TAKING A TRIP ON THE ENERGY LANDSCAPE OF UNSOLVATED PEPTIDES: WHAT REALLY CONTROLS HELIX FORMATION?

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The alpha helix is the most important secondary structure element in proteins and understanding what controls helix formation is a critical part of the connection between sequence and structure. I will describe studies of helix formation in the gas phase. The gas phase provides the natural starting point for examining helix formation, and these studies may be more directly relevant to real biological systems than those performed in aqueous solution (only a few special peptides are significantly helical in aqueous solution while helices are prevalent in folded proteins). I will describe work examining the role of charge in promoting helix formation and efforts to determine helix propensities for different amino acids in unsolvated peptides. The results show some significant differences from what is observed in solution. The role of context (or sequence) on helix formation is also being examined. Finally, I will describe studies of non-covalent complexes of helices which begin to mimic the tertiary structure domains of proteins.