Research Infrastructures: a cornerstone for nanomedicine – ITACA.SB

The PNRR project *ITACA.SB - Potentiating the Italian Capacity for Structural Biology Services in Instruct-ERIC*

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Structural biology serves as a foundational pillar in developing innovative nanomedicine strategies. It provides fundamental insights into the relationships between the structure and function of drug targets, and how these connections influence applications in biomedicine. At its heart, this field aims to decipher the intricate dance of atoms, bonds, and molecular interactions that dictate how biomolecular systems function and behave. Unraveling this orchestrated interplay requires a multidisciplinary approach, weaving together expertise from biology, chemistry, physics, mathematics, and computational science. Each discipline contributes unique tools and perspectives, collectively enhancing our comprehensive understanding of molecular structures and mechanisms.

In this context, in November 2022 started the expansive 10-year initiative ***ITACA.SB*** (https://www.itaca-sb.it).

The PNRR project *ITACA.SB* is the result of a synergistic collaboration between the National Research Council of Italy (CNR) and the University of Florence. This alliance brings together several long-standing research institutes of the CNR and the Center for Magnetic Resonance (CERM) of the University of Florence, a world-renowned center for Nuclear Magnetic Resonance studies on molecules.

With an initial funding of €18 million, *ITACA.SB* aims to establish new national research infrastructures and strengthen existing ones, empowering the biomedical structural biology community with up-to-date instrumentation, knowledge, and methodologies to meet rigorous international standards. As a result, researchers will benefit from easy and direct access to a wide range of essential experimental and computational techniques and expertise, enabling them to pursue the latest structure-based drug design approaches. These techniques include, but are not limited to, Transmission Electron cryo-Microscopy (cryo-TEM), Molecular Crystallography (MX), Nuclear Magnetic Resonance (NMR), Small Angle X-Ray Scattering (SAXS), Mass Spectrometry (MS), and Molecular Dynamics (MD).

While enhancing local opportunities, *ITACA.SB* also serves as a national entry point for accessing the European Research Infrastructure *Instruct-ERIC* (https://instruct-eric.org/). This distributed European infrastructure offers access to a wide range of structural biology techniques, from sample preparation all the way to final structure determination. The main goal of this initiative is to nurture scientific excellence within the framework of Horizon Europe.

Finally, *ITACA.SB* is dedicated to education by providing new generations of scientists with specialized schools and cutting-edge instrumentation necessary for high-level hands-on training.

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