

# Methods in Life Sciences | Learning Outcomes

## Quantification and Modulation of Protein-Protein Interactions (PPIs)

### You have a good molecular understanding of PPIs and their targeting

- You know traditional and emerging modalities for affecting protein numbers and function
- You know the mode of action, problems and potentials associated with targeted protein degradation
- You know what PPIs are targeted by peptides and how peptide pharmacology can be improved
- You can name and explain the most fundamental thermodynamic terms and laws underlying PPIs
- You know and understand the thermodynamic equations and parameters that describe PPIs
- You know thermodynamic contributions to PPIs and mechanisms of enthalpy-entropy compensation

### You know how PPI are quantified

- You know the kinetic parameters and equations that describe PPIs
- You know PPI quantification methods (PQMs) for thermodynamic and kinetic measurements
- You can read and interpret raw calorimetric titration data and raw kinetic sensogram readouts
- You know how to identify and address common artefacts and experimental limitations of PQMs

# Methods in Life Sciences | Content

## Quantification and Modulation of Protein-Protein Interactions (PPIs)

### 1. Protein-Protein Interactions (PPIs)

- 1.1 Motivation: Challenges, Opportunities and Classification
- 1.2 Targeting of PPIs: Modalities and Modes of Action to Affect Protein Function and Numbers
- 1.3 PROTAC Mode of Action, Architectures, Advantages, Limitations and Future Opportunities
- 1.4 Peptides and their Mimetics as PPI-Inhibitors and Chemical Approaches to Improve their Pharmacology

### 2. Thermodynamics and Kinetics of PPIs

- 2.1 Basics: Thermodynamic Terms and Laws
- 2.2 Binding Parameters of PPIs
- 2.3 Enthalpy and Entropy of PPIs, their Compensation and the Role of Water

### 3. Quantification of PPIs

- 3.1 Isothermal Titration Calorimetry (ITC): Mode of Action, Experimental Design, Data Interpretation
- 3.2 Biolayer Interferometry (BLI): Mode of Action, Kinetic Parameters, Data Interpretation
- 3.3 Available Methods, their Characteristics, Requirements and Limitations

### 4. Chemical Biology Group Snapshots

- 4.1 Development of Fluorescent Probes
- 4.2 Identification and Characterization of novel Autoantibodies
- 4.3 Development of an in vivo active PPI Modulator
- 4.4 Development and Application of Novel PPI Quantification Methods
- 4.5 Array-based Proteomics