

## Structural Characterization of Human Parathyroid Peptide Hormones by Circular Dichroism and NMR Spectroscopy

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Human parathyroid hormone (hPTH) regulates mineral metabolism and bone turnover by activating specific receptors located on osteoblasts and renal tubular cells. It has been reported that the N-terminal peptide PTH (1-34) was biologically active and formed  $\alpha$ -helical structure in both aqueous and TFE solution. It has been characterized that whereas PTH14 which is the 14 residues peptide fragment at N terminus of human parathyroid hormone (hPTH) displayed biological activity, the truncated 13 residues peptide (PTH13) lost its activity. To characterize structure-functions of these peptides, we studied the structure of PTH14 and PTH13 in both H<sub>2</sub>O and 30% TFE solution using Circular Dichroism, NMR Spectroscopy. We observed that both PTH14 and PTH13 showed nascent helices in aqueous solution, however, they formed  $\alpha$ -helices in 30% TFE solution. In addition, we synthesized the mutant peptide of PTH11 modified at position Ala3, Ala10 and Arg11 and it showed potent activities. Similar to PTH14 and PTH13, the structure of PTH11 in aqueous solution demonstrated a nascent helix; however, the structure of PTH11 in 30% TFE solution showed  $\alpha$ -helix. These results will provide the novel approach in a design of PTH analogues as well as the structural basis for the treatment of osteoporosis.