Evaluating Samples in their Natural State

Comprehensive Multi-Phase (CMP) NMR challenges traditional NMR methods by adapting the NMR technology to match natural samples, rather than changing the sample to match a specific NMR technique, providing valuable insights into an unmodified system.

Environmental Studies

*Daphnia magna* is an important indicator species of water quality and plays a key role in the food chain. Studies performed on the complete organism from exoskeleton to metabolites using the CMP-NMR probe enable the characterization of their feeding habits and the nutritional value of their diet. The metabolite mosaic can be correlated to the toxic stress of the organism, increasing our understanding of the effects of water contaminants.

Amyloids: Characterization of Low Abundance Oligomers

Tackling the highly dynamic aggregation pathway of amyloid-β requires a sophisticated experimental approach. Alzheimer’s disease is characterized by the misfolding and self-assembly of the amyloidogenic protein amyloid-β (Aβ). Studying Aβ oligomers at the atomic level has been a major challenge to most analytical techniques. Using magic angle spinning NMR experiments can overcome many of these limitations. A special NMR filter experiment removes both high and low molecular weight species and enables atomic-level characterization of a non-fibrillar aggregation product of the Aβ1-40 peptide using non-frozen samples without isotopic labeling. Importantly, this experiment enables the detection of the specific oligomer signal without a separate purification procedure. In comparison to other solid-state NMR techniques, the experiment is extraordinarily selective and sensitive.

Acknowledgements and References

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2. Also see "NMR Spectroscopy a Versatile Tool for Environmental Research" Simpson & Simpson 2014 Wiley

Summary

- CMP-NMR provides a comprehensive view of living intact systems such as *Daphnia magna*, from exoskeleton to metabolites.
- With the “one CMP-NMR probe and one sample” approach, other challenging environmental samples can be characterized eg soil, plants or seeds.
- Combined solid and liquid performance based on HR-MAS technology.