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The association of genetics, sleep and cardiovascular disease

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Background: Cardiovascular disease is the most common cause of death in the United States and has been declared by the Centers for Disease Control and Prevention as a public health issue since 2004. Genetic factors related to sleep and circadian rhythms appear to contribute to CVD risk and disease progression.

Objective: The purpose of this integrative review is to summarize the state of science regarding the association between genetics of cardiovascular disease prevention and circadian rhythms.

Methods: A comprehensive literature search was conducted in consult with a reference librarian. A two-level search strategy was employed. The records of six electronic databases were searched from the past five years (2012) through the present. Searches were conducted with the terms cardiovascular disease, prevention, genetic and circadian rhythm. An integrative review guided by the Public Health Prevention Model was performed to summarize the state of science on circadian rhythms and CVD prevention. The study selection, data extraction and validation were performed independently by one reviewer.

Results: Eight manuscripts were included in the final review. The results of this study showed that clock genes (*BMAL1*, *Per2-13* and *Cry 1-2*) were affected by temporally restricted feeding, which appeared to cause an increase in obesity and a phase-shift in circadian gene expression. Alterations in clock core genetics can contribute to obesity. Clock core genes also play a role in glucose metabolism by affecting the pancreas through secondary effects of increased cell division and replication. Melatonin is an antioxidant under circadian regulation that can help to counter cellular changes contributing to obesity and CVD. Clock genetic makeup contributes to the effectiveness of dietary interventions in metabolic syndrome. Circadian genetics contribute to day and night time blood pressure differences as well as stroke risk from hypertension.

Conclusions: Human sleep/wake cycles, otherwise known as circadian rhythms, appear to have a strong influence on both genetic and environmental components of CVD. Patient populations at higher risk for circadian desynchronization such as nurses, military personnel and other shift workers should be evaluated by clinicians for primary and secondary prevention of accelerated aging and CVD risk.

Biography

Erin Flaherty has completed her Bachelor's and Master's degrees at the Connell School and then served as a Nurse Practitioner for three years in the US. She has returned to BC as a Doctoral student in the Connell School and is a Resident Assistant.

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