BET protein Brd4 activates transcription in neurons and BET inhibitor Jq1 blocks memory in mice

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Brd4 is a member of the bromodomain and extra-terminal domain (BET) protein family, which bind acetylated histones and is critical for the regulator of transcription in many cell types, including transcription in response to external cues. Brd4 is well positioned to regulate transcription in neurons in response to neuronal activation, and expressed in neurons. BET protein inhibitors such as Jq1 are a class of drugs with anticancer, immunosuppressive and now in clinical trials. In this study, the authors tested whether this drug affects the synaptic plasticity and memory function. They reveal that BET inhibitor drug (Jq1) blocked BDNF-induced rapid increase of immediate early genes (IEG) *Arc* and *Fos* and also the transcription of these IEGs, which is also resulting in altering the GluA1 total protein and surface expression. Although Jq1 did not affect the number of spines on *in vitro*, they found that pretreatment of the Jq1 block the memory formation. Also consistent with its effects in the synaptic proteins, Jq1 treatment also decreased seizure susceptibility in mice. Together with this results that Brd4 is necessary for rapid activation of genes, and the inhibition of Brd4 alters the memory formation, and the Jq1 has potential used as epilepsy drugs.