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MOLECULAR
HORIZONS



SEMINAR SERIES 2026

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Professor Thomas Sharp

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Thom Sharp is Professor of Structural and Synthetic Immunology at the University of Bristol, UK. Thom's lab combines structural and synthetic biology to investigate the human immune system, as well as developing equipment, tools and methods to perform super-resolution light microscopy on samples prepared for cryoEM.



Thom was originally trained as a Biochemist before performing his PhD in Chemistry, at the University of Bristol, UK. His first postdoc was in Oxford, where he combined DNA nanotechnology with structural biology using cryoEM, and he then moved to Leiden, where applied his structural biology expertise to components of the complement system. In Leiden, Thom was awarded numerous grants and awards, including an ERC starting grant in 2017. In 2024, Thom moved his research back to Bristol, where his lab is focussed on in situ structural biology of various complexes involved in human immunity, including pentraxins, antibodies, and complement components, and how these structures can be used to inspire therapeutics.

Understanding immune function through in situ structural biology

Antibodies activate the human complement system, a key component of host defence and one of the principal effector mechanisms of therapeutic monoclonal antibodies. Upon antigen binding, antibodies recruit the complement initiator C1, triggering a proteolytic cascade that can eliminate targeted cells. Despite its importance, the molecular mechanism by which antibodies engage and activate C1 remains unclear. Using multimodal imaging and structural biology, we investigate the molecular steps underlying complement activation, from the assembly of higher-order antibody activation platforms to the recruitment and activation of C1. Combining 3D cryo-electron tomography (cryoET) with complementary structural approaches, we have determined the structures of multiple complement components directly in non-purified human serum. These insights are providing a structural framework for the rational design of next-generation immunotherapies. By integrating structure-guided drug design with AI-driven approaches, we are exploring new strategies to modulate complement activity in autoimmune disease. Finally, I will highlight how correlative cryogenic super-resolution microscopy and cryoET enable the localisation and structural analysis of molecular complexes within cells, opening new opportunities to study immune function directly in complex native environments.