

## Abstract

The transcription factor *optix* is a renowned eye developmental gene. *optix* is a 297 amino acid protein member of the Six (sine oculis homeobox) family of homeodomain transcription factors involved in animals' eye and brain development. Transcription factors (TFs) regulate gene expression by binding to specific sequences throughout the genome. *optix* has been previously identified also as a master regulator of red color patterns in the butterfly developing wing. Mutations at *Six 6* gene, the human homologue to *optix*, have been associated to brain and eye abnormalities. To date, several differential gene expression experiments have identified candidate target genes regulated by *optix*. Interestingly, putative downstream targets of *optix* include genes that encode enzymes involved in ommochrome pigment synthesis and pigment precursor transporters. However, the genes directly regulated by *optix* and their effects in final wing coloration remain to be determined. To address these questions, we will implement in vitro strategy to uncover the *optix* gene DNA binding sequences. Knowing the in vitro DNA-binding preferences of a TF contributes to identifying TF's gene targets. We will determine *optix*'s in vitro DNA-binding preferences by CSI-seq (Cognate Site Identification by DNA sequencing), and shed some light into its regulatory network and its implications in eye and red color patterns in butterflies developing wing.