Poster Presentations

[MS3-P03] Blood Lipoproteins : Key Bio-Nanoparticles Defying Crystallography Need Hybrid Approach Peter Laggner [a,b] and Ruth Prassl[c] ,

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Plasma lipoproteins, soluble multicomponent supramolecular complexes of molecular weights between 105 and 107 and a size range between ~10 and >100 nm, have so far defied any attempts of high resolution crystallography. Only few examples of successful crystallization are reported for low density lipoprotein (LDL). [1,2] They were among the first objects where the hybrid analytical approach, i.e. the synergistic application of different structural, spectroscopic and thermodynamic methods has been successfully applied. [3] SAXS, SANS, and electron microscopy have played pivotal roles towards the understanding of size, shape and internal organization, while spectroscopic methods like spin-label ESR, NMR and fluorescence microscopy have contributed important information on internal short range organization and dynamics. Thermotropic transitions, and the effects of cholesterol lowering drugs thereon, were analyzed by calorimetry. Contributions to molecular structure analysis came from secondary structure prediction. Time resolved synchrotron SAXS, finally, was used to study the limiting kinetics of transitions, and hence their possible physiological roles in blood circulation between central and peripheral blood vessels. Thus the structural and dynamic properties of lipoproteins, their transport functions and their interactions with cells and tissue are beginning to be understood on a structure-dynamics defined basis. This knowledge serves as an important guide for rational design of drugs and therapeutic strategies in a number of highly relevant areas of disease, e.g. atherosclerosis, Alzheimer etc. It can be expected that these highly interesting species of bio-nanoparticles will be among the first to be in the focus of single-particle diffraction by XFEL facilities and/or coherent X-ray nanoimaging laboratory techniques.

[1] Prassl, R., Chapman, J.M., Nigon, F.M., Sara, S. Eschenburg,
C. Betzel, A. Saxena & Laggner, P., J. Biol. Chem. 271
(1996) 28731.
[2] Ritter, S., Diederichs, K., Frey, I., Berg, A., Keul, J. &
Baumstark,M.W., J.Cryst Growth 196 (1999) 344.
[3] Prassl R. & Laggner P., INTECH Open Science,
"Lipoproteins - Role in Health and Diseases", ed by Sasa Frank
and Gerhard Kostner. http://dx.doi.org/10.5772/48145

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