Mass spectrometry to study nucleic acid folding and interactions

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Résumé

60 years after the discovery of the DNA double helix, the variety of structures that nucleic acids can adopt continues to surprise the scientific community. My project is to develop experimental tools, based on mass spectrometry, to monitor all assemblies and structures formed when a small molecule encounters a target nucleic acid. With mass spectrometry, we want to detect, quantify and characterize the different states present in solution. The most challenging part is the characterization. For that, we study how structures are preserved inside the mass spectrometer and develop approaches coupling mass spectrometry with ion mobility and ion spectroscopy. We apply these new approaches to biologically important nucleic acids, in order to reveal the mechanisms of ligand-induced conformational changes in important regulatory structures such as G-quadruplex or riboswitches. Our research also has a broader impact, because the approaches and concepts contribute fundamental advances in mass spectrometry, which are transferrable to other supramolecular or biological complexes.

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