

Accepted Manuscript

3D Structure Determination of Amyloid Fibrils using Solid-State NMR Spectroscopy

Antoine Loquet, Nadia El Mammeri, Jan Stanek, Mélanie Berbon, Benjamin Bardiaux, Guido Pintacuda, Birgit Habenstein

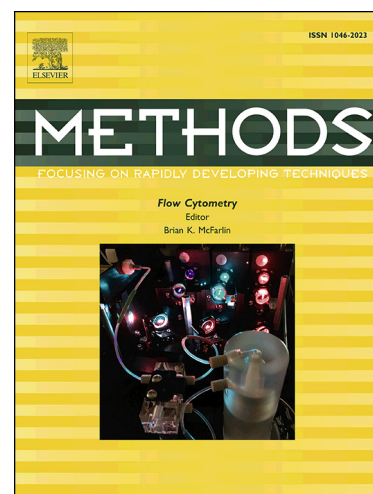
PII: S1046-2023(17)30251-7
DOI: <https://doi.org/10.1016/j.ymeth.2018.03.014>
Reference: YMETH 4437

To appear in: *Methods*

Received Date: 29 January 2018
Revised Date: 28 March 2018
Accepted Date: 30 March 2018

Please cite this article as: A. Loquet, N. El Mammeri, J. Stanek, M. Berbon, B. Bardiaux, G. Pintacuda, B. Habenstein, 3D Structure Determination of Amyloid Fibrils using Solid-State NMR Spectroscopy, *Methods* (2018), doi: <https://doi.org/10.1016/j.ymeth.2018.03.014>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



3D Structure Determination of Amyloid Fibrils using Solid-State NMR Spectroscopy

Antoine Loquet¹, Nadia El Mammeri¹, Jan Stanek², Mélanie Berbon¹, Benjamin Bardiaux³, Guido Pintacuda², Birgit Habenstein^{1*}

¹ Institute of Chemistry and Biology of Membranes and Nanoobjects, Institut Européen de Chimie et Biologie (CNRS UMR 5248, Université de Bordeaux), 33600 Pessac, France.

² Centre de RMN à Très Hauts Champs, Institut des Sciences Analytiques (CNRS, ENS Lyon, UCB Lyon 1), 69100 Villeurbanne, France.

³ Unité de Bioinformatique Structurale, CNRS UMR 3528, Institut Pasteur, 75015 Paris, France.

Correspondance: b.habenstein@iecb.u-bordeaux.fr

ABSTRACT:

The amyloid fold is structurally characterized by a typical cross- β architecture, which is under debate to represent an energy-favourable folding state that many globular or natively unfolded proteins can adopt. Being initially solely associated with amyloid fibrils observed in the propagation of several neurodegenerative disorders, the discovery of non-pathological (or “functional”) amyloids in many native biological processes has recently further intensified the general interest invested in those cross- β supramolecular assemblies. The insoluble and non-crystalline nature of amyloid fibrils and their usually inhomogeneous appearance on the mesoscopic level pose a challenge to biophysical techniques aiming at an atomic-level structural characterization. Solid-state NMR spectroscopy (SSNMR) has granted breakthroughs in structural investigations on amyloid fibrils ranging from the assessment of the impact of polymorphism in disease development to the 3D atomic structure determination of amyloid fibrils. First landmark studies towards the characterization of atomic structures and interactions involving functional amyloids have provided new impulses in the understanding of the role of the amyloid fold in native biological functions.

Over the last decade many strategies have been developed in protein isotope labelling, NMR resonance assignment, distance restraint determination and 3D structure calculation of amyloid fibrils based on SSNMR approaches. We will here discuss the emerging concepts and state-of-the-art methods related to the assessment of amyloid structures and interactions involving amyloid entities by SSNMR.

Keywords:

Solid-state NMR, Amyloid fibrils, Structural biology, Protein aggregation, Prions, Structure calculation, Isotopic labelling, Proton detection

Contents

1. Introduction	2
2. Methods	3
2.1 SSNMR Sample preparation	3
2.1.1 Protein Production	3
2.1.2 Assembly and polymorphism	4
2.1.3 Isotope labeling	4
2.2 SSNMR analysis	6
2.2.1 SSNMR experiments for biomolecular assemblies	6
2.2.2 Data analysis	6
2.2.3 Restraint detection and identification	7
2.2.4 ¹ H-detection for investigation of amyloid structures	8

Download English Version:

<https://daneshyari.com/en/article/8340073>

Download Persian Version:

<https://daneshyari.com/article/8340073>

[Daneshyari.com](https://daneshyari.com)