

Stanford

James Whitlock

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Bio

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Chemical and Systems Biology

LINKS

- Personal Web site: <https://web.stanford.edu/group/whitlock/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

We are analyzing the mechanism by which the environmental contaminant 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD, dioxin) induces gene transcription. TCDD binds to an intracellular protein (the Ah receptor) which then dimerizes with a second bHLH/PAS protein (Arnt) to form a heterodimeric, DNA binding transcription factor. The AhR/Arnt complex interacts with a dioxin-responsive transcriptional enhancer located upstream of the target CYP1A1 gene. The receptor-enhancer interaction disrupts the nucleosomal structure of the regulatory region, increasing the access of the transcription factors to the CYP1A1 promoter in vivo.

Our current studies utilize techniques ranging from cell culture to molecular genetics and focus on:

- Identifying the protein-DNA interactions at enhancer and promoter elements for dioxin-responsive genes and understanding their contributions to the activation of gene transcription, with particular focus on enhancer-promoter communication.
- Characterizing the structural and functional domains of the Ah receptor and other regulatory proteins involved in the transcriptional response to dioxin, with particular focus on the mechanism of transactivation and changes in chromatin structure.
- Analyzing the mechanism by which low oxygen tension (hypoxia) induces mammalian gene transcription via bHLH/PAS proteins.