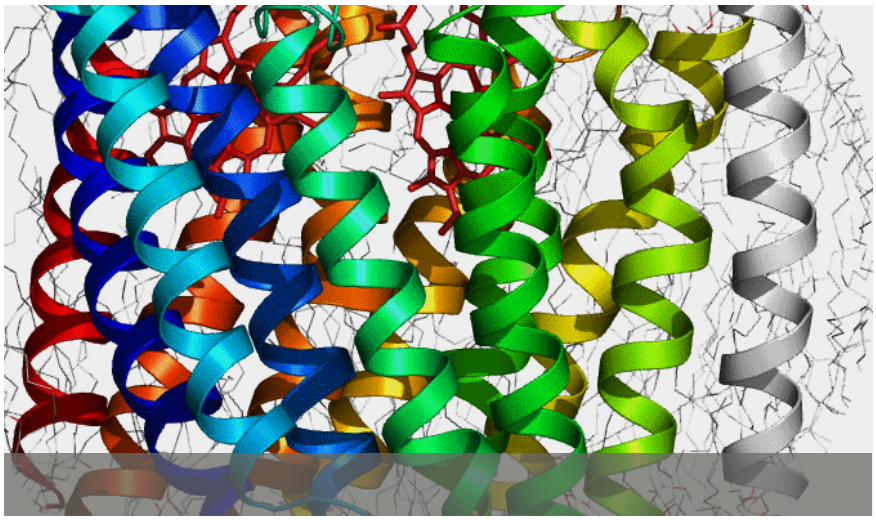

Hiver 2015

Conférence

au Département de chimie
présentée conjointement avec
PROTEO

CONFÉRENCIER

PROF. JOCHEN BÜRCK

Karlsruhe Institute of Technology (KIT)
Institute for Biological Interfaces (IBG-2), Karlsruhe, Germany

DATE

Jeudi, 11 juin 2015

TITRE

Characterizing structure, orientation and aggregation of membrane-active peptides and proteins in lipid bilayers by OCD and SRCD

RÉSUMÉ

For understanding the mode of action of antimicrobial peptides which lyse bacterial cell membranes or integral membrane proteins such as receptors on a molecular level it is necessary to characterize their conformation, insertion and alignment in lipid membrane environment as well as binding to interaction partners.

Oriented circular dichroism (OCD) first described by Olah and Huang in the early 1990s is a valuable technique for getting a global view on secondary structure, orientation and aggregation behaviour of membrane-active biopolymers embedded in anisotropic model lipid bilayers. Here, hydrated self-assembled lipids are macroscopically oriented on a planar quartz glass support with respect to the light beam and form mimics of native cell membranes. We have developed an OCD setup more than 10 years ago, which was integrated in a commercial bench-top CD spectrometer (1). Since then, it was applied for secondary structure and orientation analysis of numerous antimicrobial and cell-penetrating peptides as well as transmembrane domains of integral membrane proteins.

Recently, synchrotron radiation circular dichroism (SRCD) due to an increased photon flux has become an attractive extension beyond the bench-top instrument for refined structure analysis of these compounds (2). The SRCD beamline UV-CD12, which covers the vacuum-UV to near-UV spectral range, is operated by our institute since 2011 at the ANKA synchrotron (KIT, Karlsruhe, Germany). The current end-station includes two experimental modules: a setup for standard liquid-state SRCD of membrane-active peptides/proteins reconstituted in micelles or liposomes and an automated OCD module. Compared with the bench-top instrument the SR-based setup offers a better sensitivity and signal-to-noise ratio at wavelengths < 210 nm - especially for measurements in unsaturated lipids - and accelerated data collection by a factor of 3.

Both chiroptical methods are favorably combined with the complementary high-resolution method of solid-state NMR, which is also well established at our institute for structure and orientation analysis of the same peptide-lipid mixtures. Application of these techniques for characterizing conformational changes, orientation and aggregation in model membranes will be presented for the hydrophobic PDGFβ-receptor transmembrane segment and its interaction partner the E5 oncoprotein, as well as for some amphiphilic antimicrobial peptides.

References: (1) Bürck, J., Roth, S., Wadhwani, P., Afonin, S., Strandberg, E. & Ulrich, A.S. (2008) Biophys. J. 95, 3872-3881. (2) Bürck, J., Roth, S., Windisch, D., Wadhwani, P., Moss, D. & Ulrich, A. S. (2015) J. Synchrotron Rad. 22, 844-852.

La conférence aura lieu **à 11h au VCH-3820** du **Pav. A.-Vachon**
Cordiale invitation à toutes et à tous !

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