

49. Proteins with intrinsically disordered regions

1 unit, Christine Mayr, November 7, 2025

1. What are intrinsically disordered regions (IDRs)?

Discuss structure-function paradigm and exceptions

2. How widespread are IDRs?

Discuss their evolution and presence in regulatory proteins

Transactivation domains of transcription factors, histone tails, regulatory domains of enzymes, C-terminal tails of receptors, RNA-binding proteins

3. Classification based on sequence

Extended vs collapsed IDRs, Low complexity sequences, Repeats, RNA-binding IDRs

RGG, SR, FG, Q-rich, G/S-Y-G/S

4. Mechanism of action

Folding upon binding, conformational selection, higher-order assembly and multivalency, scaffolds, short half-life

5. Functions of proteins with IDRs

Interaction with structurally diverse partners, post-translational modifications, phase separation, RNA-binding

6. IDRs and disease

Reading materials:

Babu MM, Biochem soc transact (2016).

Holehouse, Kragelund. Nature Reviews Molecular Cellular Biology (2023).

The second review is for further information. Very detailed and very recent review for people with interest in IDRs. I recommend to read the first few pages. The later pages are only interesting for specialists.

Paper to discuss:

1. Oksuz O et al., Mol Cell 2023. Transcription factors interact with RNA to regulate genes.