INSIGHTS INTO THE COLLISION-INDUCED DISSOCIATION OF MACROMOLECULAR ASSEMBLIES

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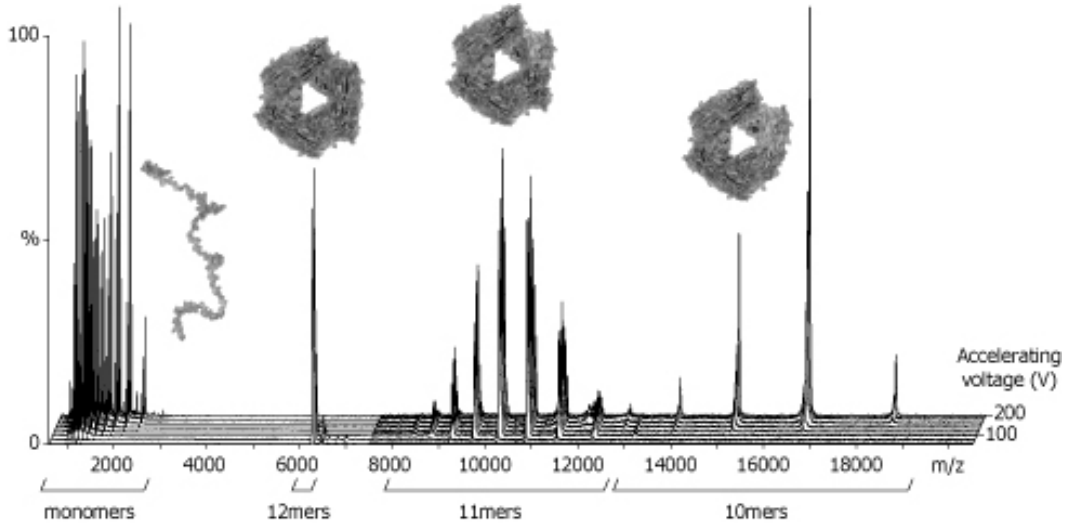
One of the major advances of the last years in the field of mass spectrometry of large macromolecular assemblies has been the application of a collision-induced dissociation (CID) procedure to garner structural biology information [1]. This technique involves the selection of specific assemblies in the gas phase, and inducing their dissociation through collisions with neutral gas. Though this approach is becoming progressively more widespread, a lack of complete understanding of the mechanism of the CID of such large species continues to hamper the full interpretation of the results obtained.



Dissociation of TaHSP16.9 12mers into highly-charged monomers and 11mers and 10mers, as a function of acceleration voltage into a gas-filled collision cell. Adapted from [2].

Here we describe investigations into the pathway of this process by showing the behaviour of two noncovalent protein assemblies, one of 201kDa and 12 subunits (*Ta*HSP16.9) and one of 395kDa and 24 subunits (*Mj*HSP16.5), under CID conditions in a Q-ToF type instrument. The dissociation products are monitored as a function of accelerating voltage and selected charge state. Furthermore, ion-mobility mass spectrometry measurements performed on a prototype instrument provide insight into the transition state of the CID process of these assemblies.

These results obtained allow us to delineate a generalized reaction scheme for the CID of large macromolecular assemblies, and to discuss the possible applications of such MS experiments to the fields of structural biology and interactomics.

1. Benesch JLP, Robinson CV: Mass spectrometry of macromolecular assemblies: preservation and dissociation. *Curr Opin Struct Biol* 2006, 16:245-251.
2. Benesch JLP, Aquilina JA, Ruotolo BT, Sobott F, Robinson CV: Tandem mass spectrometry reveals the quaternary organization of macromolecular assemblies. *Chem Biol* 2006, 13:597-605.