



ABSTRACTS: VOLUME 3, SPECIAL ISSUE

ABSTRACT

The Interplay of the CRY1 and PER2 Genes in the Modulation of Chronotype

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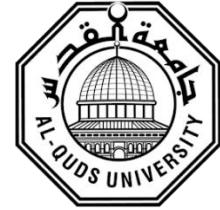
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Published in May 2022

Background: Prior studies investigated the role of the negative feedback loop within the suprachiasmatic nucleus on modulating the circadian rhythm. The regulation of the circadian rhythm is modulated by the synchronization of the endogenous system with the environmental cues including light and temperature. Variations in clock genes between individuals can produce different chronotypes (morningness and eveningness). The cryptochrome gene (CRY1) and period gene (PER2) genes have an inhibitory effect on the negative feedback loop. The c.1657+3A>C CRY1 polymorphism causes a gain of function mutation leading to the lengthening of the chronotype (late chronotype). Meanwhile, PER2 polymorphism (G3853A) has been associated with diurnal performances and the early chronotype.

Objectives: In this study, we investigated the interplay between the two clock genes; CRY1, and PER2 on the modulation of chronotypes.

Methods: We evaluated a sample of 77 healthy undergraduate participants using the Munich chronotype questionnaire (MCTQ) and the Beck depression inventory II (BDI-II). All participants were genotyped for c.1657+3A>C CRY1 polymorphism and G3853A PER2 polymorphism.



Results: Our results show a significantly increased effect of the CRY1 polymorphism on corrected midpoint sleep in free days with C-carriers showing a later chronotype. Furthermore, there was a significant effect of PER2 on corrected midpoint sleep in free days where G- homozygotes exhibited later chronotype than A-carriers. Interestingly, there was no significant effect of genotypes on depression severity, nor a significant correlation between chronotype and depression scores in healthy participants.

Conclusion: This study provides a preliminary understanding of the separate effect of PER2 and CRY1 naturally-occurring genetic variations on chronotype and the severity of depression symptoms in healthy individuals.

Research Keywords: Circadian rhythm, the period 2 gene (PER2), the cryptochrome 1 gene (CRY1), the Munich chronotype questionnaire (MCTQ), the Beck depression inventory II (BDI-II), depression symptoms, chronotypes.