ABSTRACT: Circadian clock is a 24hr rhythmicity that controls behavioral, metabolic events in most of the organisms. It has been reported that around 10% of all transcripts in mice show circadian expression pattern. The circadian clock is regulated by core clock which in most organisms is controlled by a transcription-translation feedback loop (TTFL). Transcriptional activators constitute positive arm of the TTFL and transcriptional repressors constitute the negative arm of the (TTFL). In a ChIPseq analysis in mice liver we found that core clock genes bind strongly to the promoter of a previously uncharacterized gene called Gene Model 129 (Gm129). Gm129 transcript and the protein show a very high amplitude oscillation in mouse liver. Given these core clock gene like characteristics of Gm129, I analyzed its function in the core clock and found that it interacts with BMAL1 and PER2. Additionally, Gm129 binds to BMAL1/DNA complex both in vitro and in vivo. In the reporter gene assay it inhibits CLOCK/BMAL1 induced transcription suggesting that it functions as a repressor. Gm129 knock-out mice show altered circadian transcription of clock genes and this effect is more dramatic when Gm129 mutation was combined with Cry1 mutation. Overall, I have demonstrated that Gm129 is a novel circadian clock repressor and this finding provides more insight on how the circadian clock machinery functions in mammalian organisms.