Genomic landscape of lysine acetylation in the adult hippocampus: Implications in neuronal plasticity and brain disorders

Angel Barco
Instituto de Neurociencias de Alicante (Universidad Miguel Hernández - Consejo Superior de Investigaciones Científicas), Av. Santiago Ramón y Cajal. Sant Joan d’Alacant. 03550. Alicante, Spain.

The acetylation of lysine residues at the histone tails is an epigenetic modification of the chromatin associated with active transcription. The process is regulated by the opposing activities of lysine acetyltransferase (KAT) and histone deacetylase (HDAC) enzymes and it is thought to play a relevant role in neuronal plasticity, learning and memory and diverse brain pathologies ranging from intellectual disability syndromes to neurodegenerative diseases. Importantly, these enzymes also have hundreds of non-histone substrates including transcription and chromatin-remodeling factors and regulatory subunits of the RNA polymerase II complex. Furthermore, compounds that inhibit HDAC activity (HDACi) have been show to be beneficial in diverse models of cognitive and neurodegenerative disorders and to enhance memory in wild-type animals. Understanding the mechanisms of action of HDACi and the role of lysine acetylation in neuronal plasticity, memory and neuropsychiatric disorders will require a clear distinction between epigenetic and transcriptional mechanisms. Our lab uses genomic approaches to investigate the role of lysine acetylation in neuronal gene expression and the consequences of interfering with either KAT or HDAC activity.