multidisciplinary approach to kill Gram-negative bacteria through existing antibiotics by making their outer membrane permeable**

# Deliverable 3.4
# BREAKthrough Science Days

WP 3 – Training

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| Lead participant | CNRS-IBS |
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# Revision History

| Author(s) | Description | Date |
|---|---|---|
| Cedric Laguri, Jean-Pierre Simorre (CNRS-IBS) | First draft | 28/04/2024 |
| Marco Cavallaro (accelCH) | Finalisation version 1.0 | 29/04/2024 |

# Contents

# Partner short names

| | |
|---|---|
| ABAC | ABAC Therapeutics SL |
| accelCH | accelopment Schweiz AG |
| AUMC | Stichting VUMC |
| CNRS-IBS | Centre National de la Recherche Scientifique |
| ICIQ | Fundació Privada Institut Català d'Investigació Química |
| Naicons | Naicons Srl |
| Roche | Hoffmann-La Roche AG |
| Symeres | Symeres Netherlands B.V. |
| Syngulon | Syngulon |
| UCLouvain | Université Catholique de Louvain |
| UL FFA | Univerza v Ljubljani |
| UNEW | University of Newcastle upon Tyne |
| UNIMI | Università degli Studi di Milano |
| UQ | The University of Queensland |
| URV | Universitat Rovira i Virgili |
| VU | Stichting VU |

# Abbreviations

| | |
|---|---|
| AP | Associated Partner(s) |
| D | Deliverable |
| DC | Doctoral Candidate |
| EC | European Commission |
| EU | European Union |
| HEU | Horizon Europe |
| M | Month |
| MS | Milestone |
| MSB | Management and Steering Board |

# 1 Introduction

The BREAKthrough Science Days are workshop days with a special focus on broadening the Doctoral Candidates' (DCs) skill sets in biophysics and structural biology. They include scientific workshops as well as transferrable skills workshops.

The present deliverable covers the BREAKthrough Science Days, which were held only for DCs from 22 to 24th of April 2024 at the Institut de Biologie Structurale, Grenoble (France).

The BREAKthrough Doctoral Candidates (DCs) had the opportunity to attend training sessions on Imaging techniques, structural biology, and drug discovery. They also received training on ethics, scientific integrity as well as quality and data management.


**Figure 1: Picture during the science days in Grenoble, Imaging techniques**

# 2 Advanced Imaging Techniques (TM02)

The training was delivered by three researchers from CNRS-IBS, Jean-Luc Pellequer on Atomic Force Microscopy (AFM), Olekdander Glushonkov on fluorescence microscopy and Mai Nguyen on high resolution Peptidoglycan labelling in cells :

- Imaging single molecules by AFM
- Measuring indentation of cells and tissues
- Measurement of binding forces
- Principles of light microscopy
- Super-resolution microscopy techniques

- Application of metabolic labelling and click-chemistry for high resolution imaging of bacterial cell wall

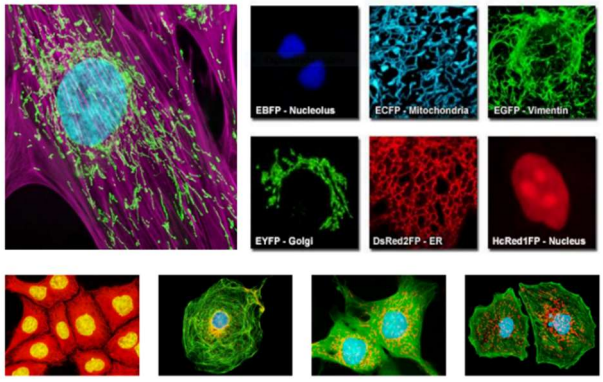


**Figure 2: Picture of the presentation on fluorescence microscopy**

# 3 Protein structure, dynamic and modelling (TM04)

The training was delivered by researchers from the CNRS-IBS Caroline Mas (Biophysics platform), Alessandra Ballandras-Colas, Robert Schneider, and from IBPC Institute (Paris) Antoine Taly. It covered the following topics:

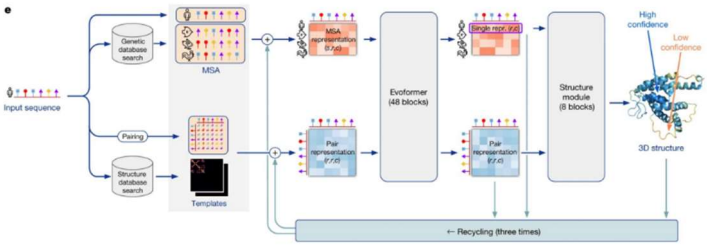


**Figure 3: Picture from the presentation**

- Biophysical quality control of purified macromolecules
- Evaluation of complexes and kinetic parameters of interactions
- Cryo-Electron microscopy for protein structure determination.
- Sample preparation, drawbacks and examples of structures by Cryo-EM.
- Principles of protein biomolecular Nuclear Magnetic Resonance
- Applications of NMR for structure, dynamics and interactions of proteins
- Principle and limitations of AI-driven protein structure prediction
- Examples of structural prediction of proteins and protein-protein complexes

# 4 Relevance of physchem properties in drug discovery exemplified by value chain-showcases (TM06)

The training was delivered by Researchers from CEA (Grenoble) screening platform Marie Odile Fauvarque, ALpX start-up (Grenoble) Joanna Rocha, and the University of Lyon Isabelle Krimm. It covered the following topics:

- Drug screening on isolated targets or on cells
- Examples of drug discovery
- Principles of X-ray crystallography and automated workflows
- X-ray crystallography for drug screening
- Principles of fragment screening strategy
- Successful examples of fragment growth

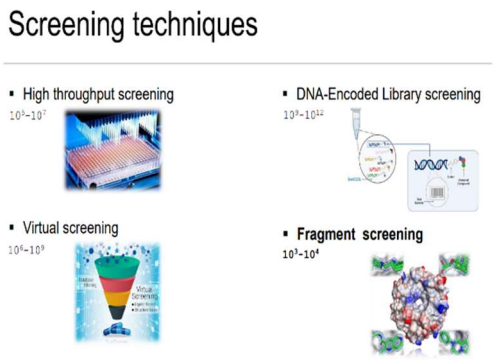


**Figure 4: Picture from the presentations**

# 5 Research Integrity and Ethics (TM13)

The training was delivered by Aline Waltzing from ADOC-Mètis company. It covered the following topics:

- Definitions and stakes of research integrity
- Changes in research practices and development of detection and prevention tools


**Figure 5: Picture from the presentations**

# 6 Quality and data management (TM17)

The training was delivered by Aline Waltzing from ADOC-Mètis company. It covered the following topics:

- Identify issues related to data and metadata and their management
- Manage data daily: lab journals
- Manage the data in your research project: understand and plan your data's "lifecycle" using Data Management Plans

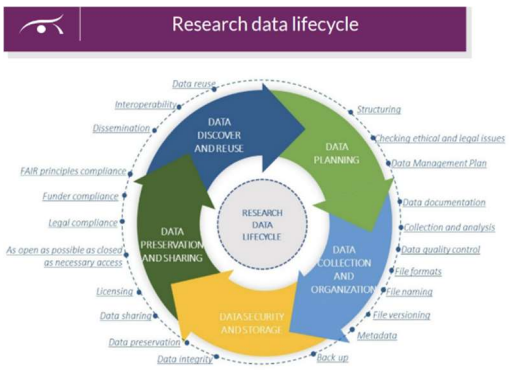


**Figure 6: Picture from the presentations**

# 7 Conclusion

We would like to express our gratitude to the dedicated trainers for their invaluable guidance and expertise throughout these training sessions. Their unwavering commitment has been instrumental in enhancing our DCs' skills and knowledge.