# Self-assembled heterotrimeric collagen triple helices directed through electrostatic interactions.

Gauba V, Hartgerink JD.

*Department of Chemistry, Rice University, 6100 Main Street, Mail Stop 60, Houston, TX 77005, USA.*

J Am Chem Soc. 2007 Mar 7;129(9):2683-90. Epub 2007 Feb 13.

**Abstract**

Collagen, a fibrous protein, is an essential structural component of all connective tissues such as cartilage, bones, ligaments, and skin. Type I collagen, the most abundant form, is a heterotrimer assembled from two identical alpha1 chains and one alpha2 chain. However, most synthetic systems have addressed homotrimeric triple helices. In this paper we examine the stability of several heterotrimeric collagen-like triple helices with an emphasis on electrostatic interactions between peptides. We synthesize seven 30 amino acid peptides with net charges ranging from -10 to +10. These peptides were mixed, and their ability to form heterotrimers was assessed. We successfully show the assembly of five different AAB heterotrimers and one ABC heterotrimer. The results from this study indicate that intermolecular electrostatic interactions can be utilized to direct heterotrimer formation. Furthermore, amino acids with poor stability in collagen triple helices can be "rescued" in heterotrimers containing amino acids with known high triple helical stability. This mechanism allows collagen triple helices to have greater chemical diversity than would otherwise be allowed.

PMID: 17295489 [PubMed - indexed for MEDLINE]