

Advancements in Biological Sciences at the European Synchrotron

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Biology's inherent complexity continues to challenge our understanding of life's fundamental processes. Achieving a holistic view requires integrating discoveries at the molecular, cellular, and organ/systems levels to elucidate the intricate interplay between structure and function. The ESRF leads the way in developing and applying unique biological technologies within an internationally collaborative, visitor-oriented environment, creating an ideal setting for cutting-edge research.

Among its diverse research portfolio, the ESRF dedicates significant efforts to unravelling the pathogenesis of Alzheimer's disease, a debilitating neurodegenerative condition. By probing bioenergetic mechanisms within neuronal circuits of the brain, we aim to uncover potential root causes of the disease [1]. Through a suite of advanced beamlines dedicated to structural biology [2,3], high-resolution X-ray imaging [4], and spectroscopy [5], the ESRF enables comprehensive, detailed investigations into biological processes across spatial and temporal scales.

This presentation will emphasize the key role of interdisciplinary approaches in biological research, highlighting the remarkable advancements made possible by the ESRF's state-of-the-art beamlines and collaborative environment. By investigating the enigmas of life, at the ESRF we are not only expanding our understanding but also paving the way for potential breakthroughs in the diagnosis and treatment of complex diseases such as Alzheimer's.

References

1. McGregor & Soler-Lopez, *Curr. Opin. Struct. Biol.* 80 (2023) 102573.
2. Giachin et al., *Angew. Chem. Int. Ed. Engl.* 60(9) (2021) 4689-4697s.
3. McGregor et al., *Nat. Commun.* 14(1) (2023) 8248.
4. Walsh et al., *Nat. Methods* 18(12) (2021) 1532-1541.
5. Chourrout et al., *Acta Biomater.* 170 (2023) 260-272.