

Developments of Dimeric Ligand Binders to d(CCG) Repeats and Studies of Their Biological Effects

Dr. Yang, URP 2025

Fragile X-related disorders are caused by the expanded CGG/CCG repeats in the X chromosome (Fig 1A). Previously, my group discovered selective d(CCG) repeats binders which can potentially contract the expanded repeats by the binder-induced DNA replication slippage (Fig 1B). In the coming summer, to improve the affinity and selectivity, the dimeric ligand binders will be designed and synthesized using several methods (Fig 1C).

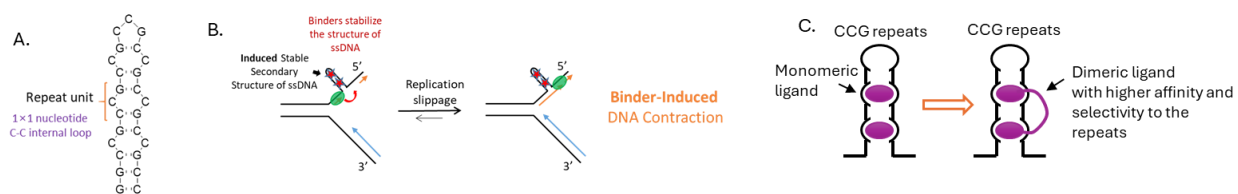


Fig 1. A. Secondary structure of d(CCG) repeats. B. Discovered d(CCG) binder. C: Proposed binder-induced repeat contraction. D: Dimeric ligand binder with higher affinity and selectivity to d(CCG) repeats.

1. Synthesis of the Dimeric Ligand Binders

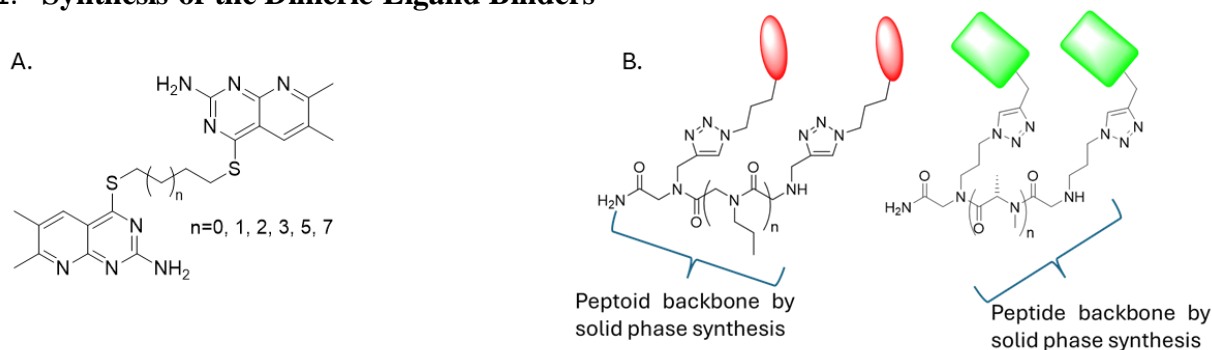
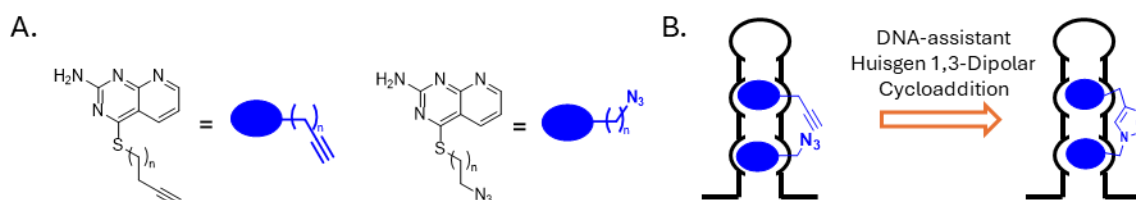


Fig 2. Designed Dimeric Ligand Binders with linear chains (A) and peptoid/peptide backbones (B)

2. Discovery of the Dimeric Ligand Binders by In-Situ-Click Chemistry



The student will be expected to enroll in CHEM 4997R in Spring 2025 to prepare for the summer research project.