Novel Way to Study the Function of Native Proteins in Solution

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The cellular processes underpinning life are orchestrated by proteins and the interactions they make with themselves and other biomolecules. A range of techniques has been developed to characterise these associations, but structural and dynamic heterogeneity remain a fundamental challenge. Mass photometry is based on interferometric scattering microscopy and can mass-image single biomolecules in solution. Thereby, we can resolve oligomeric distributions at high dynamic range, mass-measure polypeptides, glyco- and lipoproteins. These capabilities enable us to quantify the molecular mechanisms of processes as diverse as homo- and hetero-oligomeric protein assembly, amyloidogenic protein aggregation and more [1]. The label free imaging and solution-based measurement offers optimal settings for studying protein-protein interactions, protein-nucleic acid interactions or protein interaction with any molecules causing mass change. This ability to investigate biomolecules in their native state with high mass accuracy and resolution provides critical, complementary information to static structural techniques in the context of protein function and regulation.
It also enables us to investigate native conditions for the different biomolecules and optimize various buffer, salt and factor conditions necessary for their activity. Single molecule mass imaging provides access to protein dynamics and interactions and thus introduces a third, light-based approach to measuring mass in addition to the historical mechanical and spectrometric methodologies and widens our capabilities to study biological processes.

1. Young G, Hundt N, Cole D, Fineberg A, Andrecka J, Tyler A, Olerinyova A, Ansari A, Marklund EG, Collier MP, Chandler SA, Tkachenko O, Allen J, Crispin M, Billington N, Takagi Y, Sellers JR, Eichmann C, Selenko P, Frey L, Riek R, Galpin MR, Struwe WB, Benesch JLP, Kukura P. Quantitative mass imaging of single biological macromolecules. *Science* **2018** 360: 423-327